VAASAN YLIOPISTO

TIMO ROTHOVIUS – JUSSI NIKKINEN (Eds)

Contributions to Accounting and Finance

Essays in Honour of Professor Paavo Yli-Olli

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PAAVO YLI-OLLI

Alkusanat

Tämä kirja muodostuu neljästätoista artikkelista, joiden kirjoittamiseen on osallistunut yhteensä 25 tutkijaa laskentatoimen, rahoituksen ja liikkeenjohdon tutkimusalueella. Artikkelit on omistettu professori Paavo Yli-Ollille hänen 60-vuotispäivänsä kunniaksi. Paavo Yli-Ollilla on pitkä ja monipuolinen ura tutkijana, opettajana ja erilaisissa luottamustehtävissä yliopistomaailmassa, mukaan lukien pitkä toiminta Vaasan yliopiston laskentatoimen ja rahoituksen laitoksen johtajana. Tämän artikkelikokoelman tarkoitus on kunnioittaa ja onnitella päivänsankaria.

Haluamme tässä yhteydessä kiittää artikkelien kirjoittajia siitä, että he ovat omistaneet tutkimuksensa ystävällemme ja kollegallemme Paavo Yli-Ollille. Haluamme kiittää myös artikkelien arvioitsijoita hyvästä työstä. Parhaat kiitoksemme myös Tarja Salolle kirjan erinomaisesta viimeistelystä.

Vaasa, helmikuu 2007

Timo Rothovius Jussi Nikkinen

Foreword

This volume consists of 14 papers written by 25 authors in accounting, finance and management science. These articles are dedicated to professor Paavo Yli-Olli on the accasion of his 60th birthday. Paavo Yli-Olli has a long and many-sided career as a researcher, teacher and in various administrative duties at the university, such as the head of the department of Accounting and Finance. This collection gives us an opportunity to congratulate him for his work.

We would like to thank the authors for dedicating their papers to our friend and colleague, Paavo Yli-Olli. We would also like to thank two anonymous referees for acting as referees for the collection. Finally, we are grateful to Tarja Salo for her excellent editorial work.

Vaasa, February, 2007

Timo Rothovius Jussi Nikkinen

Paavo Yli-Olli 60 vuotta

Paavo Antero Yli-Olli syntyi Lappajärvellä, 18. päivänä helmikuuta vuonna 1947 maanviljelijäperheeseen. Ylioppilaaksi hän kirjoitti vuonna 1967, jonka jälkeen hän aloitti opintonsa Tampereen yliopistossa. Taloustieteen kandidaatin tutkinnon hän suoritti vuonna 1972 pääaineenaan kansantaloustiede. Tampereelta tie vei Vaasaan, jossa opinnot jatkuivat Vaasan kauppakorkeakoulussa. Paavo valmistui kauppatieteiden lisensiaatiksi vuonna 1976, pääaineenaan yrityksen taloustiede ja laskentatoimi. Kauppatieteiden tohtoriksi Paavo väitteli Vaasassa kesäkuussa 1978 aiheesta suomalaisten teollisuusyritysten rahoitus- ja investointikäyttäytyminen.

Työuransa Paavo aloitti valtiotieteen professori Olavi Keskumäen tutkimusapulaisena Suomen teollisuutta koskevassa palkkarakennetutkimuksessa vuosina 1971–1972, jonka jälkeen hän toimi Tampereen yliopistossa kansantaloustieteen, erityisesti julkistalouden assistenttina vuonna 1972, ja kansainvälisen talouden assistenttina vuonna 1973. Vuonna 1974 Paavo toimi Merkonomien Jatkokoulutuskeskus ry:n rehtorina. Tämän jälkeen hän siirtyi Vaasan kauppakorkeakouluun tutkijaksi, minkä ohella hän toimi myös osa-aikaisena apulaisprofessorina Reijo Ruuhelan virassa. Hän sai nimityksen laskentatoimen yliassistentiksi vuonna 1977, mutta käytännössä hän toimi ensin jonkin aikaa tutkimuslaitoksen johtajana, ja sen jälkeen apulaisprofessin viran viransijaisena ja virkaa tekevänä vuoteen 1981 asti. Tuon vuoden loppuun hän toimi dosenttina, erityisalana yrityksen investoinnit ja rahoitus, ja sen jälkeen vuoden Suomen Akatemian vanhempana tutkijana. Tämän jälkeen hän toimi apulaisprofessorin virassa vuoteen 1989 saakka, lukuun ottamatta vuoden professorivierailua European Insitute for Advanced Studies in Managementissa Brysselissä, Belgiassa. Vuonna 1989 Paavo palasi takaisin Vaasaan ja 1990 hänet nimitettiin Vaasan korkeakoulun, sittemmin Vaasan yliopiston kauppatieteellisen tiedekunnan laskentatoimen professoriksi.

Vuodesta 1992 lähtien Paavo luotsasi menestyksekkäästi laskentatoimen laitosta (myöhemmin laskentatoimen ja rahoituksen laitos) sen johtajana aina vuoteen 2003 saakka. Kaudelle oli ominaista ylläpitää laaja-alaista kansainvälistä tutkimusyhteistyötä ja panostaa julkaisemiseen kansainvälisissä referoiduissa tieteellisissä aikakauskirjoissa. Me

Paavon alaiset ja työtoverit muistamme hänet tuolta ajalta kannustavana ja innostavana esimiehenä ja henkilönä, jonka kanssa oli aina helppo tehdä yhteistyötä.

Laitoksen kannustava ja tutkimusmyönteinen ilmapiiri ilmentyi lukuisina erinomaisina saavutuksina. Vuonna 1995 laskentatoimen laitos valittiin yhdessä menetelmätieteiden laitoksen kanssa tutkimuksen huippuyksiköksi. Tutkimukseen kannustava ilmapiiri on tuottanut myös erinomaisia kansainvälisiä julkaisuja, mistä on hyvänä osoituksena esimerkiksi *Journal of Business Finance and Accounting* -lehdessä (2004, Vol. 31, No. 3–4, sivut 401–437: Chan, Chen & Steiner, "Who is publishing? An analysis of finance research productivity in the European region") julkaistu tutkimus, jonka mukaan Vaasan yliopiston laskentatoimen ja rahoituksen laitos on ollut kymmenenneksi tuottoisin yksikkö koko Euroopassa. Samanlaista tunnustusta on esitetty myös Accounting and Business Research -lehdessä (2006, Vol. 36, No. 1, sivut 3–17: Chan, Chen & Cheng: "A ranking of accounting research output in the European region") julkaistussa tutkimuksessa.

Tieteellisiä julkaisuja Paavon nimiin on pitkän akateemisen uran aikana kertynyt toistasataa, joista yli viisikymmentä on julkaistu kansainvälisissä referoiduissa aikakauskirjoissa. Aihepiiriltään julkaisukenttä on hyvin laaja, keskittyen kuitenkin rahoituksen, rahoitusmarkkinoiden ja tuotantotalouden kysymyksiin. Aiheista voisi mainita esimerkkeinä yrityksen markkina-arvoon ja pääomankustannuksiin, pienten osakemarkkinoiden tehokkuuteen, tunnuslukujen luokitteluun, arbitraasi hinnoittelumallin teoriaan, yritysten osingonjakopolitiikkaan, yritysteorioihin ja malleihin, kustannuslaskennan tuottaman informaation vaikutuksiin päätöksen tekoon sekä suomalaisiin rahoitusmarkkinoihin keskittyvät tutkimukset. Tunnusomaista näille tutkimuksille on laajat yhteydet muihin tutkijoihin, joista voimme mainita esimerkkeinä professori Timo Salmen ja professori Ilkka Virtasen tunnuslukujen luokitteluun ja jakaumiin liittyen, professori Teppo Martikaisen ja professori Geoffrey Boothin rahoitusmarkkinoihin liittyen sekä professori Angappa Gunasekaranin tuotantotalouteen liittyen. 1990-luvun puolessa välissä Paavon mielenkiinto suuntautui voimakkaasti vapautuvaan Itä-Eurooppaan, jolloin hän teki tutkimuksia Venäjän valtionyritysten yksityistämisestä ja yksityistämisen vaikutuksista Suomen ja Venäjän väliseen kauppaan sekä venäläisten teollisuusyritysten asenteista yhteistyöhön suomalaisyritysten kanssa. Oman julkaisemisen lisäksi Paavo on pitkän uransa aikana toiminut myös International Review of Financial Analysis – julkaisun associate editorina vuodesta 1990 lähtien.

Paavon vaikutus rahoituksen tutkimukseen Suomessa on kiistaton. Aloitettiinhan rahoituksen tutkimus ja laajemmassa määrin opetuskin nimenomaan Vaasassa, ja tästä suurin kunnia kuuluu nimenomaan Paavolle, vaikka taustatukea antoivatkin professorit Reijo Ruuhela ja Timo Salmi. Paavo toimi vuosina 1990–93 KOP:n tukeman rahoituksen valtakunnallisen tutkijakoulun tieteellisen valiokunnan puheenjohtajana oltuaan perustamassa sitä. Tämän peruja on nykyinen Graduate School of Finance eli GSF, jonka puitteissa nykyään hoidetaan käytännössä kaikki rahoituksen jatko-opiskelu Suomessa.

Yliopiston ulkopuolella Paavo viettää mielellään aikansa kirjallisuuden ja liikunnan parissa, erityisesti sauvakävely on löytänyt tiensä lempilajien joukkoon. Pitkästä ja ansiokkaasta toiminnastaan Paavolle on myönnetty Suomen Valkoisen Ruusun ritarikunnan 1. luokan ritari -merkki.

Paavo Yli-Olli, 60 years old

Paavo Antero Yli.Olli was born in Lappajärvi on 18 February 1947 into a farming family. He passed the matriculation examination in 1967 and entered the University of Tampere. In 1972 he took a master's degree in economics with national economics as his major subject. From Tampere he continued his career with further studies at the School of Economics and Business Administration, now the University of Vaasa. By 1976 Paavo had completed his licentiate's degree with economics and accountancy as his main interests. In 1978 he defended his doctoral dissertation in Vaasa, the subject being finance and investment behaviour among Finnish industrial companies.

Paavo began his work career as research assistant to Professor Olavi Keskumäki on a research project on wage structures in Finnish industry in the years 1971–1972, after which in 1972 he served at the University of Tampere as academic assistant in economics with special reference to public economics, and in 1973 as academic assistant in international economics. In 1974 Paavo became rector of the *Merkonomien Jatkokoulutuskeskus,* an institution for the further education of commercial college graduates. Next he moved to Vaasa as a researcher at the School of Economics and Business Administration, serving over and above this as a part-time associate professor in the post of Reijo Ruuhela. In 1977 Paavo was appointed senior academic assistant in accounting, but in practice he was briefly director of the research institute, and thereafter an acting associate professor and substitute until 1981. At the end of that year he became adjunct professor with investment and finance as his special field, and then a senior researcher of the Academy of Finland for one year. Next he worked as an associate professor until 1989, except for one year spent in Belgium as visiting professor to the European Institute for Advanced Studies in Management in Brussels. Having returned to Vaasa in 1989, Paavo was appointed Professor of Accounting at what had by then become the Faculty of Business Studies of the University of Vaasa.

From 1992 Paavo successfully steered the Department of Accounting (later the Department of Accounting and Finance) as its Head of Department until 2003. This period was characterised by intensive international research co-operation and investment in publishing in international refereed scientific journals. As Paavo's subordinates and colleagues we recall how supportive and inspiring a superior he was, and always easy to work with.

The supportive atmosphere in the department with its positive attitude to research manifested itself in numerous notable achievements. In 1995 the Department of Accounting was named together with the Department of Mathematics and Statistics as one of the top research units. The atmosphere encouraging research has also resulted in excellent international publications, exemplified in a study published in the *Journal of Business Finance and accounting* (2004, Vol. 31, No. 3–4, pp. 401–437: Chan, Chen & Steiner, "Who is publishing?? An analysis of finance research productivity in the European region"), according to which the department of Accounting and Finance at the University of Vaasa was the tenth most productive unit in the whole of Europe. Similar recognition has also been given in a study published in *Accounting and Business Research* (2006, Vol. 36, No. 1, pp. 3–17: Chan, Chen & Cheng: "A ranking of research output in the European region").

Throughout a long career Paavo's name has appeared on well over a hundred publications, fifty of which in international refereed journals. These publications cover a wide range of subjects, but focus on finance, financial market and production economy issues. Mention could be made of work on the market value of a company, on cost of capital, market efficiency on small markets, classification of financial ratios, the arbitrage pricing theory, dividend policy in companies, theory and models of the firm, effects of cost accounting information on decision-making and Finnish financial markets. These studies are characterised by extensive contacts to other scholars, among whom mention should be made of Professors Timo Salmi and Ilka Virtanen in connection with classification and distribution of financial ratios and Professors Tepo Martikainen and Geoffrey Booth in connection with production economics, and Professor Angappa Gunasekaran in connection with production economics. In the mid 1990s Paavo's interest turned sharply towards the emerging countries of Eastern Europe, when he instigated research on the privatization of state enterprises and the effects of that privatization on trade between Finland and Russia and the attitudes of Russian enterprises to collaborating with Finnish enterprises. In addition to his own publications Paavo also found time during his lengthy career to serve as of 1990 as associate editor of the *International Review of Financial Analysis.*

The impact of Paavo on research on finance in Finland is beyond question. It was specifically in Vaasa that research on finance was introduced, likewise teaching on a wider scale, and it is to Paavo that the credit for this is due, even though Professors Reijo Ruuhela and Timo Salmi provided background support. During the period 1990-90 Paavo as a founding father served as chair of scientific committee of the national graduate school supported by the former KOP bank (an 'ancestor' of today's Nordea Bank). The descendant of that graduate school today is the Graduate School of Finance (GSF) under whose auspices virtually all Finnish postgraduate study in finance is taken care of.

Outside the University Paavo enjoys spending time on literature and exercise, with a special preference for Nordic walking. He has been decorated Knight, First Class of the Order of the White Rose of Finland.

CONTENTS

ACTA WASAENSIA

Earnings smoothing, momentum profits and investor sophistication: Evidence from international markets

G. Geoffrey Booth and Umit G. Gurun

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

Booth, G. Geoffrey and Umit G. Gurun (2007). Earnings smoothing, momentum profits and investor sophistication: Evidence from international markets. In: *Contributions to Accounting and Finance. Essays in Honour of Professor Paavo Yli-Olli.* Acta Wasaensia No. 173, 17–37. Eds Timo Rothovius and Jussi Nikkinen.

We investigate whether the statistical properties of a stock return generating process depends on earnings smoothing and if this dependence, if it exists, is conditioned on investor sophistication (informedness). We address this issue by focusing on a momentum trading strategy. Momentum profits depend on the cross-sectional variation in returns and this variation is affected by earnings smoothing. Our results from 25 countries show that momentum profits, as measured by the probability of statistical arbitrage, decrease as earnings smoothing increases but only in markets where investors are likely to be more sophisticated.

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JEL Classification: G14

Key words: Momentum, asset price comovement, investor sophistication, earnings management

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1. Introduction

According to Beidleman (1973) earnings smoothing occurs when managers intentionally use their reporting discretion to reduce the volatility of their firms' reported earnings. This intertemporal smoothing may be accomplished using both "artificial" and "real" means. Artificial smoothing occurs when managers shift earnings from one period to another using the built-in flexibility typically afforded them by their country's legal and accounting systems while not affecting any period's cash flow. In contrast, real smoothing occurs when the actual cash flows change. Smoothing can be accomplished in many ways, including the propitious scheduling of investments, developing marketing strategies that speed up or slow down sales toward the end of a reporting period, and financing risky accounts receivables. Goel and Thakor (2003) among others point out that both types of smoothing are costly. Real smoothing directly reduces firm value while artificial smoothing affects value through the loss of manager credibility and administrative expenses.

That managers actively engage in this activity is well-documented (e.g. Moses 1987; Bannister and Newman 1996; and Subramanyan 1996, to name but three studies in a long list). Although smoothing an international phenomenon, Leuz, Nanda and Wysocki (2003) report that it is more pronounced in some countries than in others. Many reasons have been offered to explain why managers smooth reported earnings. They include managerial self-interest (e.g. Lambert 1984; Fudenberg and Tirole 1995), signaling firm value (e.g. Dye 1988; Tucker and Zarowin 2006)), bankruptcy concerns (e.g. Trueman and Titman 1988), and tax incentives (e.g. Rozycki 1997). Although these factors undoubtedly provide some explanation, Moses (1987), Goel and Thakor (2003), Tucker and Zarowin (2006), and numerous others suggest that managers smooth earnings to support liquidity trading.

In commenting on liquidity trading, Goel and Thakor (2003) argue that greater earnings volatility gives informed investors a profit advantage over liquidity (uninformed) traders, thereby causing the latter to want managers to smooth earnings. Their argument is supported by Dey (2004), who empirically demonstrates that sophisticated (informed) investors tend to invest less in firms that actively smooth earnings. Wang (2006) documents that the market overreacts to bad news but that it underreacts to good news, most likely because managers tend to smooth earnings by hiding bad news and spreading good news over time. Building on the work of Daniel, Hirshleifer and Subrahmanyam (2001), Jiang (2005a, 2005b) shows that when a large number overconfident (informed) investors overreact to earnings news, the cross-sectional dispersion of firm valuations widens because of mispricing by these investors and this widening, in turn, increases the cross-sectional dispersion of returns. These studies support the notion that earnings smoothing and cross-sectional dispersion of returns are linked and that this linkage depends on the amount of trading by informed investors.

Although earnings smoothing has been widely documented and analyzed, its direct impact on trading strategies has received little attention.[1] As a partial remedy, in this paper we investigate the impact of earnings smoothing on momentum trading strategies and the manner in which this impact depends on the sophistication (informedness) of the market. Momentum strategies involve the buying of prior winners and the selling of prior losers. These strategies have historically provided statistically and economically significant profits in the U.S. (e.g. Jegadeesh and Titman 1993) and other major stock markets (e.g. Rouwenhorst 1998, 1999; Liew and Vassalou 2002; and Griffin, Ji, and Martin 2003). Lo and MacKinlay (1990) and others point out that these profits, by construction, are a function of the cross-sectional variation in returns such that as the cross-sectional variation increases, momentum profits increase. Moreover, although other factors have been found to affect momentum profits, the cross-sectional dispersion of returns is one of the primary drivers.[2]

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[1] A recent exception is Chordia and Shivakumar (2006). They show that earnings momentum and price momentum are related and suggest that price momentum is the result of earnings momentum. Earnings momentum occurs when firms that report unexpected high profits subsequently perform better than those that report unexpected low profits. Myers and Skinner (2004) link earnings smoothing to earnings momentum.

[2] Momentum profits are also associated with several characteristics not typically included in asset pricing models. For example, Chan, Jegadeesh, and Lakonishok (1996) show that return momentum coexists with earnings momentum. Lee and Swaminathan (2000) indicate that momentum is more common in stocks with a high turnover. Hong, Lim, and Stein (2000) show that small firms with low analyst coverage exhibit more momentum. Grinblatt and Moskowitz (2004) report that momentum is more often observed not only for small firms with few institutional owners but also for growth firms and firms with high trading volume. Finally, Hvidkjaer (2006) associates the presence of a large number of small traders with momentum. In contrast, research has been unable to attribute momentum profits to economy-wide factors. For instance, Liew and Vassalou (2002) find that the growth rate of

Based on the link (1) between earnings smoothing and cross-sectional variation in returns and (2) between cross-sectional variation in returns and momentum profits, we hypothesize that an increase in earnings smoothing will decrease momentum profits in sophisticated (informed) markets but will not impact these profits in naïve (uninformed) markets. We investigate this proposition using data from 19 developed markets and six emerging ones, and we find evidence consistent with our hypothesis. Our results from the 25 countries show that momentum profits decrease with earnings smoothing but only when investors are as a group relatively more sophisticated (informed).

The remainder of the paper is organized in four sections. In the following section, we state our model and accompanying hypothesis. Our data and variable definitions are discussed in the third section. In the fourth section, we report the results of our empirical tests and offer concluding remarks in the fifth, and final, section.

2. Model and Hypothesis

In a perfectly efficient market, managers reveal firm-specific information in a timely manner, and investors instantaneously incorporate this information in stock prices. Any distortion of this process affects the informativeness of stock prices and impacts trading strategies. We view these distortions as (1) those that arise from the inability of investors to comprehend the value of firm-specific information and (2) those that result from managers' manipulating the content and timing of the news. In our case, the combined effect of the level investor sophistication (distortion #1) and the amount of earnings smoothing (distortion #2) define the efficiency of information flow from companies to investors, and, therefore, not only determines a market's information (intelligence) environment but also impacts the cross-sectional variation in expected returns and, by extension, the profitability of momentum strategies.

GDP cannot capture momentum strategy profitability, and Griffen, Ji and Martin (2003) demonstrate that differences in macroeconomic risk cannot explain the variability of this profitability among countries.

Our empirical hypothesis rests on the notion that markets that are populated by a large number of sophisticated investors are characterized by low levels of earnings smoothing by managers. The presence of these investors means that these markets exhibit high cross-sectional variability in stock returns as these investors tend to overreact to earnings news. Because this variability in returns and momentum profits are positively related, we expect that earnings smoothing and momentum profits are inversely related.

We test this prediction using the following basic probit regression model:

$$P(MOM > 0) = \beta_0 + \beta_1 Smooth + \beta_2 DInvSoph + \beta_3 SmoothxDInvSoph + e, \qquad (1)$$

where *MOM* is a binary variable that indicates the presence of momentum, *DInvSoph* is a binary variable which takes value of one if our proxy for investor sophistication is greater than the sample average and zero otherwise, *Smooth* is an earnings smoothing proxy, in which higher values represent lower earnings smoothing, and *e* is the conventional error term. If our conjecture is valid, momentum profits should decrease with earnings smoothing in sophisticated markets for all levels of earnings smoothing. Thus, our null hypothesis is $\beta_3 \leq 0$.

3. Data and Definitions

We use various data sources to test our conjecture regarding the relationship between momentum profits, earnings smoothing, and sophisticated (informed) investors. We also use several variables to control for the possibility that the relationship among our primary variables may be driven by one or more common factors. In this section, we define our measures and data sources.

3.1 Momentum Profits

To calculate returns to momentum we use monthly stock return data from the U.S. and 24 other countries. Our data cover most of the developed markets including the U.S., U.K., Canada, France, Germany and Japan as well as several emerging markets. We exclude some countries (such as Egypt, Argentina, Brazil, Peru, China, Taiwan, and Thailand) because there are not enough data to calculate momentum profits. We eliminate others because they have neither the requisite earnings smoothing measure nor investor sophistication measures.

Table 1 displays the sample starting dates for each country and the number of firms at the beginning of 1982 (or the first available month for countries when they are included in the sample), respectively. In terms of size, the sample varies widely with the largest country in terms of GDP being the U.S. and the smallest being the Philippines. The sample starting date for the countries varies and ranges from 1965 for the U.S. to 1990 for India and the Philippines. The ending date is 2000 for the U.S. and 2003 for the other 24 countries.

Our U.S. sample includes the common shares of all NYSE, AMEX and Nasdaq firms listed in the CRSP data base between January 1965 and December 2000. We exclude ADRs, SBIs, certificates, REITs, closed-end funds, companies incorporated outside the U.S., and Americus Trust Components to maintain consistency with other momentum studies. In addition, to lessen possible microstructure effects, we eliminate stocks with a price of less than USD 5.

For non-U.S. data, we follow Griffin, Ji, and Martin (2003) and select the countries from TSF Datastream International that have at least 50 regularly traded stocks after January 1982. We remove real estate trusts and investment companies from our international sample and improve reliability by following Ince and Porter's (2004) data cleaning procedures. We also exclude monthly returns above 500% and less than -99% because such observations are unlikely unless there is a recording error. Our results, however, are not sensitive to this filtering procedure. For all countries, we obtain the monthly risk-free rate from Global Finance Database (www.globalfindata.com).

Table 1. Sample start dates and number of companies used in returns from momentum calculations and two market characteristics

This table provides the beginning and ending dates and the number of stocks for the first portfolio available at the beginning of the sample for each country in our sample. The U.S. stock data are from CRSP and non-U.S. stock data are from TSF Datastream International. The table also displays the GDP for 2001 in 1995 USD and whether the country is currently classified as being a developed or emerging economy. We obtain the GDP figures from UNESCO and the country's development status from *The Economist*.

Country	Sample Dates	Number of Companies	GDP	Development Status
Australia	11/15/1982 – 11/15/2003	164	468	Developed
Belgium	11/15/1982– 11/15/2003	70	319	Developed
Canada	11/15/1982– 11/15/2003	485	717	Developed
Denmark	11/15/1982– 11/15/2003	50	209	Developed
Finland	5/15/1988– 11/15/2003	69	165	Developed
France	11/15/1982– 11/15/2003	157	1810	Developed
Germany	11/15/1982– 11/15/2003	201	2703	Developed
Greece	2/15/1988– 11/15/2003	74	145	Developed
Hong Kong	11/15/1982– 11/15/2003	73	169	Emerging
India	2/15/1990– 11/15/2003	423	495	Emerging
Ireland	6/15/1987– 11/15/2003	51	112	Developed
Italy	11/15/1982– 11/15/2003	84	1230	Developed
Japan	11/15/1982– 11/15/2003	886	5707	Developed
Korea (South)	8/15/1984– 11/15/2003	291	640	Emerging
Malaysia	2/15/1986– 11/15/2003	175	112	Emerging
Netherlands	11/15/1982– 11/15/2003	199	504	Developed
Norway	11/15/1982– 11/15/2003	66	180	Developed
Philippines	1/15/1990– 11/15/2003	81	93	Emerging
Portugal	2/15/1988– 11/15/2003	64	132	Developed
South Africa	11/15/1982– 11/15/2003	61	177	Emerging
Spain	4/15/1987– 11/15/2003	67	724	Developed
Sweden	11/15/1982– 11/15/2003	93	295	Developed
Switzerland	11/15/1982– 11/15/2003	167	339	Developed
U.K.	11/15/1982– 11/15/2003	2161	1337	Developed
U.S.	1/1/1965– 12/31/2000	2119	8978	Developed

To calculate momentum profits, we follow a two-step approach. First, we employ the quantile strategy used by Jegadeesh and Titman (1993), although our subsequent results hold for other momentum strategies. Any momentum strategy consists of a ranking period in which winners and losers are identified, and an investment period in which winners are held and losers are shorted. To be compatible with numerous momentum studies, we use 6-month ranking and investment periods and create portfolios with equal weights. We follow this investment rule every month. Except for the U.S., we classify as winners those stocks in the top performance quintile and losers as those stocks in the bottom quintile during the ranking period. We classify by quintile because some countries do not have enough stocks to allow us to use the more common top and bottom decile classification. For the U.S., however, we classify winners and losers by using the top and bottom performance deciles, respectively, although using the top and bottom quintiles does not materially alter the results. To avoid possible transition distortions, we skip one month between the ranking and investment periods. Thus, for each month *t*, the portfolio (winner minus loser (WML)) held during the investment period months *t* to *t*+5 is determined by the performance of stocks during the ranking period, i.e., months *t*-7 to *t*-2. We denote such a strategy by "6/1/6", where the first (second) "6" is the number of months in the ranking (investment) period and "1" represents the one-month transition period between the ranking and investment periods.

Second, we use the statistical arbitrage methods offered by Hogan et al. (2004), which we briefly outline in the appendix, to decompose momentum profits into momentum profit per month (μ) and the growth rate of volatility of momentum profits or exploitability risk (λ), and then categorize the countries into two groups (those where statistical arbitrage is present and those where it is not) using these two measures. The idea underpinning this decomposition is similar to that of the intercept test of classical asset pricing models, except the decomposition of the intercept term (winner minus loser profits in our case) allows us to study its time series behavior. In this framework, momentum profit per month (μ) represents the risk-free profit, provided that the volatility of the trading strategy quickly declines towards zero. The decline is governed by the second parameter (λ). For statistical arbitrage opportunities to be present, momentum profits per month should positive ($\mu > 0$) and the growth rate of volatility should be negative ($\lambda < 0$). A less negative volatility growth rate means that the momentum portfolio's profit is less likely to be wiped out by fluctuations in the long and short parts of the portfolio.

We summarize the results of the 6/1/6 momentum strategy statistical arbitrage tests for our 25 countries in Table 2. A review of this table shows that 22 λ estimates are negative and that 16 μ estimates are positive. Statistical arbitrage (both parameter estimates are of the proper sign) is found in 13 countries. Using the joint test suggested by Hogan et al. (2004), statistical arbitrage, however, is only statistically significant for seven countries at about the 10% level, with six being developed markets (U.S., U.K., Denmark, Finland, Italy, and Spain) and one being an emerging market (India). Nevertheless, Hogan et al. (2004) indicate that their test is biased toward accepting the null hypothesis of no statistical arbitrage if the price process contains such features as autocorrelation, jumps or nonstationarities of any kind. Because these features are often found in stock price processes, we believe that the number of instances of statistical arbitrage that we identify is greater than that indicated by their joint test. Nevertheless, for our measure of returns to momentum strategies (*MOM*), we use a binary variable that equals one if the significant statistical arbitrage possibilities are present in a market or zero otherwise.

Table 2. Statistical arbitrage tests for the 6/1/6 momentum strategy

This table summarizes the statistical arbitrage parameter estimates of the 6/1/6 momentum strategy as described in the Appendix. The sample periods are reported in Table 1. Statistical arbitrage profits are calculated for a 6-month ranking period and a 6-month investment period. Every month, stocks are sorted based on past six months of returns into decile portfolios. The portfolio 6/1/6 longs the top quintile and shorts the bottom quintile (except the U.S. where we used top and bottom deciles instead of quintiles) and holds that spread for six months. The risk-free asset is used to finance the portfolio. We use p-values p_μ and p_λ to test if the portfolio's mean monthly incremental profit is positive and whether its time-averaged variance declines over time, respectively. The sum of p_μ and p_λ is the p-value for Hogan et al.'s (2004) statistical arbitrage test, and it may exceed one because of the Bonferonni inequality.

Country	μ	p_μ	λ	p_λ	$p_\mu + p_\lambda$	No. of observations
Australia	-0.048	0.816	-0.643	0.000	0.816	238
Belgium	0.532	0.000	0.299	1.000	1.000	239
Canada	-0.022	0.605	-0.197	0.001	0.606	237
Denmark	0.113	0.003	-0.560	0.000	0.003	239
Finland	0.408	0.000	-0.170	0.026	0.026	173
France	0.020	0.362	-0.518	0.000	0.362	239
Germany	0.396	0.000	-0.026	0.283	0.283	239
Greece	-0.126	0.833	-0.550	0.000	0.833	175
Hong Kong	0.019	0.443	-0.191	0.000	0.443	239
India	0.199	0.053	-0.401	0.000	0.053	152
Ireland	0.134	0.199	-0.232	0.000	0.199	184
Italy	0.145	0.011	-0.384	0.000	0.011	239
Japan	-0.106	0.851	-0.056	0.115	0.966	239
Korea (South)	-0.089	0.783	-0.320	0.000	0.783	218
Malaysia	0.013	0.462	-0.163	0.004	0.467	200
Netherlands	0.336	0.077	0.054	0.818	0.895	239
Norway	-0.264	0.987	-1.000	0.000	0.987	239
Philippines	-0.321	0.927	-0.226	0.001	0.928	153
Portugal	-0.076	0.767	-0.079	0.061	0.828	176
South Africa	-0.095	0.981	-0.828	0.000	0.981	239
Spain	0.145	0.108	-0.172	0.002	0.110	186
Sweden	0.083	0.116	-0.066	0.096	0.212	239
Switzerland	0.359	0.000	0.079	0.930	0.930	239
U.K.	0.159	0.001	-0.280	0.000	0.001	237
U.S.	0.424	0.000	-0.125	0.000	0.000	421
Mean	0.009		-0.270			
Std. Dev.	0.222		0.299			

3.2 Earnings Smoothing

We obtain two earnings smoothing measures from Leuz, Nanda and Wysocki (2003), who calculate them using financial accounting data from 1990 to 2000 provided by the WorldScope Database. Each measure involves operating income (*OpInc*), cash flow from operations (*CFO*) and accruals (*Acc*).[3] Because direct information on firms' cash flows is not obtainable for many countries, *CFO* is computed indirectly by subtracting the accrual component from earnings (*CFO* = *OpInc* – *Acc*). Prior to calculating the smoothing measures, *OpInc*, *CFO* and *Acc* are scaled by total assets lagged one period to account for firm size differences. The first earnings smoothing measure, *ES1*, is each country's annual median ratio of the firm-level standard deviation of *OpInc* to the firm-level standard deviation of *CFO*. The denominator of this ratio accounts for any differences in the variability of the economic performance among firms. Lower values of *ES1* indicate more income smoothing. The second measure, *ES2,* is the contemporaneous correlation between the change in *Acc* and the change in *CFO* is based on the statistic. This measure assumes that reported income is smoothed by the variation in accruals offsetting the variation in cash flow from operations so that accounting accruals buffer cash flow shocks. This results in a negative correlation between changes in accruals and operating cash flows, with more income smoothing being evinced by lower (more negative) correlation values.

We provide the country values for *ES1* and *ES2* in Table 3. *ES1* ranges from 0.399 for South Korea to 0.765 for the U.S., with a mean of 0.558. The most negative *ES2* value is -0.928 for Greece and the least negative is -0.722 for Norway. The mean of *ES2* is -0.840. As we report in Table 3, the two earnings smoothing measures are highly correlated (0.85).

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[3] Following Dechow, Sloan and Sweeney (1995), *Acc* is defined for firm *i* in year *t* as the change in total current assets, less the change in cash/cash equivalents, less the change in total current liabilities, plus the change in short term debt included in current liabilities, plus the change in income taxes payable, and less the change in depreciation and amortization expense. The change in short-term debt is excluded because it relates to financing transactions as opposed to operating activities.

Table 3. Variables

This table summarizes the explanatory data we use in the empirical tests. *ES1* and *ES2* are the earnings smoothing measures. *InvSoph* represents the investor sophistication level proxied by educational enrollment. *RSq* is the asset price comovement. *Sv_g* is the ratio of stock market capitalization to GDP. *St_g* is the stock market total value traded to GDP. *Sto* is the stock market turnover ratio. *Herf* measures industry concentration using market capitalization. *Covar* is the first-order autocovariance of market returns.

Country	*ES1*	*ES2*	*InvSoph*	*RSq*	*Sv_g*	*St_g*	*Sto*	*Herf*	*Covar*
Australia	0.625	-0.790	63	0.064	0.867	0.653	0.753	0.250	1.36
Belgium	0.526	-0.831	60	0.146	0.649	0.179	0.276	0.190	19.42
Canada	0.649	-0.759	58	0.062	0.950	0.665	0.699	0.150	5.22
Denmark	0.559	-0.875	63	0.075	0.537	0.437	0.814	0.230	53.75
Finland	0.555	-0.818	86	0.142	1.716	1.482	0.863	0.180	6.29
France	0.561	-0.845	54	0.075	0.857	0.823	0.960	0.130	18.33
Germany	0.510	-0.867	48	0.114	0.543	0.769	1.416	0.190	17.37
Greece	0.415	-0.928	68	0.192	0.721	0.319	0.442	0.340	2.75
Hong Kong	0.451	-0.850	26	0.150	2.986	1.213	0.406	0.290	357.10
India	0.523	-0.867	11	0.189	0.208	0.510	2.450	0.290	0.08
Ireland	0.607	-0.788	50	0.058	0.651	0.218	0.335	0.270	0.78
Italy	0.488	-0.912	53	0.183	0.510	0.507	0.995	0.330	0.91
Japan	0.560	-0.905	49	0.234	0.559	0.441	0.788	0.140	42.58
Korea (South)	0.399	-0.922	82	0.172	0.425	1.645	3.867	0.180	0.16
Malaysia	0.569	-0.857	27	0.429	1.320	0.236	0.179	0.140	0.99
Netherlands	0.491	-0.861	57	0.103	1.238	2.719	2.197	0.230	32.79
Norway	0.713	-0.722	74	0.119	0.345	0.315	0.913	0.280	8.32
Philippines	0.722	-0.804	31	0.164	0.506	0.044	0.087	0.270	3.94
Portugal	0.402	-0.911	53	0.068	0.417	0.248	0.595	0.300	0.11
South Africa	0.643	-0.840	15	0.197	1.313	0.614	0.468	0.470	0.19
Spain	0.539	-0.865	59	0.192	0.715	1.441	2.016	0.220	1.10
Sweden	0.621	-0.764	76	0.142	1.145	1.437	1.256	0.270	178.10
Switzerland	0.473	-0.873	44	0.142	2.277	1.218	0.535	0.340	76.95
U.K.	0.574	-0.807	64	0.062	1.441	1.314	0.912	0.150	11.52
U.S.	0.765	-0.740	71	0.021	1.229	2.885	2.348	0.150	15.75
Mean	0.558	-0.840	53.7	0.140	0.965	0.893	1.063	0.239	34.23
Std. Dev.	0.097	0.057	19.5	0.082	0.641	0.745	0.885	0.082	77.25
Correlation									
ES1	1.00								
ES2	0.85	1.00							
InvSoph	0.01	0.20	1.00						
RSq	-0.20	-0.40	-0.41	1.00					
Sv_g	-0.09	0.11	-0.15	0.04	1.00				
St_g	0.03	0.16	0.36	-0.29	0.40	1.00			
Sto	-0.17	-0.14	0.29	-0.11	-0.24	0.62	1.00		
Herf	-0.14	-0.17	-0.39	0.06	0.09	-0.25	-0.23	1.00	
Covar	-0.17	0.05	-0.15	-0.01	0.69	0.19	-0.14	0.13	1.00

3.3 Investor Sophistication

The notion of investor sophistication or informedness is conceptually simple but empirically complex. How does one know that an investor recognizes an information event or understands the ramifications of that event? In the case of earnings smoothing, the answer to this question is confounded by the difficulty of determining whether sophisticated investors demand less earnings smoothing by managers or managers smooth less to attract sophisticated investors. To mitigate this potential endogeneity problem, we use the country's educational enrollment rate, *InvSoph*, to proxy potential investor informedness.[4] This rate is the total enrollment in tertiary education regardless of age, expressed as a percentage of the population in the five-year age group immediately after the secondary-school leaving age as of 2003.[5] Our source is the UNESCO Institute for Statistics (http://www.uis.unesco.org) and individual country values are presented in Table 3. The values range from 15% for South Africa to 86% for Finland. The mean of *InvSoph* is 53.7%. As mentioned earlier, we convert *InvSoph* to a binary variable *DInvSoph*, where *DInvSoph* equals one if *InvSoph* is above its mean and zero otherwise. In either form, our proxy relies on the assumption that a more educated population tends to be more informed than a less educated one.

3.4 Control Variables

The success of trading strategies may be influenced by a number of market related factors. For instance, in a series of papers LaPorta et al. (1997, 1998, 2000) argue that the financial behavior by firms and markets are strongly influenced by the legal system in which they operate. Many other researchers have contributed to this literature as well. Particularly relevant for our study is Allen and Gale's (1994) observation that opaque security rules and regulations may be a barrier to arbitrage and their suggestion that the way in which firms provide information is closely related to investor protection. Moreover, from an empirical perspective, Morck, Yeung and Yu (2000) report that asset prices tend to move together in countries where investor protection is low, a

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[4] A typical approach is to use institutional ownership to proxy informedness (e.g., Hand, 1990; Walther, 1997; El-Gazzer, 1998; and Bartov, Radhakrishnan, and Krinsky, 2000). We do not use this approach for two reasons. First, institutional ownership data are a noisy measure of investor sophistication as many institutions tend to be passive (index) investors. Second, there is little reliable international data on institutional ownership.

[5] We also use school-life expectancy and educational expense per capita. The empirical results using these measures instead of the educational enrollment rate are qualitatively the same and thus are not reported.

finding confirmed and extended to opaqueness by Jin and Myers (2006). This comovement suggests that asset prices in low investor protection countries may not be as informative as they are in high investor protection counties. Moreover, to maintain a viable market, trading volume must be large enough to ensure sufficient market depth and liquidity to avoid excessive price volatility. In this regard, Lesmond, Schill and Zhou (2004) point out that indirect and direct transaction costs also may affect the profitability of trading strategies, and Elewarapu and Venkataraman (2006) report that trading costs are negatively related to judicial efficiency and political stability. Finally, some markets are dominated by few industries, potentially causing industry-related shocks to make asset prices move together more frequently than would be the case in lesser concentrated markets.

To hold these and other market-wide effects constant, we use the following control variables, the values of which are given in Table 3, along with their correlations with each other and their correlations with *ES1* and *ES2*: (1) asset price comovement (*RSq)*, (2) the ratio of stock market capitalization to GDP (*Sv_g*), (3) the ratio of stock market total value traded to GDP (*St_g*), (4) the stock market turnover ratio (*Sto*), (5) the industry concentration (*Herf*) as measured by a market capitalization index constructed using the Herfindahl method and (6) the autocovariance of market returns (*Covar*).[6] The potential importance of including *RSq* is highlighted by noting that Morck, Yeung and Yu (2000) show that average of market model R^2s also reflects the other market characteristics mentioned above and is highly correlated with other measures of comovement.

[6] *Herf* is the mean weekly concentration and is obtained from Xing (2004). We calculate *Sv_g*, *St_g*, and *Sto* using 2001 values obtained from the World Bank's Financial Structure and Economic Development Database (http://www.worldbank.org/research/projects/finstructure/database.htm). We gather the R^2 values from Morck, Yeung and Yu (2000), who calculate them using a market model that regresses a firm's returns on the corresponding market returns for that country and U.S. returns adjusted for exchange rate changes. They include U.S. returns because most economies are partially open to foreign capital. For markets in the Far East, U.S. market returns are lagged by one day to account for time zone differences, and the exchange rate adjusted U.S. returns variable is eliminated in the U.S. regression.

4. Results of Hypothesis Tests

We report the results of our probit estimates for equation (1) for the 6/1/6 strategy in Table 4. Panel A provides the estimates associated with *ES1* while Panel B displays those of *ES2*. Both panels contain the regression results with and without the five control variables. We use a one-tailed t-test to test the null hypotheses that momentum profits in less sophisticated markets should not be lower than those in sophisticated markets for all levels of earnings smoothing. This relationship is modeled by the earnings smoothing and investor sophistication interaction term. All of the other p-values reflect a two-tailed t-test.

According to the t-tests, in neither case do the p-values of any of the control variables indicate that these variables provide explanation at conventional levels of statistical significance. Nevertheless, we focus on the regressions containing the control variables because these variables increase the overall explanatory power of these regressions, suggesting that the statistical insignificance of their respective parameters may be the result of mild multicollinearity. Moreover, the magnitude, and thus economic significance, of the smoothing and investor sophistication parameters is similar whether or not the control variables are included. As we did before, we are generous in the size of the Type II error probability that we allow. This is because our regressions have only 16 degrees of freedom.[7]

As shown in Table 4, the coefficient of the interaction term, β_3, is positive and statistically significant at least at the 10% critical level regardless of whether *ES1* or *ES2* is used as our measure of earnings smoothing, thereby signaling the rejection of the null hypothesis. Economically, this means the following. First, in sophisticated (informed) markets an increase in earnings smoothing is associated with a decrease in the probability of statistical arbitrage. Second, if markets are not sophisticated (uniformed)

[7] This strategy for extremely small sample sizes is opposite to the one often employed to account for the possibility of a very small Type II error in extremely large sample sizes. The latter requires that the critical t-statistic be larger than the conventional value to account for the Lindley Paradox. In our case, we believe that the critical t-statistic value should be smaller than conventionally used. This belief recognizes not only that our proxies for earnings smoothing and investor sophistication are noisy measures but also that Aristotle's assertion that the degree of required precision should be determined by the problem under consideration. Nevertheless, instead of t-statistics we report p-values to permit the reader to make her own assessment as to the statistical significance of our findings.

Table 4. Probit model: Momentum profits and investor sophistication

This table summarizes the results of the estimating equation (1) with and without the control variables:

$$P(MOM_{6/1/6} > 0) = \beta_0 + \beta_1 Smooth + \beta_2 DInvSoph + \beta_3 SmoothxDInvSoph + \sum_{i=4}^{9} \beta_i Control_i + e \cdot \qquad (1)$$

P(MOM$_{6/1/6}$>0) is a binary variable that takes a value of one if there is statistical arbitrage in the momentum profits with 6-month ranking and investment periods and zero otherwise. *Smooth* denotes either *ES1* or *ES2*, our smoothing proxy variables. *DInvSoph* is a binary variable which takes value of one if investor sophistication proxy is greater than the sample average and zero otherwise. The control variables are defined in Table 3. Panel A (B) reports the results based on *Smooth* being *ES1* (*ES2*). Robust p-values are provided below the estimated values, and the R^2s show the goodness of fit of the regressions. The p-values for the β_i's save for β_3 are for a two-tailed hypothesis test while the p-values for β_3 are for a one-tailed hypothesis test.

Panel A. Earnings smoothing (*Smooth*) measured by *ES1*

				Control variables						
Constant	*Smooth*	*DInvSoph*	*Smooth x DInvSoph*	*RSq*	*Sv_g*	*St_g*	*Sto*	*Herf*	*Covar*	
β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	R^2
1.128	-4.406	-4.223	8.232							0.07
(0.549)	(0.250)	(0.128)	(0.008)							
1.173	-4.447	-5.172	9.375	-2.169	0.600	-0.180	0.534	-0.263	-0.008	0.31
(0.672)	(0.362)	(0.151)	(0.070)	(0.577)	(0.559)	(0.830)	(0.432)	(0.934)	(0.269)	

Panel B. Earnings smoothing (*Smooth*) measured by *ES2*

				Control Variables						
Constant	*Smooth*	*DInvSoph*	*Smooth x DInvSoph*	*RSq*	*Sv_g*	*St_g*	*Sto*	*Herf*	*Covar*	
β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	R^2
-16.971	-18.988	18.397	21.549							0.08
(0.145)	(0.128)	(0.166)	(0.133)							
-18.899	-20.570	20.153	23.330	-5.121	0.806	-0.297	0.582	-0.118	-0.007	0.68
(0.190)	(0.195)	(0.186)	(0.095)	(0.344)	(0.432)	(0.717)	(0.390)	(0.971)	(0.326)	

the degree of earnings smoothing has no effect this probability. Finally, in markets that exhibit high or low levels earnings smoothing, an increase in market sophistication is associated with a decrease in the probability of statistical arbitrage, although the impact is larger for markets with higher levels of smoothing. Does this mean that earnings smoothing investor sophistication are economic substitutes for each other? Possibly, but we do not think so. This is because, although it is plausible that the educational level of a country might influence the desire and attempts of managers to smooth earnings, it seems farfetched that a country's educational level would be determined by the managers' collective ability or inclination to engage in this activity.

5. Concluding Remarks

We present evidence that interaction of investor sophistication and earnings smoothing influences momentum profits. Following Goel and Thakor (2003) and others, we conjecture that liquidity investors want managers to smooth earnings as much as possible to minimize potential future losses from trading with informed investors. Informed investors, however, desire the reverse. Thus, markets that contain a relatively large number of informed investors also exhibit a limited level of earnings smoothing. The presence of these investors also means that the cross-sectional variance of returns will be relatively higher and, hence, momentum profits should be more pronounced. Our results based on data from 25 countries that show that earnings smoothing and momentum profits are negatively related confirm this prediction.

We believe our results are provocative for two reasons. First, our results suggest that the price of earnings smoothing depends on investor sophistication. Under the classical asset pricing framework, the price of earnings smoothing is zero because investors are assumed to be sophisticated and able to diversify the idiosyncratic risk associated with earnings smoothing. In naïve markets, this may not be the case, thereby creating variation in expected returns. This means that the value-relevance of accounting numbers (smoothed earnings in our case) should not only be judged on their explanatory power on expected return (or price) but also on their impact on the cross-sectional variation when this variation cannot be diversified.

Second, the analysis of momentum profits using market-specific factors sheds light on the relationship between earnings smoothing and investor sophistication. The answer to why managers smooth earnings is beyond the scope of this study but we do provide some clues for future research. If earnings smoothing is undertaken for opportunistic reasons, i.e., managers hide their worse performances by shifting income from prior periods, the incidence of earnings smoothing should be higher when managers are less likely to be punished for such actions as is the likely case in naïve markets. If, however, earnings smoothing is done to aid naïve investors by reducing volatility, earnings smoothing should be demanded more in naïve markets. In either case, earnings smoothing is negatively related to investor sophistication and our results are consistent with both of these alternatives.

Appendix

In this appendix, we summarize the methodology developed in Hogan et al. (2004) that tests the existence of statistical arbitrage for a particular zero investment trading strategy. Let $v(t_1)$, $v(t_2)$, . . . , $v(t_n)$ denote a time series of discounted cumulative trading profits that are generated by the strategy. Then let $\Delta v_i = v(t_i) - v(t_{i-1})$ represent its increments at equidistant time points $t_i - t_{i1} = \Delta$ with $t_i = i\Delta$ so that these incremental trading profits satisfy $\Delta v_i = \mu i^{\theta} + \sigma i^{\lambda} z_i$ for $i = 1,2,\ldots,n$ where z_i are i.i.d. N(0,1) random variables.

In this case discounted cumulative trading profits generated are

$$v(t_n) = \sum_{i=1}^{n} \Delta v_i \approx N(\mu \sum_{i=1}^{n} i^{\theta}, \sigma^2 \sum_{i=1}^{n} i^{2\lambda}),$$

and the log likelihood function for the increments is

$$LogL(\mu, \sigma^2, \lambda, \theta | \Delta v) = -\frac{1}{2} \sum_{i=1}^{n} log(\sigma^2 i^{2\lambda}) - \frac{1}{2\sigma^2} \sum_{i=1}^{n} \frac{1}{i^{2\lambda}} (\Delta v_i - \mu i^{\theta})^2 .$$

Maximum likelihood estimation is used to determine the values of μ (momentum profits per period), θ (growth rate in momentum profits), σ^2 (volatility), and λ (growth rate in volatility). Similar to Hogan et al. (2004), we use unconditional mean estimates, i.e., $\theta = 0$. A trading strategy generates statistical arbitrage if $\mu > 0$, $\lambda < 0$, and $\theta > \max(\lambda - 0.5, -1)$.

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Theta neutral gamma hedging

Kenneth Högholm and Kim Sundkvist

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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In this paper we discuss and test a strategy of trading volatility in a stock and an index. From a practical standpoint gamma positions are taken in options to gain exposure to realized volatility. We start by testing a static strategy of being long gamma in a stock and short gamma in the index. The daily profit and loss is computed as the difference in volatility points between the stock and the index. We then try to improve the results by using the relationship between the actual volatility in the index and stocks to signal when to be long gamma[1] in the index and short gamma in the stock and vice versa. However, we conclude that a static strategy of continuously being long gamma in the stocks and short gamma in the index is better than a dynamic strategy.

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1 Introduction

The Black-Scholes option pricing formula (Black and Scholes 1973, Merton 1973) expresses the value of a European call option on a stock in terms of six parameters: the price of the underlying stock, the maturity of the option, the strike price, the risk free interest rate, the dividend rate and the volatility of the underlying stock. Of the six parameters in the Black-Scholes formula, all but the volatility are, in principle, directly observable in the financial markets. However, the volatility parameter can be estimated using historical data or, as is more common, by numerically inverting the Black-Scholes

[1] Being long gamma is the same as being long volatility, and, hence, having a long position in options.

formula to obtain the level of the volatility, the implied volatility that is consistent with observed market prices of European options. Historical volatility is easy to estimate but does not necessarily give a fair prediction of future volatility since volatility in financial assets is time dependent. The implied volatility estimate can be interpreted as the market's estimate of the constant volatility parameter for the life of the option.

There are a number of different trading strategies involving options and the volatility associated with the underlying asset. One way to trade volatility is to assume that other market participants will revise their view of future volatility. Another way to trade volatility is to have a position in implied volatility and hedge the realized volatility, i.e., hedge when the value of the underlying changes. The common feature of volatility trading strategies is the assumption that the implied volatility is not a correct estimate of future volatility. This is an adequate assumption since there are a number of studies comparing implied volatility with subsequent actual volatility, reporting that implied volatilities alone do not capture all available information. E.g., Lamoureux and Lastrapes (1993) found that implied volatility is inefficient at subsuming all available information when pricing volatility, and, hence, forecasts of volatility can be improved by adding other variables to the information set.

The volatility in a single stock is in most cases higher than in an index. This is evident both for implied and historical volatility. This is reasonable since an index has only a systematic risk component, while the stock has both a non-systematic and a systematic risk component that contributes to the higher volatility. An asset's volatility (and implied volatility) can occasionally deviate from a long-term average, but volatility is believed to be mean reverting. Given that volatility is mean reverting in both stocks and the index, the relationship between volatility in a stock and the index should also be mean reverting.

The purpose of this paper is to empirically evaluate a trading strategy based upon the relationship between volatility in a single stock and in an index. We test two alternative strategies, a naive (static) strategy and a more dynamic strategy. The static strategy builds upon the assumption that a single stock has a higher volatility than an index. The dynamic strategy assumes a mean reverting volatility for both the stocks and the index, and a mean reversion for the volatility relationship between the stocks and the index.

The results from testing the strategies for a number of stocks listed on the German stock exchange indicate that the naive strategy may yield positive results, and that the strategy seems to work better in high volatility periods. The naive strategy also outperforms the dynamic strategy for all stocks.

The following section of the paper outlines a static and a dynamic strategy for trading volatility in stocks and an index. The data is discussed in section three. The results from the two strategies are presented in section four. Finally, a summary is given in section five.

2 Trading implied and realized volatility

When taking a position in an option contract you expose yourself to a number of risks, e.g., the risk of changes in the value of the underlying asset (the realized volatility), the risk of a change in the expected volatility and the risk of changes in the interest rate. Using partial derivatives of the Black-Scholes option pricing formula we can isolate these risk factors. In this study we are particularly interested in three specific risk factors, namely *delta* (the first derivative of the option price with respect to the underlying asset), *gamma* (the first derivative of delta), and *theta* (the first derivative of the option price with respect to time). See Appendix A for a brief presentation of the partial derivatives.

The core concept in the trading strategies to be tested is to expose ourselves to realized volatility in two different underlying assets, but to stay both delta and theta neutral. By taking a long (short) position in options we are exposed positively (negatively) to realized volatility in the underlying asset. As gamma is the measure of how much delta will change after a small change in the underlying, a long (short) position will get both a positive (negative) gamma as well as a positive (negative) delta. Hence, in order to stay delta neutral we sell (buy) the underlying at a higher price if the price of the underlying asset increases. If, on the other hand, the price of the underlying asset decreases we buy (sell) the underlying asset at a lower price. Or, in other words, we can make a profit on the movements in the underlying asset if having a long option position, and we make a loss on the movements if having a short option position.

In building a strategy exposing yourself to realized volatility, but staying both delta and theta neutral, you need a combination of two (or more) underlying assets. That is, you will take a long position in options in one underlying asset, and a corresponding short position in another underlying asset. Since you gain on movements in the long position, you want to stay long in the underlying asset with higher realized volatility, and, hence, you will short options in the asset with lower realized volatility. That is, you will be hedging more often the asset in which you are long gamma and receiving a net profit before transaction costs. The asset in which you are short gamma produces a loss at every hedge, but these losses are assumed to be less frequent than the profits generated by the more volatile asset.

Comparing the volatility for stocks and an index, the volatility is in most cases higher in a single stock than in an index. This is evident both for implied and historical volatility. This is reasonable since an index has only a systematic risk component, while the stock has both a non-systematic and a systematic risk component that contributes to the higher volatility. Stocks have a higher probability for very large daily moves in either direction due to, e.g., unexpected news. Such news are, e.g., mergers and acquisitions announcements and news about unexpected changes in earnings. The index, however, almost never does any large daily movements upwards, but at a few occasions there have been large downward movements.

2.1 The naive, static strategy of gamma hedging

The first strategy to be tested is a simple strategy where we expose ourselves positively to realized volatility in a stock and negatively to realized volatility in an index. This is a static strategy of continuously being long gamma in the stock and short gamma in the index. The motivation for this strategy is the assumption that the volatility in the stock is higher than the volatility in the index. Hence, we assume that the gains from transactions in the stock will more than offset the losses from transactions in the index. The trading strategy also assumes that the implied volatility is not a correct estimate of future volatility.

When initialized, the position is delta neutral as we use option straddles. The long and short gamma positions will be created by buying and selling at-the-money options, respectively, as at-the-money options have the highest amount of gamma. By using at-the-money options there is no need to account for any differences in volatility skews between the assets.[2]

The asset with the higher implied volatility will also have a higher theta. This means that the position is not automatically theta neutral by buying volatility in one asset and selling volatility in another asset. The position is made theta neutral by taking a position in the index options that equals the amount of theta in the stock options, but with the opposite signs. That is, we gain time value on the position in the index and loose time value of corresponding size in the stock. The relationship (TR) between theta in the stock and in the index can be approximated by

$$TR = \sigma_s/\sigma_i, \tag{1}$$

where σ is the implied volatility in the stock and the index, respectively (see Appendix A). To make the total position theta neutral, we simply multiply the amount of options needed in the index by TR. If implied volatility is higher in the stock, we will have relatively more options in the index as TR > 1 in that case. In order to stay theta neutral, adjustments have to be made to the option positions. This is because the relationships of implied volatility varies over time, and, hence, also the theta relationship.

[2] We disregard the transaction costs that occur when adjusting to keep the option positions at-the-money as the underlying changes. This is not a critical assumption, since including transaction costs faced by a market maker will not in any way affect the reported results.

The outcome of the strategy will be closely related to the actual volatility in the underlying assets. To obtain a standardized measure of the outcome we calculate the result of the strategy in terms of volatility points. Movements in the long gamma position will result in a gain, while the negative gamma position will result in a loss. The net gain (or loss) from the total position will be the sum of the volatility points from the long and short gamma position, respectively. Using daily volatility we obtain a daily profit/loss measured in volatility points. The cumulative sum of these daily volatility profits/losses will be the total outcome of the strategy.

2.2 The dynamic strategy of gamma hedging

In the static strategy we created a position by buying a straddle in the more volatile asset (stock) and selling a straddle in the less volatile asset (index). That is, the idea is to be long gamma in the more volatile asset and short gamma in the other asset, and assuming that the implied volatility is relatively cheaper in the more volatile asset. In order to take the idea a step further, we also tested a more dynamic strategy, where the idea is to try to be long gamma in the asset that has relatively higher volatility, and to be short gamma in the other asset. That is, the positions will be switched from long gamma in the stock and short gamma in the index to the reverse at several occasions. The two assets relative volatility will be used for deciding when to reverse the positions.

In trying to determine which asset's volatility is relatively cheaper, we use a similar method to that presented by Tompkins (1994) in a similar context. Tompkins compared the relationship between the implied volatility of a stock and an index to the relationship between historical volatilities of the same assets. After multiplying both relationships with the historical beta of the stock he called these relationships the implied and the historical R-squared relationships. Let us put the index volatility in the numerator and the stock volatility in the denominator in these two relationships. If, for example, the implied R-square relationship is higher than the historical R-squared, it should fall. This means that the implied volatility of the index should fall relatively to the implied volatility of the stock. If this hypothesis holds one should buy the implied volatility of the stock and sell the implied volatility of the index. If the implied R-squared relationship falls below the historical R-squared relationship we have a signal to reverse the position. The R-squared method isolates the partial derivative eta of the Black and Scholes option pricing formula, which is defined as the derivative of the option price with respect to changes in the implied volatility.

To form a dynamic strategy we use historical volatility and gamma relationships between the index and the stock in order to decide in which asset to be long and short gamma, respectively. We first estimate the relationship of the historical volatility between the two assets (*VR*), where the standard deviation of the stock is in the denominator and the standard deviation of the index is in the numerator.

$$VR_s = \sigma_s/\sigma_i. \tag{2}$$

This relationship will be greater than one under the assumption that the historical volatility of the stock is higher than that of the index. The historical volatility is estimated using daily observations. The next step is to estimate the relationship between the gamma in the index and the stock. The gamma relationship (*GR*) is

$$GR_s = \Gamma_i/\Gamma_s, \tag{3}$$

where Γ is gamma for the index and the stock, respectively.

As shown in Appendix A there is an inverse relationship between implied volatility and gamma. If historical volatility correlates with implied volatility, then VR will correlate with GR. These relationships seem to correlate positively in the medium term with both relationships greater than 1 at most occasions.

The GR is made theta neutral by dividing it by the relationship between the theta of both assets, which results in the theta neutral gamma relationship (*TGR*),

$$TGR_s = \Gamma_i/\Gamma_s * \theta_s/\theta_i\ . \tag{4}$$

The relationships VR and TGR are both greater than 1 most of the time as shown in Figure 1. The relationships tend to follow each other in the long term, but not on a daily basis. Daily (0,13) and weekly (0,11) correlation is low, but monthly correlation (0,50) is significantly higher.

As with the static strategy, the initial position is delta neutral as we use option straddles to take long and short gamma positions by buying and selling at-the-money options, respectively. Initially, we buy a straddle in the stock, and sell a straddle in the index. The position is made theta neutral by taking a position in the index options that equals the amount of theta in the stock options, but with the opposite signs.

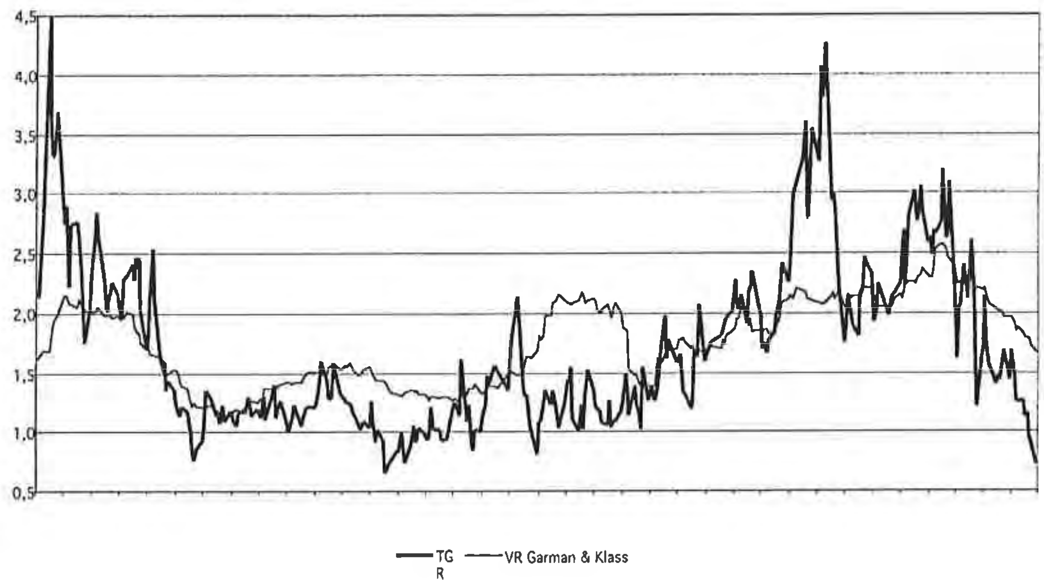

Figure 1. The relationship of the historical volatility (VR Garman&Klass) and the theta neutral gamma reletionship (TG) for Deutsche Telekom and the index ODAX seem to correlate under weekly or monthly periods.

Assuming that both the actual and the implied volatility in both stocks and the index is mean reverting, also the relationship between volatility in a stock and the index should be mean reverting. Hence, since the gamma relationship can be approximated by the implied volatility relationship, deviation from a long-term mean will produce signals about which assets volatility is relatively speaking cheaper. That is, when the actual volatility relationship deviates from the gamma relationship we expect the relationship to return to its long-term relationship, and, hence, get signals about what position to take in gamma in the two assets.

The strategy can be visualized by plotting the two relationships, VR and TGR, and their daily changes. When the two lines crosses we get signals to reverse the position, that is, to change from a long to a short gamma position in the stock and visa versa for the index.

3 The data

Estlander & Rönnlund Ab, operating as an equity options market maker on, e.g., the German market, has kindly provided historical data, including their estimates of implied volatility, used in this study. The price data is from major stocks traded on the XETRA in Germany in late 1990s. For the estimation of the actual volatility, daily open-high-low-close prices are used for the dividend-adjusted ODAX stock index and eight stocks with a high liquidity in both stocks and in option contracts. These stocks are Basf, Bayer, CommerzBank, Daimler-Chrysler (formerly Daimler-Benz), Deutsche Bank, Deutsche Telekom, Siemens and Volkswagen. The main period used is from January 2, 1997, to September 21, 1998. For one stock, Volkswagen, we also used data for a longer period, starting at August 19, 1991.

The implied volatilities are from options traded on EUREX with maturities ranging from 14-46 days. We always used the option series with shortest maturity, but switched to the next option series when the series with maturity closest to expiration had 14 days left until expiration. Implied volatilities were taken from the market marker's estimates of the implied volatility of at-the-money options half an hour before close each day. These estimates are the market maker's view of the markets implied volatility within the range of implied volatilities iterated from the bid and ask prices of the options. The trader's own opinion should only matter with outliers, but as we are using at-the-money volatilities the frequency of outliers is minimal. The market maker quotes option prices based on these volatilities with a spread, which is altered in either direction according to his portfolio. The volatility estimates are not, however, altered to suit his portfolio, but these estimates are changed only when there is a change in the market's overall pricing of volatility. By using these estimates we do not have problems with non-trading or non-synchronized trading.

Options on ODAX are European-style options and on the stocks American-style options. Implied volatilities for the stocks are adjusted for the expected dividends. The average time to maturity of the options was 28.3 days. See Table 1 for descriptive statistics of the data used.

Table 1. Statistical properties of the index and the stocks in the data set. The data consists of daily stock returns with N observations. DAX is the index, BAS is Basf, BAY is Bayer, CBK is Commerzbank, DBK is Deutsche Bank, DCX is Daimler-Chrysler, DTE is Deutsche Telekom, SIE is Siemens and VOW is Volkswagen.

	N	average	minimum	maximum	st.dev.	kurtosis	skewness
DAX	423	0,0013	-0,0458	0,0432	0,0123	1,4608	-0,3855
BAS	332	0,0005	-0,0571	0,0977	0,0199	1,7190	0,3159
BAY	214	0,0004	-0,0685	0,0745	0,0207	1,0924	0,2964
CBK	215	-0,0006	-0,0524	0,0636	0,0196	0,1316	0,0224
DBK	421	0,0011	-0,0756	0,0745	0,0208	1,1536	-0,0479
DCX	423	0,0006	-0,0989	0,0805	0,0202	2,2499	-0,3013
DTE	367	0,0011	-0,0588	0,0716	0,0214	0,7981	0,2623
SIE	422	0,0006	-0,0939	0,0730	0,0167	3,0680	-0,1604
VOW	420	0,0017	-0,0851	0,0941	0,0208	2,8076	0,1062

Volatility is often estimated using daily closing prices. We compute the standard deviation of the differences between the logarithms of closing prices as one measure of volatility.

$$\sigma = (1/(n-1)\sum(x_i - x)^2)^\wedge 0{,}5 \tag{5}$$

It has, however, been argued in the financial literature that improved stock return volatility measures can be obtained by using open, high and low prices in addition to closing prices. Parkinson (1980) showed that using high and low prices is more reliable than using closing prices for volatility estimation. Garman and Klass (1980) showed that including closing prices to high and low prices further improves the efficiency of the volatility estimator. If trading is not continuous, including opening prices would increase efficiency a little further. In this paper we use the model presented by Garman and Klass as an alternative measure of volatility. This measure is expected to account for intraday volatility.

$$\sigma^2_{G\&K} = 0{,}511(H_i - L_i) - 0{,}019[C_i(H_i - L_i) - 2\,C_iL_i] - 0{,}383C_i^2, \tag{6}$$

where C, H and L are the natural logarithms (ln) of the close, high and low prices, respectively. These more efficient measures are downward biased. Since we are dealing with relationships between the stock and the index, this will be of little importance as long as the bias is of approximately the same magnitude in both assets.

If the position is hedged once a day at closing prices or less frequently then the standard deviation of daily closing returns is an appropriate measure of volatility. A gamma hedger may also be a day trader who is exposed to volatility within trading days. Assuming more frequent hedging, intraday volatility is neglected when using the standard deviation calculated from closing prices. Hence, the proper method for volatility estimation depends on the trader's hedging frequency and we are therefore using two different measures of volatility in this paper.

4 Empirical evaluation

The two trading strategies, the static and the dynamic strategy, are evaluated using data for eight individual stocks versus an index. If the market constantly prices volatility correctly, or if the mispricing is random, neither of the two strategies is expected to generate a trading profit. The profit or loss for the strategy is calculated as a cumulative standardized measure over the test period; cumulative volatility points.

4.1 Evaluation of the static strategy

In Table 2 we present the profit in volatility points for being long gamma in a stock and gamma short in an index. The results are calculated using two different hedging strategies, daily and intradaily hedging, presented by two different measures of volatility. We calculate the profit in volatility points as a measure of the profitability of the strategy when hedging is supposed to occur at some predetermined point in order to stay delta neutral. This point is reached when the delta in percentage in either asset reaches the predetermined value. This value of delta measured in percentage is the same in both assets and equal to the predetermined point of hedging.

We do not explicitly test which hedging frequency would give the largest profit, but some preliminary simulation suggests that too frequent or to infrequent hedging can produce poor results. There is an optimal hedging point, which most likely varies under different regimes of market activity.

From Table 2 it is obvious that the profit and loss differs substantially for the two different measures of volatility. Estimating volatility as the standard deviation of daily returns, corresponding to hedging at the close of the market, produces mixed results. Hedging at closing prices produces losses more often than profits for six stocks out of eight. In general, using standard deviation as the measure of volatility the strategy yield a loss during more than 50 % of the days. However, at the end of the period the cumulative profit is still positive for six out of eight stocks.

Table 2. The result of the theta neutral gamma hedging.
Actual volatility points accumulated with the static strategy of continuously being long gamma in the stock and short gamma in the index 2.1.1997-21.9.1998. CVP stands for cumulative volatility profit and PPD stands for percentage profitable days.The volatility was estimated as the standard deviation of closing prices and using the Garman & Klass' method. BAS is Basf, BAY is Bayer, CBK is Commerzbank, DBK is Deutsche Bank, DCX is Daimler-Chrysler, DTE is Deutsche Telekom, SIE is Siemens and VOW is Volkswagen.

	Standard deviation		Garman & Klass	
	CVP	PPD	CVP	PPD
BAS	7,5 %	47,1 %	53,5 %	73,4 %
BAY	5,1 %	48,6 %	34,9 %	68,1 %
CBK	-16,0 %	47,9 %	25,7 %	62,1 %
DBK	5,1 %	45,9 %	38,9 %	59,2 %
DCX	-11,8 %	50,2 %	18,4 %	53,1 %
DTE	24,2 %	48,1 %	89,1 %	72,5 %
SIE	42,5 %	50,4 %	64,0 %	65,9 %
VOW	38,7 %	48,0 %	61,5 %	63,3 %

Using the Garman and Klass volatility estimator produces profits most of the time in this strategy, with profitable days ranging from 53 % and 73 % for the stocks included in the sample. When losses occurred, they were small but could persist for several days. However, the cumulative profit for the entire period is positive for every stock.

Of the two measures of volatility, the Garman and Klass volatility estimator is considered to represent the intraday volatility which best corresponds to the volatility a gamma hedger is exposed to. This volatility estimator is to some extent used by day traders and can be considered to be a more suitable estimate of volatility in gamma hedging.

We also tested the strategy for a longer period, using daily data for one stock, Volkswagen, versus the index for the time period August, 1991 - September, 1998. In this, we capture two regimes of volatility. The first part of the period is characterized by low volatility, while the second part is a high volatility period. The results for the longer period are presented in Table 3.

Table 3. The result of theta neutral gamma hedging on a longer period.
Actual volatility points accumulated from being long gamma in Volkswagen and short gamma in the index 19.8.1991–21.9.1998. CVP stands for cumulative volatility profits and PPD stands for percentage profitable days.

	standard deviation		Garman & Klass	
	CVP	PPD	CVP	PPD
VOW	72,2 %	48,7 %	122,8 %	58,9 %

The longer period is almost five times as long as the shorter period. However, we only have a cumulative profit of twice as much for Volkswagen during the entire period compared to the profit accumulated during the shorter period. This may be due to the higher volatility during the shorter period. To illustrate, the implied volatility in the index was on average 17 % during the entire period compared to 24 % during the shorter period. The implied volatility in Volkswagen was on average 27 % during the entire period compared to 37 % during the last 20 months.

4.2 *Evaluation of the dynamic strategy*

The average time to maturity for the options used is 28.3 days, which justifies calculating the actual volatility as a rolling window for a period of 30 days. We also tested using periods of 15 and 45 days for estimating the actual volatility relationship (VR), but the results are similar to the ones obtained using a period of 30 days. Hence, only the results using 30 days are reported here.

In the dynamic strategy we use the relationship between the historical volatility for the stock and for the index, the volatility relationship (VR), and a theta adjusted relationship between gamma for the two assets (TGR), in order to obtain signals for when to reverse positions. We try to optimize the parameters indicating how much the relationships between VR and TGR should differ after a crossing has occurred before we reverse the position. We assume the strategy to be such that you always have a position, i.e., we try to estimate the optimal level for switching the position. The main idea is, however, that when VR crosses TGR from below we switch to a long gamma position in the index and a short gamma position in the stock. Hence, this indicates that we expect the gamma to become undervalued in the index relative to that of the stock. With this position we expect to hedge more in the index than in the stock, producing a net profit of the cumulative difference between realized volatility in the index and the stock. When VR crosses TGR from above we reverse the position.

The optimization maximizes the cumulative profit in volatility points, giving us indication of when to switch the position. Using these trading signals we estimate daily the actual volatility in the long position and subtract the actual volatility in the short position. To exemplify, we have the cumulative profit for Deutsche Bank in Figure 2, where we have used Garman and Klass volatility estimator for estimating the historical volatility relationship VR and the daily realized volatility. The figure also shows the static strategy of continuously being long gamma in the stock and short gamma in the index. For Deutsche Bank we received 59 signals to reverse the position during the period 21.4.1997-21.9.1998. During some periods we received signals very frequently and the strategy performed quite badly during these periods. There were also a few longer periods with no trading signals at all. These periods accumulated much larger profits in general. We therefore conclude that the frequent signals were mainly noise.

For the other stocks the results were quite similar when using the intraday estimator of volatility. When calculating the profit from the standard deviation of closing prices the results were inconsistent.

The optimization shows that neither of the two volatility relationships can give signals that can produce a switching pattern that is more profitable than the static strategy, which can be viewed as a benchmark.

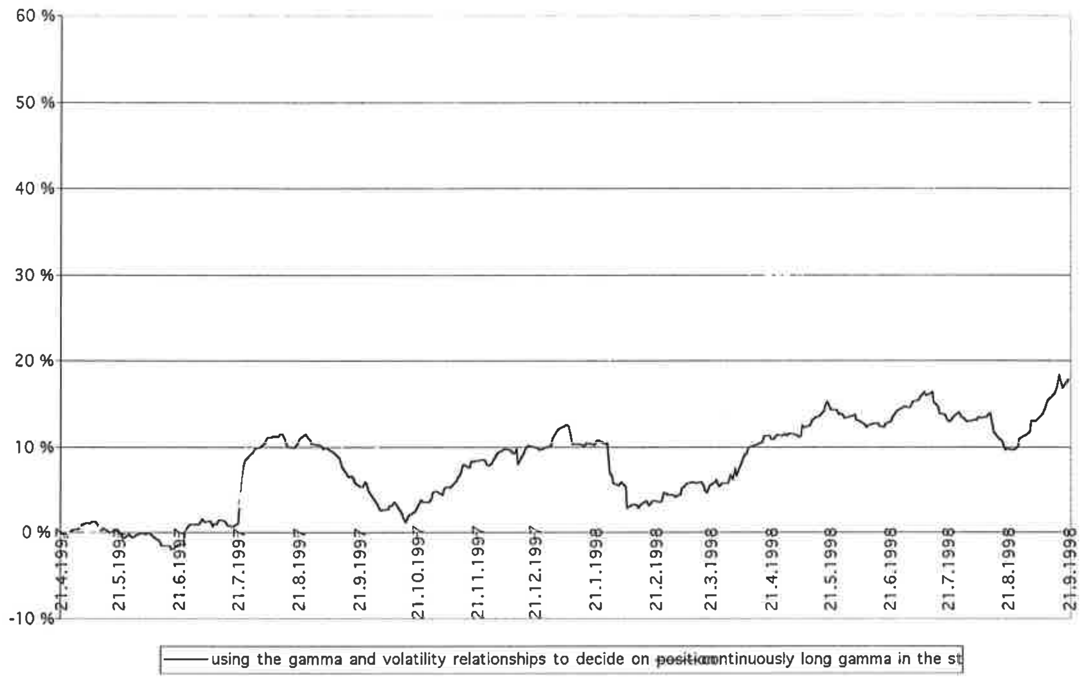

Figure 2. The profit in volatility points from theta neutral gamma hedging between Deutsche Bank and the index ODAX where the volatility relationship is estimated by Garman & Klass' model. The bold curve represents the cumulative profit in volatility points using the dynamic strategy where the position is adjusted for every crossing between the volatility and gamma relationships. The other curve represents the profit from the static strategy of being continuously long gamma in the stock and short gamma in the index.

The static strategy of being long gamma in the stock and short gamma in the index is generally better than the strategy using trading signals from the relationship between VR and TGR.

The variation in the theta relationship follows the gamma relationship. When the TGR is extremely low, so is also the theta relationship with a value of approximately 1. This means that we will have a position with initially the same amount of both underlying assets, which gives us a position with relatively low risk as both assets are expected to move in the same direction by the same amount. In the other extreme situation, when TGR is much higher than VR, we have a theta relationship of approximately 2. This means that we have a position in the underlying index that is twice as much as the position in the stock. The downside risk is then large in the index while the upside risk is large in the stock, which is the opposite risks of what we expect a practitioner to prefer.

4.3 Discussion of the results

The results obtained have been calculated under the assumption of a constant exposure to gamma during the duration of the position. However, this is not likely to be the case when trading options, as gamma is in particular a function of the underlying, time to maturity and the implied volatility level. In order to keep gamma constant the trader would need to trade options whenever the underlying changes or as time lapses. This would probably increase transaction costs more than the advantage obtained.

This problem can be partly eliminated by using options with longer time to maturity. This, on the other hand, would increase the windfall profit/loss from changes in the implied volatility level. In conclusion, the results obtained are fairly satisfactory and shows that under periods of higher volatility it is also profitable to be long volatility in stocks.

5 Summary and conclusions

In this paper we test the profitability of trading realized volatility in major stocks and the index on the German market. Exposure to realized volatility is obtained by buying and selling options on the stocks and the index, respectively.

As a first step we test a strategy of continuously being long gamma in a stock and short gamma in the index. Calculating the daily profit and loss as the difference in volatility points between the stock and the index, we find that using an intraday measure of volatility the strategy is profitable for all stocks included in our sample.

In an attempt to improve this static strategy we also test a strategy of switching between long and short gamma in the two assets. To decide upon when to switch the position, relationships between historical volatility and gamma of the stock and the index are used. When historical volatility in the stock is high in relation to the historical volatility in the index, compared to the relationship in gamma, a long gamma position in the stock is entered and a short position in the index.

The results from using the dynamic switching strategy were mixed. We are able to obtain a profit using this dynamic strategy, but the profit is not in any cases above that of the benchmark of continuously being long gamma in the stock and short gamma in the index.

Appendix A

We use Black and Scholes (1973) option pricing model throughout this paper and compute partial derivatives of their equation. Define Δ as the derivative of the option price C with respect to the underlying asset S. Delta is then defined as

$$\Delta = \frac{\partial C}{\partial S} = N(d_1),$$

where

$$d_1 = \frac{\ln(S/X) + (r + \sigma^2/2)t}{\sigma\sqrt{t}}$$

and $N(d_1)$ is the standard normal cumulative distribution of d_1 with strike price X, interest rate r, volatility σ and time to maturity t. The delta in (A1) tells us how much a move in the underlying is affecting the value of the option position. Define gamma Γ as the second derivative of the option price with respect to the underlying asset. Then the formula

$$\Gamma = \frac{\partial^2 C}{\partial S^2} = \frac{N'(d_1}{S\sigma\sqrt{t}}$$

where

$$N'(d_1) = \frac{1}{\sqrt{2\pi}} e^{-d_1^2/2},$$

tells us how much of the underlying is needed to hedge the position after a move in the underlying. Gamma gives the change of the delta with a small change in the underlying. Define theta θ as the derivative of the option price with respect to time. The formula for an option's time decay is

$$\Theta = \frac{\partial C}{\partial t} = -\frac{SN'(d_1)\sigma}{2\sqrt{t}} - rXe^{-rt}N(d_2),$$

where

$$d_2 = d_1 - \sigma\sqrt{t}.$$

Approximations to the gamma and theta relationships

The gamma relationship between the index and stock options can be approximated by the implied volatility relationship between ditto.

$$\frac{N'(d_1)_s}{S_s\sigma_s\sqrt{t}} \Big/ \frac{N'(d_1)_i}{S_i\sigma_i\sqrt{t}} \approx \frac{\sigma_i}{\sigma_s},$$

as time until maturity is the same, the underlyings are standardized for comparability and N'(d1) is approximately the same for both assets at-the-money even with different volatilities.

It can also be shown that the theta relationship is approximately the inverse of the gamma relationship

$$\left(-\frac{S_s N'(d_1)_s\sigma_s}{2\sqrt{t}} - rX_s e^{-rt}N(d_2)_s\right) \Big/ \left(-\frac{S_i N'(d_1)_i\sigma_i}{2\sqrt{t}} - rX_i e^{-rt}N(d_2)_i\right) \approx \frac{\sigma_s}{\sigma_i}$$

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Empirical evidence on the relationship between qualified audit reports and stock prices

Kim Ittonen

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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This paper examines the relationship between qualified audit reports and stock prices. Previous literature has discussed the puzzle of the identification of the correct event date when analyzing the impact of audit reports on stock prices. In this study it is hypothesized that there is a negative stock market reaction to qualified audit reports on the day of the audit report. To empirically test the hypothesis, abnormal stock returns on the qualified audit report dates are analyzed for 357 US-listed companies. The results of the study provide some evidence of statistically significant abnormal returns to qualified audit reports in the audit report date event window. These findings indicate that the audit report date could be the answer to the event date puzzle and that qualified audit reports contain relevant information for investors.

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Key words: audit report, market reaction

Data availability: The data are available from public sources

1. Introduction

The responsibility of auditors is to assess the client's financial statements and financial position. If the financial statement fails to give a true and fair view of the auditee or uncertainties about the future exist, the duty of the auditors is to disclose missing information or emphasize information included in the financial statements. Empirical evidence that such a disclosure, the qualified audit report, affects investment decisions is mixed. Whereas some studies report significant share price adjustments to modified audit report announcements (eg. Firth 1978, Chow and Rice 1982, Choi and Jeter 1992, Chen and Church 1996, Carlson, Glenzen and Benefield 1998, Chen, Su and Zhao 2000, Soltani 2000, Taffler, Lu and Kausar 2004) others do not detect such a reaction (Baskin 1972, Alderman 1977, Davis 1982, Elliot 1982, Dodd, Dopuch, Holthausen and Leftwich 1984, Ameen, Chan and Guffey 1994 and Martínez, Martínez and Benau 2004). Martinez et al. (2004) underlines based on their review, that research on information content of audit reports has suffered from methodological weaknesses in the early studies while the identification of the correct event date has been a major concern in later studies.

The purpose of this study is to investigate the event day puzzle that has been discussed in the literature. In this study we suggest that the audit report date could be the first day in which trading takes place after the audit report information release. It is hypothesized that there is a negative abnormal stock price reaction to the audit report. The mixed results from previous studies have shown that in able to measure properly the stock market reaction, it is essential to recognize the correct event day.

This study contributes to previous literature by attempting to solve the event day puzzle associated with studying audit reports and stock market reactions. Crashwell (1985) concluded his analysis that the event day problem could be a possible reason for heterogeneous results concerning the relationship between qualified audit reports and stock prices. Since Crashwell (1985) many studies have most commonly still used the day of annual report announcements as the event day (eg. Chen et al. 2000) but some have also reported experiments with alternative dates, eg. Soltani (2000) used three experimental event days: (i) date of the auditor's signature on the audit report, (ii) 15 days before the day of the general annual meeting, and (iii) average between auditors signature and 15 days before the general annual meeting.

The results of this study may have important implications for academic research. The relationship between audit reports and stock returns has been a subject of research for nearly 30 years, but still no final conclusion has been done. The event day puzzle that this research focuses on is one problem that has been identified in this stream of research.

The remainder of the paper is organized as follows. The following section discusses the relationship between stock market reactions and qualified audit reports. Section 3 describes the data and methodos used. The empirical results are presented in Section 4. Section 5 summarizes the findings of the study.

2. Modified audit reports and stock market reactions

Considerable evidence exists supporting the simultaneous or delayed correlation between earnings information and stock price changes (Ball and Brown 1968; Bernard and Thomas 1989). However, as Lev (1989) reported, earnings explain only a fraction of the change in returns at the earnings announcement date. Due to this, accounting researchers have explored market reactions with other financial information (Ou and Penman 1989; Livnat and Zarowin 1990; Sloan 1996). One such source of information is the audit report. Audit reports have the potential to change the market responsiveness to earnings by adding (reducing) noise or reducing (increasing) the persistency of reported earnings (Choi et al. 1992).

Crashwell (1985) concluded his review that "because the evidence is contradictory and inconsistent, it is not possible to make general statements about the information content of audit qualifications". Several studies have been done since this conclusion, but nearly two decades later Martinez et al. (2004) conclude their review that research has still not provided any absolutely conclusive results. They also propose that the market is able to anticipate the information disclosed in an audit report before it becomes public and thus the information is already discounted into the stock prices when it arrives (Martinez et al. 2004).

A wide range of recent studies have considerable effort on trying to identify the date when the investors had knowledge of the auditors' report. Dodd et al. (1984) devoted attention to analyze the announcement date of the audit qualification. Based on their investigation they decided to focus on the announcement of the 10-k or annual report. Dopuch, Holthausen and Leftwich (1986) found evidence of a significant negative stock market reaction to media disclosures of qualified audit reports. Chen et. al (1996) investigated the association between going concern audit reports and market's reaction to bankruptcy filings. The results indicated that going concern audit reports contains information that is useful in predicting bankruptcy. Carlson et al. (1998) used a matched pair -method to analyze differences in stock market performance of firms receiving going concern audit report and firms with no going concern audit report. They found significant differences in mean stock returns for the two groups. Soltani (2000) presented significant negative abnormal returns for French firms around the estimated announcement dates of audit reports. Soltani (2000) defined the event date as the fifteenth day before the annual general meeting of each company. Martinez et al. (2004) used the earlier of the two dates; the fifteenth day before the annual general meeting or the date when the Spanish Stock Exchange Commission makes the financial statement and audit report available. They found that qualified audit reports have no information value for investors.

A qualified audit report may contain information that shifts owners' perceptions of a firm's risk and therefore decreases owners' expectations of future cash flows and stock performance. By conveying incremental information to the financial statement users the issuance of a qualified audit report is likely to have a negative effect on that firm's stock price. (Carlson et al. 1998)

Based on the previous literature, it is hypothesized that:

H1: There is a negative relationship between qualified audit reports and abnormal stock returns surrounding the audit report date

The choice of this date is based on the previous literature. However, previous studies have not reported any results regarding this event date. In this study we consider the audit report date (i.e. the date typed by the auditor on the audit report) to be the first possible day when trade takes place after the auditor has signed the audit report. Here we do not take into consideration how the audit report becomes public, we just assume that the information becomes public on that day.

3. Data and method

The sample consists of firms listed in the US stock markets. A search in the Thomson Financial database identified 636 firms that received a first time qualified audit report from financial years ending 2002–2005. After excluding firms in the financial services industry the audit reports for 388 firms are located from public sources. The final sample consists of 317 firms with a first time qualified audit report and stock price data available. First time qualified audit report is defined in this study as the qualified audit report from a period with the previous period being unqualified. The qualified audit reports and audit report dates are searched from the SEC Edgar database. Thomson Financial database contains the information needed for estimating the abnormal returns.

Table 1. Number of audit reports during the period of study (2002–2005)

Audit report dated	Number of Qualifications
2002	82
2003	140
2004	69
2005	53
2006	13
Number of observations	357

Table 2. Descriptive statistics of abnormal returns in periods [-1, 0, +1]

Panel A. Abnormal Returns

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
-1	-0.008	0.000	0.833	-1.082	0.119	-0.854	36.600
0	-0.001	0.001	0.707	-0.679	0.109	-0.006	18.700
+1	0.005	0.002	1.109	-0.283	0.107	4.146	39.200
CAR [-1, +1]	-0.003	-0.002	0.933	-0.689	0.166	0.862	11.360

Panel B. Abnormal returns - Extreme observations rounded up

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
-1	-0.001	0.001	0.198	-0.186	0.066	0.146	5.831
0	0.000	0.002	0.198	-0.186	0.068	0.178	5.259
+1	-0.006	-0.002	0.198	-0.186	0.095	0.182	3.062
CAR [-1, +1]	-0.006	0.000	0.198	-0.186	0.067	0.178	5.315

Panel C. Abnormal returns – Extreme observations rounded up

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
-1	-0.008	0.000	0.834	-1.082	0.119	-0.854	36.600
0	-0.001	0.001	0.707	-0.679	0.109	-0.006	18.700
+1	0.005	0.002	1.109	-0.284	0.107	4.146	39.200
CAR [-1, +1]	-0.009	-0.002	0.100	-0.123	0.069	-0.091	2.147

Number of observations: 357

Panel B. Observations over two standard deviations away from the mean rounded up to the value at the limit

Panel C. The highest and lowest 5% of the observations rounded up to the value at the limit

Abnormal returns, are defined as the market model daily abnormal returns (AR), with the event date being the audit report date and market return the return of the Russell 3000 Index. The parameters for the market model are estimated for each firm using daily stock returns for the previous 200-days period.

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) \quad (1)$$

Where:

AR_i = Abnormal return for firm i at time t

R_i = Return for firm i at time t

R_m = Return of the market at time t

The standard t-statistic is applied to test the hypothesis whether the mean of the abnormal returns in the event window is different from zero.

4. Results

Table 3 presents the results of the empirical analysis. Results are reported for abnormal stock returns in periods [-1], [0], [+1] and cumulative abnormal stock returns for period [-1, +1]. In Panel A the mean abnormal returns are negative, except in period [+1]. However the abnormal returns are very moderate (<1 percent) and the results from the t-statistic are statistically insignificant. Nevertheless, in Panel B, where extreme outliers are identified as those over two standard deviations away from the mean, the result from t-statistic in period [-1] is statistically significant. This indicates that a significant abnormal stock reaction can be found one day before the auditor signs the qualified audit report. Finally, in Panel C, where the highest and lowest 5% of the abnormal returns are smoothed, the mean abnormal returns in different periods are identical in nature to Panel A and Panel B, but here also the cumulative abnormal returns for period [-1, +1] statistically differ from zero.

In general, the results indicate that there is some evidence in this sample of a relationship between abnormal stock returns and qualified audit reports in the period surrounding the audit report date. As previously discussed, identifying the first day trade takes place after the audit report information becomes available is one of the most important problems that this field of research has to deal with. In this study we assume that the information from the audit report becomes available the same day as the auditor signs the document. How this information is transferred to the markets is not an issue in this study.

Table 3. Abnormal stock returns around the event date

Period	Mean abnormal return	T-test	
Panel A. Abnormal Returns			
-1	-0.00811	(1.29)	
0	-0.00065	(0.11)	
+1	0.00549	(0.96)	
CAR [-1, +1]	-0.00290	(0.09)	
Panel B. Abnormal returns - Extreme outliers excluded			
-1	-0.00647	(1.83)	*
0	-0.00095	(0.27)	
+1	0.00005	(0.01)	
CAR [-1, +1]	-0.00582	(1.15)	
Panel C. Abnormal returns - Outliers excluded			
-1	-0.00811	(2.76)	**
0	-0.00065	(0.98)	
+1	0.00549	(0.78)	
CAR [-1, +1]	-0.00897	(2.45)	**
Number of observations: 357			

** Statistically significant at the 5% level,
* Statistically significant at the 10% level

Panel B. Observations over two standard deviations away from the mean rounded up to the value at the limit
Panel C. The highest and lowest 5% of the observations rounded up to the value at the limit

These results presented in this study give some support to the presented hypotheses. In particular, after evening up the most extreme observations there is an indication of a significant negative stock market reaction one day before the signing of the qualified audit report and some evidence of a reaction in the three day period surrounding the event day, when smoothing more of the extreme observations (Panel C of Table 3). These results contribute to the previous literature, specially those of Soltani (2000), but also others putting effort on solving the event day puzzle (eg. Dodd et. al 1984, Martinez et al. 2004).

5. Conclusions

This paper investigates whether there is a relationship between qualified audit reports and stock market reactions. The main purpose is to find new evidence to the event day puzzle brought up in previous studies. Based on previous literature it is hypothesized that there is a negative relationship between qualified audit reports and abnormal stock market returns surrounding the audit report date.

Since the 1980's several studies have focused on identifying the appropriate event day, i.e. the first day stock market activities take place after a qualified audit report. However, the results from a wide range of different event windows are inconclusive. This can mean that the event period has not been identified or that the audit report is of no value to the investors.

To empirically test the hypothesis, abnormal returns surrounding the event day (audit report date) are estimated using the market model. The statistical significance of the abnormal returns is tested using the standard t-statistic. The findings of this study give weak support to the hypothesis. After smoothing extreme observations in the sample we find significant abnormal returns the day before the auditor dates the audit report. Additionally, we find significant results in the cumulative abnormal returns for the three-day period surrounding the audit report date.

These results suggest, at least to some extent, that stock price adjustment to the qualified audit report information can be observed around the audit report date. These results contribute to several studies. Audit report date as the event date has been used by Soltani (2000), but the results of that particular analysis were insignificant. Soltani (2000) and Martinez et al. (2004) used an estimation of 15 days before the annual general meeting as an experimental event date in the examination of French (significant negative abnormal returns) and Spanish (insignificant returns) markets. Others, eg. Chen et al. (2000), have used the announcement of the annual report as the event day for audit reports. However, the results from this study would indicate that the first day of trading after the audit report is earlier than identified in any of the previous studies.

How the information is transferred to the markets at this time is unclear, but the findings could also be an indication of insider activity.

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Tilintarkastaja ja sisäinen tarkastaja – ammatinharjoittajasta tieteen tutkimuskohteeksi

Annukka Jokipii & Teija Laitinen

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

Jokipii, Annukka ja Teija Laitinen (2007). Tilintarkastaja ja sisäinen tarkastaja – Ammatinharjoittajasta tieteen tutkimuskohteeksi (External auditor and internal auditor – from practitioner to research subject). In: *Contributions to Accounting and Finance. Essays in Honour of Professor Paavo Yli-Olli.* Acta Wasaensia No. 173, 73–113. Eds Timo Rothovius and Jussi Nikkinen.

Auditing has been one of the most important corporate governance tools for an owner of a company. Internal auditing has since evolved as a management tool, partly due to company growth and the globalization of business. However, external auditing and internal auditing have a long, common history. This article describes the process that has led to the separation of a once common auditing function into the two functions of external and internal auditing. It also depicts the emergence and development of two separate professions, namely those of the external and internal auditor. The development of these professions has contributed to the birth of scientific research focused on external and internal auditing. In this article some research issues that are important from the practitioners' point of view are presented.

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Key words: Auditing, internal auditing, profession, research, history.

Johdanto

Tänä päivänä sekä tilintarkastuksen että sisäisen tarkastuksen tehtävät ovat valtavien muutospaineiden kohteena. Molemmille ammattikunnille asetetut vaatimukset ovat lisääntyneet ja monipuolistuneet monella tavoin. Ammattitaidon hankkiminen, ylläpitäminen ja kehittäminen vaatii yhä suurempia panostuksia yritystoiminnan monimutkaistuessa ja kansainvälistyessä. Aikaisempaan petosten ja virheiden etsintään perustuvaan tarkastukseen on noussut aivan uusia elementtejä. Tällaisia elementtejä ovat esimerkiksi yrityksen arvonmääritys, tilintarkastettavan yrityksen koti- ja ulkomaanmarkkinoiden tunteminen, kilpailutilanteen ja riskien arviointi ja tulevaisuudennäkymien realistinen kartoitus.

Huolimatta kasvaneesta vaatimustasosta tarkastuksen ammattikuntia kohtaan voitaneen todeta, että tämän päivän tarkastusmaailmassa vellovat ilmiöt ja vaatimukset eivät ole ainutkertaisia. Itse asiassa tarkastuksen historiassa, kuten monessa muussakin yleismaailmallisessa ilmiössä, on nähtävissä syklejä, jotka tuntuvat seuraavan toisiaan, välillä hiipuvan ja sitten taas voimistuvan. Mielenkiintoista on huomata, että jotkin tänä päivänä pohdittavat kysymykset ovat olleet esillä jo 5 000 vuotta sitten, tosin eri nimillä. Katsaus tarkastuksen historiaan valottaakin tähän päivään johtanutta kehitystä.

Tilintarkastuksen ja sisäisen tarkastuksen yhteinen historia: tarkastus

Tilintarkastus ja sisäinen tarkastus toimivat historiansa alkuvaiheessa samalla yhteisellä nimikkeellä tarkastus (auditing). Yli 5 000 vuotta sitten, 3 000 vuotta ennen ajanlaskun alkua ensimmäiset tunnetut kirjoitetut merkit tehtiin kahdessa eri paikassa suunnilleen samanaikaisesti. Nämä kirjoitetut merkit liittyivät kaupankäyntiin ja huomattava osa niistä sisälsi numeerista tietoa. Muinaisessa Mesopotamian laaksossa, nykyisen Irakin alueella ja toisaalta Egyptissä oli syntynyt kukoistavat sivilisaatiot ja näiltä ajoilta on peräisin vanhimmat tunnetut merkinnät liiketoimista. Tuonaikainen Hammurabin laki sääti kaikille tutun ”silmä silmästä, hammas hampaasta” -momentin lisäksi kirjoitetussa muodossaan kaupanharjoittajan ja hänen agenttinsa välisestä suhteesta.

Tarkastuksen voidaankin nähdä syntyneen ja kulkeneen käsi kädessä laskentatoimen kanssa. Nykypäivän tarkastajan ja kirjanpitäjän edeltäjä oli tuolloin toimiva kirjuri, jonka ammatti oli erittäin arvostettu ja kadehdittu. Kirjurit liikkuivat temppeleissä, palatseissa ja kaupungin porteilla valmiina laatimaan lain kirjaimen täyttäviä kauppasopimuksia asiakkaidensa välille. Tämän päivän käytännöistä poiketen sopimukset laadittiin käyttäen savea, josta muotoiltiin sopivan mallinen sopimus. Kirjurin tehtävänä oli kirjata saveen kauppaosapuolten nimet, myyty tavara, kauppahinta ja muut mahdolliset ehdot. Puumerkkien jälkeen sopimus sai kuivua auringossa tai, erittäin tärkeiden kauppojen ollessa kyseessä, savilaatta poltettiin tiilenpolttouunissa.

Kirjureilla oli tarkastustehtävissä erityisiä kirjurien esimiehiä. Egyptissä faarao piti tarkastusta erittäin tärkeänä ja jokaisella majesteetillisella kauppahuoneella oli kaksi tarkastajaa. Ensimmäinen laski tavarat kun ne tuotiin sisään kauppahuoneeseen ja toinen laski ne pois vietäessä. Kirjurien esimies vertasi tämän jälkeen molempia laskutoimituksia, ja jos ne erosivat toisistaan, molemmat tarkastajat surmattiin. Tarkastajan ammatti on siten vanhempi kuin suhteellisen nuori kristinuskomme.

Muinaisten roomalaisten valtakausi oli noin 500 vuotta ennen ajanlaskun alkua ja saman verran sen jälkeen. Muinaisessa Rooman valtakunnassa päälliköillä oli hallussaan hallitsijalle kuuluvia varoja, joilla he ylläpitivät esimerkiksi sotajoukkoja. Tietyin väliajoin he selvittivät julkisesti suullisesti kuluneen ajanjakson tulot ja menot. Tarkastus oli suhteellisen ongelmatonta sen ajan mittapuun mukaan, sillä jos epäily tilien vääristelystä syntyi, epäiltyä voitiin kiduttaa kunnes totuus tuli ilmi. Tästä suullisesta selvityksestä syntyi englannin kieleen sana audit, tarkastus, joka latinaksi merkitsee "hän kuulee".

Muinaisissa kulttuureissa kuten Egyptissä, Kreikassa ja Roomassa kirjanpito ja numeroiden hyödyntäminen ei niinkään pyrkinyt hallitsijan omaisuuden kartuttamiseen ja sen järkevään hoitamiseen vaan toimi lähinnä yksinkertaisena muistiinpanovälineenä kauppiasosapuolten välillä. Näihin kulttuureihin ei liittynyt tarvetta tavoitella voiton maksimointia ja rikkautta yleensä tehokkaan yritystoiminnan kautta. Joillekin alamaisille kertynyt valtava omaisuus ei siis ollut välttämättä tulosta hyvästä liiketoiminnasta vaan pikemminkin palkkio alamaisen lojaalisuudesta hallitsijaa kohtaan ja siitä, että hän elää sopusoinnussa uskonnollisten ja moraalisten periaatteiden ja sääntöjen mukaan.

Kiinan ja Rooman kauppasuhteet

Aikojen kuluessa kaksi mahtavaa sivilisaatiota, Kiina ja Rooma, joutuivat kosketuksiin toistensa kanssa. Tämä johti vilkkaaseen kaupankäyntiin ja yritystoiminnan alkamiseen noin 100 vuotta ennen ajanlaskun alkua. Kiinalaiset olivat oppineet silkinviljelyn ja sen kutomisen, joita molempia tietoja pidettiin valtionsalaisuutena. Kamelikaravaanit kuljettivat tätä kallisarvoista kauppatavaraa yli 10 000 kilometriä pitkää Silkkitietä pitkin Syyrian satamiin, joista se kuljetettiin kauppalaivoilla Rooman valtakuntaan. Kuumimmillaan silkkikauppa kävi ajanlaskumme alussa, jolloin Rooman valtakunta kukoisti.

Tällaista karavaania voidaan pitää ensimmäisten yritysten esikuvana. Karavaaneissa saattoi olla parikin sataa kamelia ja yksi matka saattoi kestää lähes kymmenen vuotta. Yrityksen toiminnan tuloksen laskeminen oli helppoa, koska toiminnan alkamis- ja päättymisajankohta tiedettiin. Jokainen karavaani oli oma itsenäinen ”yrityksensä”, joten hankkeen kokonaiskustannukset ja tuotot voitiin helposti todeta matkan päätyttyä. Tarkastajan tehtäväksi jäi todeta, että karavaanin johtajan ilmoittamat tulot ja menot oli laskettu virheettömästi yhteen ja että petosta tai tilien vääristelyä ei ilmennyt.

Keskiaika

Englannissa 1200-luvulla Lontoon kaupungin hallintoa tarkastettiin erityisen viranomaiskomitean johdolla ja Italiassa Pisan viranomaisten osalta tehtiin tarkastuksia 1300-luvulla julkisten varojen mahdollisten väärinkäytösten selvittämiseksi. Myöhemmin keskiajan lopulla Italiassa aloittivat toimintansa suuret kauppahuoneet. Kaupankäynti ei enää ollut pelkästään yksittäisten kulkukauppiaiden varassa, vaan ylelliset kauppahuoneet tarjosivat myyntipaikkoja kaupungeissa kuten Venetsia, Firenze ja Pisa. Italialainen kauppias palkkasi kapteenin ja laivan antaen toimeksiannon matkasta

Intiaan. Laivat veivät Intiaan eurooppalaisia tuotteita ja toivat sieltä mausteita ja silkkiä. Kapteenin saama palkkio oli riippuvainen matkan tuloksesta ja tarkastajan tehtävä jatkui samanlaisena kuin se oli ollut kamelikaravaanienkin osalta. Yhteydet eri kauppapaikkojen välillä olivat hyvät ja kun yritystoimintaa syntyi kiihtyvää vauhtia, ei olekaan ihme, että yritysten tänäkin päivänä käyttämä kahdenkertainen kirjanpito kehitettiin juuri Italiassa 1494 Luca Paciolin toimesta.

Teollinen vallankumous

Tämän päivän kirjanpito juontaa juurensa teolliseen vallankumoukseen Englannissa 1800-luvun puolivälissä. Tuolloin Englanti oli johtava hiilen, raudan ja puuvillan tuottajamaa ja samalla Euroopan talouselämän keskus. Yritystoiminta oli tähän asti ollut epämuodollista ja satunnaista toimintaa, mutta nyt teollinen vallankumous toi mukanaan suuria koneita ja laitteita, joiden rahoittaminen ei enää onnistunut yksittäiseltä yrittäjältä ilman ulkopuolista rahoitusta. Samaan aikaan syntyi uusi keskiluokka, jolla oli omia säästöjä ja rahaa sijoitettavaksi. Uusina yrittäjinä alkoivat toimia pankkien edeltäjät, rahoitusyrittäjät, jotka keräsivät piensijoittajilta rahaa ja sijoittivat ne sitten suurempina kokonaisuuksina johonkin teolliseen tai kaupalliseen yritykseen.

Ongelmallista oli se, että kun yritystoiminta ja eri yritysmuodot olivat vielä lapsenkengissään, konkursseja tapahtui paljon. Piensijoittajien varat synnyttivät osakemarkkinat, jotka kuitenkin olivat vielä erittäin epävakaat. Kun lisäksi sijoittajien vastuuta ei mitenkään rajoitettu, piensijoittaja saattoi joutua koko omaisuudellaan vastaamaan sijoituskohteen veloista sen mennessä konkurssiin.

Tilintarkastuksen kehittyminen

Tähän saakka tarkastuksesta (auditing) oli puhuttu yleisesti yhteisellä nimikkeellä, mutta nyt sen rinnalle syntyi uusi käsite tilintarkastus (external auditing). Vuonna 1844 säädettiin Englannissa laki, että yritykselle piti valita tilintarkastaja, joka sai tutkia, kuvasivatko yritysjohdon antamat tiedot yrityksen todellista taloudellista tilaa. Kun omistaja ja johto olivat nyt aikaisempaan verrattuna yhä useammin eri henkilöitä, oli omistajien saatava tietää, vastasiko johdon antama kuva yrityksen hyvästä tai huonosta menestyksestä todellisuutta. Tilintarkastajien ei tuolloin tarvinnut olla riippumattomia yrityksen johdosta eikä vaatimuksia heidän ammatilliselle osaamiselleen asetettu. Käytännössä tehtävään valittiin joku osakkeenomistajista.

Tilintarkastuksen pakollisuudella oli kuitenkin vastustajia ja kymmenkunta vuotta myöhemmin lain vaatimus pakollisesta tilintarkastuksesta yrityksille kumottiin. Osaltaan tästä oli seurauksena katastrofi yritysmaailmassa. Englannissa perustettiin vuosien 1862 ja 1904 välisenä aikana 88 000 yritystä, joista 50 000 oli joutunut lopettamaan toimintansa vuoden 1904 loppuun mennessä. Yllättävää ei ollutkaan se, että vaatimus pakollisesta tilintarkastuksesta liitettiin taas lainsäädäntöön 50 vuotta sen kumoamisen jälkeen vuonna 1900. Jo tällöin huomattiin, että luotettava tilintarkastus edellyttää, että yrityksen johto ja tilintarkastaja eivät saa olla liian läheisessä suhteessa keskenään eli tilintarkastajan on oltava riippumaton tarkastamansa yrityksen johdosta. Näin ollen, laissa säädettiin erikseen, että johtaja tai joku yrityksen työntekijä ei itse voi olla tilintarkastaja. Tilintarkastajan ammattitaidolle ei kuitenkaan asetettu edelleenkään mitään vaatimuksia.

1900–luvun vaihteessa tilintarkastuksen kehityksen painopiste siirtyi Amerikkaan. The Institute of Chartered Accountants in England & Wales perustettiin Englannissa 1880 ja osittain tämän innoittamana amerikkalaiset kollegat perustivat vuonna 1887 tilintarkastajia edustavan järjestön The American Association of Public Accountants (AAPA). Kymmenkunta vuotta myöhemmin 1896 ensimmäinen tilintarkastajien hyväksymistä käsittelevä laki mahdollisti kokeneiden tilintarkastajien auktorisoinnin myös ilman erillistä koetta. Tällöin vaatimuksena oli, että tilintarkastajan oli tullut harjoittaa hyvämaineista praktiikkaa tilintarkastajana kuuden vuoden ajan. Lain hyväksymistä seuraavan kahden vuoden aikana yhteensä 108 auktorisointia myönnettiin tämän ammatillisen pätevöitymisen kautta, kun taas ammatillisen kokeen kautta auktorisointeja myönnettiin kolmelle henkilölle (Flesher, Flesher & Previts 1996).

Vähitellen ammatillinen pätevöityminen korvattiin kokonaan ammatillisen kokeen suorittamisella. Tilintarkastajaehdokkaan tuli täyttää määrätyt osavaltiokohtaiset vaatimukset koulutuksen ja kokemuksen suhteen sekä suorittaa "Uniform Certified Public Accountant Examination" -tutkinto, jossa hänen tietämystään ja asiantuntemustaan testattiin ammatissa tarvittavilla eri osa-alueilla.

Vuonna 1917 yhdistyksen nimeksi muuttui The American Institute of Accountants ja se säilyi samana aina vuoteen 1957 saakka, jolloin yhdistys vaihtoi nimen nykyiseen muotonsa, The American Institute of Certified Public Accountants (AICPA). Tänä päivänä AICPA edustaa arviolta 330 000 auktorisoitua tilintarkastajaa niin yritysmaailmassa, julkisella sektorilla, hallinnossa kuin koulutuksessakin.

Suomalainen tilintarkastustoiminta pohjautuu nykyisessä muodossaan 1800-luvun lopulle. Vuonna 1985 annetussa osakeyhtiölaissa säädettiin osakeyhtiöitä valitsemaan tarkastaja yrityksen hallinnolle ja tileille. Ensimmäinen tilintarkastajien yhdistys perustettiin Suomeen vuonna 1910 Suomen Tilintarkastajainyhdistys, Finska Revisorsföreningen nimellä. Vuonna 1925 yhdistyksen aloitteesta Keskuskauppakamari otti huolehtiakseen tilintarkastajien auktorisoinnista ja valvonnasta ja Suomen Tilintarkastajainyhdistys lakkautettiin. Yhdistyksessä aktiivisina jäseninä toimineista henkilöistä tuli Keskuskauppakamarin hyväksymiä tilintarkastajia ja yhdistys aloitti tai oikeastaan jatkoi toimintaansa nimellä K.H.T.-yhdistys, Föreningen C.G.R (Koskelainen 2000).

Ensimmäisenä uuden yhdistyksen toimintavuonna vahvistettiin 36 auktorisoitua KHT-tutkintoa. Vuoteen 1950 mennessä jäsenten määrä oli hieman yli kaksinkertaistunut ja vuonna 1971 se oli 112 henkilöä. 2000-luvulle tultaessa jäsenmäärä oli noussut 600 henkilöön ja vuoden 2006 jäsenmäärä on noin 700 tilintarkastajaa. KHT-yhteisöjä Suomessa toimi samana vuonna noin nelisenkymmentä.

1950-luvulla perustettiin Suomessa toinenkin tilintarkastajien yhdistys. Kauppakamarien hyväksymät tilimiehet perustivat yhdistyksen nimeltä Tilintarkastajayhdistys HTM – Revisorsföreningen GRM. Jo ensimmäisen toimintavuotensa aikana HTM-tilintarkastajien määrä kohosi suuremmaksi kuin KHT-tilintarkastajien. Vuonna 2006 jäsenmäärä yhdistyksessä oli noin 750 jäsentä ja HTM-yhteisöjä Suomessa noin kolmekymmentä. (HE 194/2006)

Sisäisen tarkastuksen kehittyminen

Tilintarkastuksen rinnalle syntyi sisäinen tarkastus Yhdysvalloissa 1900-luvun alussa, kun rautatieyhtiöt palkkasivat sisäisiä tarkastajia kiertämään paikallisia rautatielippujen myyntipisteitä. Näillä toimenpiteillä haluttiin varmistaa, että lipunmyyntitulot kertyvät kokonaisuudessaan yhtiöille. Alkuvaiheessa nämä sisäiset tarkastajat olivat kuitenkin voimakkaasti tilintarkastuksen toimintojen alaisuudessa.

Vaikka sisäinen tarkastustoiminta alkoikin jo vuosisadan alussa, vasta 1930-luvulla sen merkitys tunnustettiin sekä yrityksissä että toisaalta jo syntyneen tilintarkastajien ammattikunnan keskuudessa. Tähän johti periaatteessa kaksi eri kehitystapahtumaa, Securities and Exchange Commission eli SECin perustaminen vuonna 1934 ja ulkoisen tilintarkastuksen tavoitteiden ja tekniikoiden kehittyminen. SEC vaati, että rekisteröityneiden yritysten täytyi huolehtia siitä, että niiden tilinpäätökset oli tarkastettu riippumattomien tilintarkastajien toimesta. Tämä vaatimus johti siihen, että yritykset alkoivat nopeassa tahdissa perustaa sisäisen tarkastuksen yksiköitä auttamaan riippumatonta tilintarkastajaa. Tuolloin tilintarkastajan lausunnon painopiste muuttui enemmänkin mielipiteen ilmaisuksi tilinpäätöksen antamasta oikeasta ja riittävästä kuvasta kuin petoksen ja virheiden löytämistä. Tämä muutos tavoitteissa edisti tilintarkastusta, joka perustui liiketapahtumien tarkastukseen otantapohjalta sekä yhä suurempaan luottamukseen sisäisen valvonnan toimintatavoista.

Sisäisen tarkastuksen laajuus yrityksissä vaihteli suuresti sen mukaan kuinka paljon ihmisiä siihen oli sitoutunut ja kuinka syvällisesti ja laajasti tarkastus haluttiin tehdä. Joissakin organisaatioissa sisäisiä tarkastajia käytettiin tarkastamaan taloudellisia ja toiminnallisia rutiineja, jolloin painopiste oli oikeellisuudessa, turvallisuudessa ja petoksen havaitsemisessa. Joissakin organisaatioissa taas sisäisille tarkastajille annettiin korkeampi painoarvo ja heitä pyydettiin analysoimaan ja arvioimaan yritystoiminnan kannalta tärkeitä taloudellisia ja toiminnallisia kysymyksiä.

Toisen maailmansodan aiheuttamat muutokset taloudessa johtivat sisäisen tarkastuksen ammattialan voimakkaaseen kasvuun. Sodan jälkeisellä ajanjaksolla suuri joukko yrityksiä etsi uusia mahdollisuuksia hyödyntää sodan aikana kertynyttä ylikapasiteettia. Sota-ajan luoma sotilaallinen kysyntä ja tuotanto lakkasivat nopeasti rauhan koitettua ja kilpailu lisääntyi, jolloin yritykset pyrkivät leikkaamaan toimintamenojaan ja kasvattamaan markkinaosuuksiaan. Tähän päämäärään päästäkseen yritysten johto kääntyi sisäisen tarkastuksen puoleen (Gupta 1991).

Valitettavasti sisäiset tarkastajat eivät pystyneet hyödyntämään tätä tilaisuutta ammattikunnan kehittämiseen. Tähän on kirjallisuudessa esitetty neljä pääsyytä. Ensinnäkin, sisäisillä tarkastajilla ei ollut mahdollisuutta päästä kaikkiin yritystä koskeviin tietoihin ja he eivät pystyneet kyseenalaistamaan johdon päätöksiä. Toiseksi, suurimmalla osalla sisäisen tarkastuksen yksiköistä ei ollut harjaantuneita laskentatoimen ammattilaisia ja kolmanneksi, useimmat sisäisen tarkastuksen osastot keskittyivät vain laskentatoimen ja rahoituksen kysymyksiin. Neljäntenä pääsyynä on esitetty, että suurin osa sisäisen tarkastuksen osastoista raportoi alemmalle johdolle. Pian yritysten johto kuitenkin huomasi, että onnistuakseen tehtävässään sisäisen tarkastuksen asemaa organisaatiossa tulisi vahvistaa voimakkaasti. Tällöin johto alkoi parantaa sisäisen tarkastuksen ammatillisia toimintaedellytyksiä (Gupta 1991).

Vähitellen myös ammattikunnan sisäinen aktiivisuus vaikutti sisäisen tarkastuksen voimakkaaseen kehittymiseen 1940-luvulla. Yhä suurempi osa sisäisistä tarkastajista alkoi tunnistaa merkityksensä ja kehittää yhteyksiä ja suhteita ammattilaisiin muissa organisaatioissa saadakseen apua omassa työssään kohtaamiensa ongelmien ratkaisuihin. Tämä johti siihen, että vuonna 1941 joukko sisäisiä tarkastajia kokoontui yhteen, minkä seurauksena moderni sisäinen tarkastus alkoi kehittyä ja he perustivat yhdistyksen The Institute of Internal Auditors (IIA). IIA pyrki laajentamaan sisäisen tarkastuksen toimikenttää laskennallisten virheiden ja väärinkäytösten etsimisestä järjestelmän heikkouksien etsimiseen ja parannusehdotusten tekemiseen.

IIA:n tavoitteeksi asetettiin tuolloin seuraavaa:

"Harrastaa, edistää ja välittää sisäistä tarkastusta ja siihen liittyviä aihepiiriä koskevaa tietoa ja informaatiota. Luoda ja ylläpitää korkeita standardeja rehellisyydessä, kunniallisuudessa ja luonteenlujuudessa sisäisten tarkastajien keskuudessa. Hankkia jäsenilleen, muille sisäisestä tarkastuksesta kiinnostuneille ja suurelle yleisölle informaatiota sisäisestä tarkastuksesta sekä sen käytännöistä ja metodeista. Edistää sisäisen tarkastuksen käytäntöjä ja metodeita käsittelevien artikkeleiden julkaisua. Luoda ja ylläpitää kirjastoa ja lukusaleja, kokoussaleja ja sosiaalisia tiloja jäsentensä käyttöön. Edistää sosiaalista kanssakäymistä jäsentensä keskuudessa ja tehdä kaikkia niitä tehtäviä jotka ovat laillisia ja sopivia edellä ilmaistujen tavoitteiden edistämiseksi."

Joulukuussa 1941 ensimmäiseen IIA:n kokoukseen osallistui 24 jäsentä Yhdysvaltojen itärannikolta ja keskilännestä. Jäsenmäärä kasvoi ensimmäisenä vuonna sataan jäseneen ja viidessä vuodessa tuhanteen jäseneen. Vuonna 1957 yhdistyksessä oli 3700 jäsentä, joista 20 prosenttia toimi Yhdysvaltojen ulkopuolella. Vuonna 2006 jäsenmäärä on noussut lähes 120 000 jäseneen. Tällä hetkellä jäseniä on 160 maassa ja jäsenjärjestöjä 246 järjestöä 90 maassa. Suomessa Sisäiset Tarkastajat ry (the IIA-Finland) toimii sisäisten tarkastajien yhteistyöjärjestönä. Tähän suomalaiseen järjestöön kuuluu lähes 600 jäsentä Suomen johtavista yrityksistä ja yhteisöistä.

Ensimmäinen Certified Internal Auditor (CIA) –ammattitutkinto suoritettiin vuonna 1974 Yhdysvalloissa. Tänä päivänä tämä tutkinto on ylin sisäisen tarkastuksen ammattitutkinto ja se on kansainvälisesti tunnustettu kaikkialla maailmassa. Suomessa ensimmäinen CIA-tutkinto suoritettiin vuonna 1991 ja vuonna 2006 tutkinnon suorittaneita oli yli sata henkilöä. Tämän CIA-tutkinnon rinnalle on noussut myös muita erityisalueisiin painottuneita ammattitutkintoja. Tälläisia ovat esimerkiksi Information Systems Audit and Control Associationin (ISACA) järjestämä Certified Internal Systems Auditor -tutkinto (CISA), Board of Environmental Health Safetyn (BEAC) ympäristöpainotteinen Certified Professional Environmental Auditor (CPEA) –tutkinto ja Association of Certified Fraud Examinersin (ACEF) väärinkäytösten tutkimukseen painottuva Certified Fraud Examiner (CFE) –tutkinto.

Seuraavaan taulukkoon 1 on koottu yhteenvetona tilintarkastuksen ja sisäisen tarkastuksen kehittymisen kannalta keskeisimmät vuosiluvut.

Taulukko 1. Tilintarkastuksen ja sisäisen tarkastuksen tärkeitä vuosilukuja (Sawyer, Dittenhofer, Scheiner ym. 2003:12)

	Tilin-tarkastus	**Sisäinen tarkastus**
Ammattiyhdistykset		
American Association of Public Accountants	1886	
The Institute of Internal Auditors		1941
Ammatilliset lehdet		
Journal of Accountancy	1905	
Internal Auditor		1943
Ammattitutkinnot	1896	1974
Ammatilliset käsikirjat		
Dicksee's Auditing (Englanti)	1892	
Montgomery's Auditing (USA)	1914	
Brink's Internal Auditing (USA)		1941
Sawyer's Modern Internal Auditing (USA)		1973
Eettiset koodit	1917	1968
Ammattistandardit	1954	1978

Tieteellisen tilintarkastustutkimuksen syntyminen

Kun tilintarkastuksen asema oli vakiintunut 1900-luvun puolivälissä yritysmaailmassa ja muussa yhteiskunnassa, alkoi akateemisten tutkijoiden mielenkiinto vähitellen kohdistua siihen. Tämä tapahtui suhteellisen myöhään. Tutkimuksia, joissa voidaan tunnistaa tieteelliset elementit, syntyi tilintarkastuksen kenttään 1970-luvun lopulta alkaen. Tutkimuksen käyntiinlähtö oli hidasta mutta siinä tapahtui räjähdysmäinen kasvu 1990-luvulla.

Räjähdysmäiseen kasvuun oli olemassa monia syitä. Osakemarkkinoiden laajentuessa ja kasvaessa sijoittajien merkitys nousi yhä tärkeämmäksi. Sijoittajien merkityksen kasvun myötä myös vaatimus oikeellisesta ja totuutta vastaavasta informaatiosta heidän keskuudessaan kasvoi. Vähäisenä ei voi myöskään pitää laajoja tilintarkastuksen epäonnistumiseen liittyneitä skandaaleja, joita mediassa maailmanlaajuisesti on käsitelty, välillä erittäinkin yksityiskohtaisesti. Tämä nosti myös aiheen ajankohtaisuutta ja lisäsi kiinnostusta tilintarkastustutkimusta rahoittavilta tahoilta. Tärkein ja keskeisin syy, joka osaltaan oli seurausta edellä esitetyistä syistä, oli kuitenkin eri yliopistoihin perustetut tilintarkastusalan tutkimukseen liittyvät oppituolit. Näitä rahoittamassa on ollut aktiivisesti myös tilintarkastusyhteisöt.

Tieteellisen tutkimuksen kenttään erilaisia tilintarkastukseen liittyviä tutkimusaihepiirejä on syntynyt lukuisia. Muiden muassa tilintarkastajan konsultointiin liittyvät kysymykset, tilintarkastuksen laadun arviointi, tilintarkastajan riippumattomuuden eri muodot ja ammattitaitoon liittyvät kysymykset ovat olleet tutkimuksen kohteina. Tämän artikkelin näkökulmasta kiinnostavia ovat kuitenkin ne tieteellisen tutkimuksen aihepiirit, jotka kohdistuvat tilintarkastajan ammatin kehityksen kannalta keskeisiin kysymyksiin. Nämä kysymykset voidaan esittää seuraavasti:

Mitä informaatiota tilintarkastusraportin tulisi sisältää ja kenelle se tulisi suunnata?

Millä perusteella tilintarkastaja tekee päätökset raportointinsa pohjaksi?

Millainen korvaus tehdystä tilintarkastustyöstä tulisi saada?

Seuraavassa tarkastelemme, millaisista näkökulmista tieteellinen tutkimus on näitä kysymyksiä lähestynyt.

Mitä informaatiota tilintarkastusraportin tulisi sisältää ja kenelle se tulisi suunnata: Tilintarkastajan raportointia koskeva tutkimus

Käytännön tilintarkastusprosessi kulminoituu tarkastuksen loppuvaiheessa tilintarkastajan osakkeenomistajille tai muille sidosryhmille laatimaan tilintarkastuskertomukseen. Tämän raportin tarkoituksena on osoittaa tilinpäätöstietojen hyväksikäyttäjille tilintarkastajan näkemys muun muassa siitä, antaako tarkastettu tilinpäätösaineisto oikean ja riittävän kuvan tarkastuskohteen taloudellisesta tilanteesta.

Omalta osaltaan yrityksen johto pyrkii aina välttämään mukautetun tilintarkastuskertomuksen saamisen, sillä se voi vaikuttaa moniin tekijöihin kuten yrityksen osakkeen markkinahintaan, johdon palkkaukseen ja maineeseen ja yrityksen rahoituksen hankintaan tulevaisuudessa. Keskeinen tutkimuskysymys on, miten arvokas on se informaatio, joka tilintarkastuskertomukseen sisältyy osakkeenomistajien ja muiden tilinpäätöksen hyväksikäyttäjien kannalta.

Eräs tilintarkastajan raportointia käsittelevä tutkimusalue tarkasteleekin mukautetun tilintarkastuskertomuksen merkitystä sen hyväksikäyttäjille. Tärkein tilintarkastuskertomuksen hyväksikäyttäjä on sijoittaja. Pääomamarkkinatutkimukseen liittyy kuitenkin erityisongelmia kuten se, että osakemarkkinoille virtaa informaatiota yhtäaikaisesti useasta eri lähteestä ja niiden erottaminen yleisestä kohinasta voi olla vaikeaa, jos ei mahdotonta. Markkinamallipohjainen tutkimus onkin saanut osakseen kritiikkiä, koska arvellaan olevan mahdotonta eristää mukautetun tilintarkastuskertomuksen sisältämää infoa muusta yrityksen toimintaympäristöstä tulevasta informaatiosta (Bailey 1982). Samaten ongelmallisena on pidetty mm. mukautetun tilintarkastuskertomuksen julkistamisajankohdan määrittelyä ja etukäteisodotusten vaikutusta. Näistä ongelmista huolimatta tutkimukset ovat osoittaneet, että osakemarkkinat reagoivat mukautettuihin tilintarkastuskertomuksiin (Dopuch, Holthausen & Leftwich 1986; Choi & Jeter 1992; Louder, Khurana, Sawyers, Cordey, Johnson, Lowe & Wunderle 1992).

Kun edellisissä tutkimuksissa tarkastellaan sijoittajien reaktioita mukautetun tilintarkastuskertomuksen julkaisemiseen, toisen tärkeän tilintarkastuskertomuksen hyväksikäyttäjäryhmän eli luotonantajien osalta pyritään mittaamaan heidän arvioitaan, havaitsemiskykyään ja käsityskykyään. Joissakin tutkimuksissa on esitetty evidenssiä, ettei luotonantaja huomioisi tilintarkastuskertomuksen sisältöä (Libby 1979; Houghton 1983; Abdel-Khalik, Graul & Newton 1986). Myös vastakkaisia tuloksia on saatu, esim. Firth (1979), Gul (1987) ja LaSalle & Anandarajan (1997).

Toinen tutkimusalue, tilintarkastajan vaihtuminen mukautettuihin tilintarkastuskertomuksiin liittyen sisältää laajan tutkimusjoukon. Merkittävän avauksen aihepiiriin teki DeAngelo (1981), joka esitti, että tilintarkastajan taloudellinen riippuvuus asiakkaastaan saattaa johtaa myönnytyksiin tilintarkastajan taholta. Tällöin voitiin ajatella, että mikäli tilintarkastaja ei hyväksy tarkastuskohteen taloudellisessa raportoinnissa tehtyjä ratkaisuja, voitaisiin tilanne korjata vaihtamalla tilintarkastajaa. Tämän jälkeen useissa tutkimuksissa mitattiin asiakkaan taloudellista riippuvuutta tilintarkastusyhteisöstä (DeAngelo 1981; Francis & Wilson 1988; Lys & Watts 1994). Reynolds & Francis (2001) ehdottivat, että myös tilintarkastusyhteisön paikallisuus saattaa vaikuttaa taloudelliseen riippumattomuuteen.

Aikaisemmat tutkimukset ovat osoittaneet, että mukautetun tilintarkastuskertomuksen saaneella yrityksellä on pyrkimyksiä vaihtaa tilintarkastajaa (Chow & Rice 1982; Craswell 1988; Vanstraelen 2003). Yleensä näissä tapauksissa tilintarkastajaa halutaan vaihtaa pienempään yhteisöön (Johnson & Lys 1990; Chan, Lin & Mo 2006). Tutkimustulokset ovat kuitenkin ristiriitaisia. Joidenkin tutkimusten mukaan tilintarkastajan vaihtumisen ja mukautetun tilintarkastuskertomuksen saamisen välillä voidaan löytää tilastollinen riippuvuus (Citron & Taffler 1992; Chow & Rice 1982; Craswell 1988), kun taas osa tutkimuksista ei ole pystynyt löytämään merkittävää yhteyttä (Smith 1986; Haskins & Williams 1990; Schwartz & Menon 1985).

Kolmas tutkimusalue on keskittynyt tilintarkastusraportin rooliin ennustamisessa. Keasey & Watson (1987) osoittivat tutkimuksessaan, että pienyrityksen konkurssin ennustamisessa voidaan saada parempia tuloksia, kun tilintarkastuskertomuksen muoto otetaan mukaan tarkasteluun selittävänä muuttujana. Samansuuntaisia tuloksia ovat saaneet myös Hopwood, McKeow & Mutchler (1989) ja Sundgren (1998). Toisaalta tilintarkastuskertomuksen muoto on toiminut monessa tutkimuksessa myös selitettävänä muuttujana. Tällöin sen muotoa on pyritty ennustamaan erilaisilla taloudellisilla (Mutchler 1985; Dopuch, Holthausen & Leftwich 1987; Keasey, Watson & Wynarzcyk 1988) tai ei-taloudellisilla muuttujilla (Chen & Church 1992; Goodman, Braunstein & Gregory 1995; Mutchler, Hopwood & McKeown 1997) ja näiden yhdistelmillä (Laitinen & Laitinen 1998).

Millä perusteella tilintarkastaja tekee päätökset raportointinsa pohjaksi: Tilintarkastajan päätöksenteko

Tilintarkastajan päätöksentekoa koskeva laskentatoimen tutkimus käyttää hyväkseen psykologiasta sovellettuja malleja ja lähestymistapoja. Tutkimuksen tavoitteena on hahmottaa, ymmärtää, evaluoida ja parantaa tilintarkastuksen yhteydessä tapahtuvia päätöksentekoprosesseja. Ennen kuin tilintarkastajan aloittama tilintarkastustyö päättyy tarkastuksen loppuvaiheen valmiiseen tilintarkastuskertomukseen, hän on joutunut ottamaan kantaa moneen kysymykseen tarkastelemassaan aineistossa. Kun yrityksen laskentatoimen tuottamalle informaatiolle ei perinteisessä mielessä voida yhteisesti sopia tai osoittaa "oikeita" arvoja, tilintarkastajan tehtäväksi jää toistuvasti tehdä päätöksiä tulkintojen sopivuudesta. Tämä käytännön ongelma muodostaa lähtökohdan tilintarkastustehtäviä koskevalle tieteelliselle tutkimukselle.

Tutkimusaluetta on aikaisempien tutkimuksien yhteydessä luokiteltu monella eri tavalla (ks. esim. Libby & Luft 1993 tai Solomon & Trotman 2003). Tässä artikkelissa esittelemme tutkimusaluetta Nelson & Tanin (2005) käyttämän jaottelun pohjalta, jossa se on jaoteltu kolmeen eri osa-alueeseen; varsinaisia tilintarkastustehtäviä koskeva tutkimus, tilintarkastajaa itseään ja häneen liittyviä tekijöitä koskeva tutkimus ja tilintarkastajan ja eri sidosryhmien välistä vuorovaikutusta koskeva tutkimus.

Ensimmäinen tilintarkastajan päätöksentekoa koskeva tutkimuksen osa-alue on tilintarkastustehtäviä koskeva tutkimus, joka on keskittynyt neljän eri teeman ympärille.

Ensimmäinen teema sisältää tilintarkastuksen suunnittelun ja tilintarkastusriskin arvioinnin. Yleinen tilintarkastusriskimalli on muotoa

Tilintarkastusriski = IR x CR x DR,

missä

IR = toimintariski (inherent risk)
CR = kontrolliriski (control risk)
DR = havaitsemisriski (detection risk)

Toimintariskillä tarkoitetaan tällöin riskiä, että tilintarkastettava aineisto sisältää virheen tai puutteen, joka saattaa olla olennainen. Kontrolliriskissä kyseessä on riski, että asiakkaan omat sisäisen valvonnan toiminnot eivät ole pystyneet estämään olennaisen virheen syntymistä tilintarkastettavassa aineistossa. Havaitsemisriski tarkoittaa riskiä, että tilintarkastaja epäonnistuu löytämään tilintarkastettavassa aineistossa olevan olennaisen virheen. (ks tarkemmin esim. Proter, Simon & Hatherly 1996).

Toinen teema käsittelee tilintarkastajien analyyttisiä menettelytapoja ja evidenssin arviointia. Tämä teema sisältää tutkimuksia tilintarkastajan päätöksentekotilanteiden arvioinnista analyyttisten menettelytapojen yhteydessä eri vaiheissaan. Nämä vaiheet ovat ongelman muotoilu, hypoteesin muodostaminen tarkastettavasta aineistosta, tiedon hankkiminen hypoteesia koskien, hypoteesin arviointi ja lopulta päätöksenteko tarkastettavan hypoteesin osalta. Tähän aihepiiriin sisältyvät esimerkiksi tutkimukset, joissa tarkastellaan miten asiakkaan antamat selvitykset vaikuttavat tilintarkastajan hypoteesien muodostamiseen ja niiden arviointiin (Koonce 1993). Tutkimuksissa on tarkasteltu mm. asiakkaiden antamien selvitysten vaikutusta tilintarkastajan työhön (Bedard & Biggs 1991) tai tilintarkastajien evidenssilähteiden luotettavuudesta huolehtimista (Hirst 1994; Bernardi 1994).

Kolmas tilintarkastustehtävään liittyvä tutkimusteema on tilintarkastajan kehotus asiakkaalle korjata havaittu virhe tai epäkohta tilitarkastettavassa aineistossa. Tähän liittyy keskeisesti virheen olennaisuuden määritelmä. Ensimmäisiä aiheesta tehtyjä tutkimuksia oli Farmer (1987), joka havaitsi, että tilintarkastajat olivat taipuvaisia vaatimaan muutoksia kirjaustapoihin jos oikeudenkäyntiriski oli suuri ja asiakkaan menetyksen uhka pieni. Koko tutkimusteema keskittyykin jossakin määrin tilintarkastajan asiakkaalle antamien korjauskehotusten ja tilintarkastajan saamien kannustimien väliseen suhteeseen (ks. esim. Nelson 2004).

Neljäs ja viimeinen teema tilintarkastustehtävään liittyen on tilintarkastajan toiminnan jatkuvuus -päätös ja tilintarkastuskertomuksen mukauttaminen. Kidan (1980) tutkimuksessaan esiintuoma tutkimuskysymys on ollut pohjana koko tälle tutkimustehtävälle eli kun tilintarkastajat ilmeisestikin pystyvät melko pitkälle erottelemaan yritysjoukosta konkurssiin menevät ja toimivat yritykset, miksi tämä erottelu ei heijastu heidän laatimissaan tilintarkastuskertomuksissa? Edelleen tutkimuskohteena on se, missä määrin kyseessä on tietoinen ratkaisu ja missä määrin asiaan vaikuttavat tilintarkastajan päätöksenteon taustalla olevat motiivit ja taloudelliset ja muut kannustimet. (Nelson ym. 2005).

Toinen tilintarkastajan päätöksentekoa koskeva tutkimuksen osa-alue on tilintarkastajaa itseään ja häneen liittyviä tekijöitä koskeva tutkimus. Keskeisimpiä tutkimusteemoja tästä aihepiiristä ovat tilintarkastajan tietämystä ja asiantuntemusta sekä muita yksilöllisiä ominaispiirteitä koskeva tutkimus. Tähän yhteyteen Nelson ym. (2005) liittävät myös tiedollisia rajoitteita (esim. Schultz & Reckers 1981) ja päätöksenteon apuvälineitä (esim. Lowe ym. 2002) koskevat tutkimukset.

Tilintarkastajan tietämystä ja asiantuntemusta koskevasta teemasta Ashton & Kramer (1980) raportoivat ensimmäisinä, että opiskelijoiden ja tilintarkastajien päätöksentekoprosesseissa oli samankaltaisuuksia. Myöhemmät tutkimukset johtivat vastakkaisiin tuloksiin (Messier 1983; Krogstad ym. 1984). Tulosten erilaisuus sai osaselityksen, kun Biggs ym. (1987) osoittivat kokeneen tilintarkastajan omaavan asiantuntijuutta, joka parantaa päätöksenteon laatua. Asiantuntijuutta pyrittiin mittaamaan ja tutkimaan tarkastelemalla erilaisia tietämyksen ja tehtävän yhdistelmiä. Bonner & Lewis (1990) ensimmäisten joukossa osoittivat, että kokemuksella ja asiantuntijuudella on selkeä ero ja että tietämyksen osalta voidaan löytää useita eri alueita. Vähitellen tämä tutkimus johti toimialaerikoistumisen tutkimiseen (Taylor 2000; Owhoso, Messier & Lynch 2002; Low 2004).

Tilintarkastajan yksilöllisiä ominaispiirteitä on käytetty selittävinä tekijöinä monen eri ilmiön yhteydessä. Harrell, Chewning & Taylor (1986) tarkastelivat, kuinka organisatio-naalinen ja ammatillinen sitoutuminen vaikuttavat sisäisten tarkastajien työtyytyväisyy-teen ja vaihtuvuuteen ja samana vuonna Choo (1986) tarkasteli mm. A-tyypin persoo-nallisuuden ja sitoutumisen vaikutusta työperäiseen stressiin. Työkokemuksen vaikutuk-sesta tilintarkastajan päätöksentekoon on saatu ristiriitaisia tuloksia. Myös kognitiivisia tekijöitä on tutkittu paljon (ks. esim Ho & Waymond 1993).

Kolmas ja viimeinen tilintarkastajan päätöksentekoa koskeva tutkimuksen osa-alue on tilintarkastajan ja eri sidosryhmien välistä vuorovaikutusta koskeva tutkimus. Tilin-tarkastajan ja toisten tilintarkastajien välistä interaktiota on tutkittu mm. yksilön ja tiimin tekemien päätösten eroja vertailemalla sekä tarkastelemalla erilaisten tiimien vaikutusta päätöksentekoon (Trotman 1985; Trotman & Yetton 1985). Erityyppisiä tutkimuksia on tehty myös siitä, miten tilintarkastajan laatimien raporttien sisältöön vaikuttaa niiden hyväksikäyttäjästä annettu preferenssitieto (Peecher 1996; Wilks 2002). Raportin hyväksikäyttäjän aseman vaikutusta suhteessa raportin laatijaan on myös tutkittu (Tan & Kao 1999).

Tilintarkastajan ja asiakkaan välistä vuorovaikutusta on tutkittu mm. tarkastelemalla heidän neuvotteluprosessiaan laskentatoimen kysymyksistä (Gibbins ym. 2001; Gibbins ym. 2005). Tähän neuvotteluprosessiin on lisätty mm. erilaisia kannustimia (Nelson ym. 2002), eri osapuolien näkemyksiin keskittymistä (Libby & Kinney 2000; Ng & Tan 2003; Sanchez ym. 2004), keinotekoisia neuvottelupartnereita (Tan & Trotman 2004; Brown & Johnstone 2004) ja psykologisia tekijöitä (King 2002).

Muiden sidosryhmien ja tilintarkastajien välistä vuorovaikutusta on yleisesti tutkittu riippumattomuuden näkökulmasta (Pany & Reckers 1987; Lowe ym. 1999). Keskeinen tutkimuskysymys tuolloin on, näyttääkö tilintarkastuskertomuksen hyväksikäyttäjän mielestä tilintarkastajan riippumattomuus jostakin syystä vaarantuneen.

Millainen korvaus tehdystä tilintarkastustyöstä tulisi saada: Tilintarkastuspalkkioita koskeva tutkimus

Tilintarkastuspalkkioiden taloudellinen merkitys yrityselämälle on suuri ja se kasvaa koko ajan. Tähän on liittynyt monia tekijöitä, kuten toisaalta varsinaisten tarkastuspalkkioiden maksaminen ja toisaalta samassa asiakassuhteessa maksetut konsultointi- ja muut palkkiot. Käytännössä keskustelua on herättänyt se, miten kahden samankokoisen ja samalla toimialalla toimivan yrityksen tilintarkastuspalkkiot voivat poiketa toisistaan suurestikin. Tilintarkastajat ovat perustelleet suurta vaihtelua palkkioissa asiakkaiden erityispiirteillä.

Tilintarkastuspalkkioita koskeva tutkimus on jatkanut niitä suuntaviivoja, jotka Simunic (1980) tutkimuksessaan esitti. Tutkimuskohteena on pääsääntöisesti ollut joukko erilaisia tilintarkastuskohteeseen ja tilintarkastusyhteisöön liittyviä tekijöitä, joiden vaikutusta tilintarkastuspalkkion suuruuteen on testattu. Osa tutkituista tekijöistä on toistuvasti antanut samansuuntaisia tuloksia riippumatta otoksesta tai tutkimuksen kohdemaasta. Joidenkin tekijöiden osalta tulosten vaihtelu taas on ollut voimakasta (Hay, Knechel & Wong 2006).

Hay ym. (2006) analysoimissa 147 tilintarkastuspalkkiotutkimuksissa oli käytetty yhteensä 186 selittävää muuttujaa. Hay ym. (2006) luokittelivat nämä 186 selittävää muuttujaa neljään alaryhmään eli asiakkaisiin (yhdeksän ominaisuutta), tilintarkastusyhteisöön (kolme ominaisuutta) ja toimeksiantosuhteeseen (viisi ominaisuutta) liittyviin ominaisuuksiin sekä muihin yksittäisiin muuttujiin.

Asiakkaisiin liittyvistä muuttujista palkkiotutkimuksissa kaikkein eniten tutkittu muuttuja on yrityksen koko, jolla on todettu olevan positiivinen riippuvuus tilintarkastuspalkkion kanssa (Simunic 1980). Yleisimpinä mittareina on tällöin käytetty taseen loppusummaa ja liikevaihdon suuruutta. Taseen loppusummaa voidaan pitää approksimaationa siitä työstä, joka taseen tarkastamiseen on käytettävä luotettavan lopputuloksen saamiseksi. Liikevaihto taas approksimoi vastaavaa työmäärää eri toimintojen luotettavuuden tarkastamiseksi. Muita asiakkaisiin liittyviä tutkittuja ominaisuuksia ovat asiakkaan liiketoimintojen kompleksisuus (Simunic 1980; Hackenbrack & Knechel 1997), toimintariski (Simunic 1980; Stice 1991), kannattavuus (Simunic 1980), velkaisuus (Gist 1994), omistussuhteet (O'Sullivan & Diacon 2002), sisäinen valvonta (Knechel 2001), omistajaohjaus (Tsui, Jaggi & Gul 2001; Carcello, Hermanson, Neal & Riley 2002) ja toimiala (Turpen 1990; Pearson & Trompeter 1994). (Hay ym. 2006).

Tilintarkastajiin liittyvistä muuttujista palkkiotutkimuksissa on tarkasteltu tilintarkastuksen laatua, joka usein on liitetty tilintarkastusyhteisön kokoon (Matthews & Peel 2003). Tutkittavina muuttujina on ollut myös tilintarkastajan erikoistumisen aste (Hogan & Jeter 1999), toimeksiantosuhteen pituus (Simunic 1980; Rubin 1987) ja tilintarkastajan vaihdokset (Simon & Francis 1988; Pong & Whittington 1994) sekä tilintarkastajan toimipaikan sijainti. (Hay ym. 2006).

Toimeksiantosuhteeseen liittyvinä tilintarkastuspalkkioon vaikuttavina muuttujina on tutkittu tilintarkastuskertomuksen viivästymistä (Knechel & Payne 2001), tilintarkastuksen tekoa sesonkiaikana, tilintarkastuskertomuksen mukauttamista (Ashton 1988) ja konsultointipalveluiden myyntiä (Davis, Ricchiute & Trompeter 1993; Firth 1997, 2002). Ongelmana konsultoinnin liittyessä tilintarkastukseen pidetään riskin kohoamista siitä, että tilintarkastaja myöntyy johdon toivomuksiin saadakseen jatkaa tuottoisaa konsultointia. Myös tilintarkastusraporttien lukumäärää on pidetty mahdollisena palkkioon vaikuttavana tekijänä. (Hay ym. 2006).

Tieteellisen sisäiseen tarkastukseen kohdistuvan tutkimuksen syntyminen

Sisäisen tarkastuksen merkitys yritysten toiminnassa on kasvanut huimasti viime vuosina. Tähän kehitykseen ovat vaikuttaneet yritysskandaalit, jotka ovat vauhdittaneet muutoksia sekä lainsäädännössä että yrityksiä koskevissa suosituksissa. Myös sisäisten tarkastajien ammattikunta on havahtunut uusiin vaatimuksiin ja ammattistandardit uusittiinkin 2000-luvulla vastaamaan nykyisiin erittäin haastaviin ja nopeasti muuttuviin tarpeisiin.

Kuten tilintarkastuksessakin, ensimmäisiä tieteellisiä tutkimuksia sisäisestä tarkastuksesta syntyi 1970-luvulla. Varsinainen tutkimustoiminta käynnistyi 1990-luvulla ja se lisääntyi kiihtyvällä tahdilla 2000-luvulle saavuttaessa. Tutkimusalueita ovat olleet muun muassa sisäisen tarkastuksen laadunvarmistus, petoksiin ja riskeihin liittyvä tutkimus, eettiset kysymykset sekä corporate governance -toimintaan, sisäiseen valvontaan ja sisäisen tarkastuksen tulevaisuuteen liittyvät tutkimukset. Sisäisen tarkastuksen tutkimus on sinänsä haasteellista, sillä sisäiseen tarkastukseen liittyvät asiat ovat yrityksessä usein hyvin suojattu ja yrityksen ulkopuolelle siitä annettavat tiedot vähäisiä. Tilanne on kuitenkin muuttumassa corporate governance -kehityksen myötä ja aineistoa on vapaammin saatavilla tutkijoiden käyttöön (kts. Laitinen & Jokipii 2005).

Tässä artikkelissa keskitytään niihin sisäisen tarkastajan ammattiin ja ammattikuntaan liittyviin haasteisiin, joita on tutkittu jo pidempään ja joihin pyritään saamaan vastauksia akateemisella tutkimusareenalla edelleen. Nämä tutkitut haasteet voidaan esittää kolmen kysymyksen muodossa seuraavasti:

Mikä on sisäisen tarkastajan ammatinkuva ja rooli?

Millainen suhde sisäisellä tarkastuksella ja sen lähisukulaisella tilintarkastuksella on toisiinsa?

Tulisiko sisäisen tarkastuksen tehtävät hoitaa yrityksen sisäisinä toimintoina vai ulkoistaa?

Seuraavassa tarkastelemme, millaisia vastauksia tieteellinen tutkimus on näihin kysymyksiin löytänyt.

Mikä on sisäisen tarkastajan ammatinkuva ja rooli: Sisäisen tarkastajan ammattia ja roolia koskeva tutkimus

Sisäisen tarkastajan ammatti ja rooli ovat olleet suurten muutosten alla kuluneina vuosikymmeninä. Sisäisen tarkastajan ammattiin ja rooliin liittyviä tutkimuksia onkin tehty jo 1970 -luvulla. Ensimmäisten joukossa Gobeil (1972) tutki taitoja, joita sisäisillä tarkastajilla tulisi olla ammatin vaatimissa tilanteissa. Tätä tutkimusta pidetään ensimmäisenä Common Body of Knowledge (CBOK) -tutkimuksena, johon liittyen on tehty jatkotutkimuksia, viimeisin IIA:n maailmanlaajuisesti tekemänä vuonna 2006 (Abdolmohammadi, Burnaby & Hass 2006). CBOK (2006) tutki muun muassa sisäisten tarkastajien työtehtävien laajuutta ja tehtävien suorittamiseen tarvittavia taitoja, tarkastajien käyttämiä tekniikoita sekä tulevaisuuden näkymiä. Muita CBOK-tutkimuksia ovat tehneet Barrett, Lee, Roy & Verastegui (1985), Albrecht & Stice (1992), Birkett, Barberra, Leithhead, Lower, & Roebuck (1999).

Sisäisten tarkastajien ammattiin liittyviä tutkimuksia löytyy runsaasti. Muun muassa Kwon & Banks (2004) tutkivat tekijöitä, jotka vaikuttavat sisäisten tarkastajien organisationaaliseen ja ammatilliseen sitoutumiseen. Organisaatioon sitouttaviksi tekijöiksi havaittiin sukupuoli ja yrityksen koko, mutta negatiivisesti organisaatioon sitouttaviksi tekijöiksi havaittiin organisaation tyyppi ja sisäisen tarkastajan ammattitutkinto. Sen sijaan ammatilliseen sitoutumiseen vaikuttivat positiivisesti sekä ammattitutkinto että asema tarkastusyksikössä. Sukupuolen vaikutusta sisäisenä tarkastajana toimimiseen ovat tutkineet myös Burridge & Thomas (1996).

Sisäisten tarkastajien ammattitutkinnon (CIA) vaikutuksia tutkivat Gramling & Myers (1997). He havaitsivat, että ammattitutkintoa pidetään positiivisena indikaattorina sisäisen tarkastajan pätevyydelle ja se koetaan tärkeäksi tarkastajan urakehityksen kannalta. Tutkinnolla ei kuitenkaan ollut merkitystä siihen, kuinka hyvin tarkastajien antamat kehitysehdotukset hyväksyttiin tarkastuskohteissa eikä sillä havaittu olevan vaikutusta muuhun urakehitykseen sisäisen tarkastustoiminnon ulkopuolella.

Sisäisen tarkastuksen työn tehokkuuteen ja työtyytyväisyyteen vaikuttavia tekijöitä ovat tutkineet Apostolou, Pasewark & Strawser (1993). Sisäisen tarkastusyksikön statuksen, organisaation ja ammatillisten tavoitteiden eroavaisuuksien sekä tarkastajan kokeman stressin välistä vuorovaikutusta tutkivat Pei & Davis (1989). Cooper ja Graig (1983) tutkivat johdon ja sisäisten tarkastajien välisiä näkemyseroja sisäisen tarkastajan tehtävistä. Myöhemmin Cooper, Leung & Mathews (1996) ja Brody & Lowe (2000) havaitsivat edelleen ristiriitaisia näkemyksiä sisäisten tarkastajien ja yritysjohdon välillä asioista, jotka liittyvät sisäisen tarkastuksen tehtäviin ja tarkastajan rooliin. Ristiriitaisuuksia havaittiin esimerkiksi tilanteissa, joissa sisäiset tarkastajat samanaikaisesti sekä arvioivat johdon tehokkuutta että konsultoivat sitä. Van Peursem (2004) kartoitti laajasti sisäisten tarkastajien näkemyksiä tehtävistään ja riippumattomuudestaan yritysjohtajista. Van Peursem (2005) jatkoi roolin tutkimista ja havaitsi kolme merkittävää vaikuttajamekanismia sisäisen tarkastajan roolin muodostumiselle yrityksessä: sisäisen tarkastajan ammatillinen status, viralliset sekä epäviralliset yhteistyöverkostot sekä sisäisen tarkastajan oma asema roolin määrittelyssä.

Edwards, Kusel & Oxner (2000) vertailivat sisäisten tarkastajien roolia sekä siihen liittyvää palkkakehitystä vuosien 1990 ja 1998 välisenä aikana erityisesti terveydenhuollon piirissä. Tutkimuksessa havaittiin, että tutkitulla ajanjaksolla sisäiset tarkastajat siirtyivät taloudellisten toimintojen tarkastamisesta enemmän johdon konsultoimiseen ja heidän palkkakehityksensä oli nouseva.

Ziegenfuss & Singhapakdi (1994) tutkivat IIA:n ammattistandardien yhteydessä antamien eettisten koodien vaikutusta sisäisiin tarkastajiin. He havaitsivat, että eettiset koodit vaikuttavat voimakkaasti sisäisten tarkastajien eettisiin näkemyksiin. Lisäksi he totesivat, että eettisen koodien avulla ammattikunta on saavuttanut nykyisen ammatillisen statuksensa. Brenner (1985) ja Foster & Greenawalt (1995) tutkivat sisäisen tarkastuksen opetusta eri maiden välillä ja havaitsivat, että maa- ja koulutasokohtaisia eroja löytyi runsaasti.

Millainen suhde sisäisellä tarkastuksella ja tilintarkastuksella on toisiinsa: Sisäisen tarkastuksen ja tilintarkastuksen välistä suhdetta koskeva tutkimus

Sisäisen tarkastuksen ja tilintarkastuksen välinen suhde on jälleen tiivistynyt corporate governance -kehityksen myötä ja se on lisännyt kiinnostusta näiden toimijoiden väliseen yhteistyöhön. Yleisesti aihepiiriä on lähestytty tilintarkastuksen näkökannalta, sillä perinteisesti tilintarkastajat ovat voineet hyödyntää sisäisen tarkastuksen työtä kahdella tavalla (Zain, Subramaniam & Steward 2006); joko siten, että sisäinen tarkastus tekee työtä tilintarkastuksen suoranaisen valvonnan alaisena tai tilintarkastus luottaa sisäisen tarkastuksen itsenäisesti tekemään tarkastustyöhön. Jälkimmäinen vaihtoehto vähentää tilintarkastajan kohteessa tarvitsemia työtunteja ja tutkimus onkin useimmiten keskittynyt tarkastelemaan siihen liittyviä seikkoja. Tutkimukset voidaan jakaa kolmeen osa-alueeseen:

1) tekijät, joiden avulla tilintarkastaja arvioi sisäisen tarkastuksen laatua ja luotettavuutta,

2) sisäisen tarkastuksen tekemän työn ominaisuudet ja laajuus, jolla tilintarkastus käyttää sitä hyödykseen,

3) sisäisen tarkastuksen ja tilintarkastuksen väliseen yhteistyöhön liittyvät muut tutkimukset.

Ensimmäisellä tutkimuksen osa-alueella keskitytään tekijöihin, joiden avulla tilintarkastaja arvioi sisäisen tarkastuksen laadun ja tekee päätöksen tarkastuksen luotettavuudesta. Laatututkimuksissa on useimmiten kiinnostuksen kohteena ollut se, arvioivatko tilintarkastajat sisäisen tarkastuksen laatua kuten on määritelty tilintarkastusstandardeissa (mm. SAS 9 ja SAS 65). Näitä standardeissa määriteltyjä laatutekijöitä ovat sisäisen tarkastajan pätevyys (competence), jota mitataan muun muassa koulutuksella ja tutkinnoilla, objektiivisuus (objectivity), joka osoitetaan esimerkiksi raportointisuhteilla sekä työn laatu (quality of work perfomance), jossa voidaan arvioida esimerkiksi tarkastusohjelmien sopivuutta kohteeseen (Gramling, Maletta, Schneider & Church 2004). Sisäisen tarkastuksen laatua ovat tutkineet Clark, Gibbs & Schroeder (1981), Messier & Schneider (1988), Hopkins (1997) sekä DeZoort, Houston & Peters (2001). Useimmiten näistä kolmesta tekijästä työn laatu on havaittu tärkeimmäksi tekijäksi sisäisen tarkastuksen laatua arvioitaessa. Yleisesti kuitenkin voidaan todeta, että mitä paremmaksi edellä mainitut kolme laatutekijää arvioidaan, sitä enemmän sisäisellä tarkastuksella on vaikutusta suoritettavaan tilintarkastukseen (Krishnamoorthy 2002).

Sisäisen tarkastajan luotettavuuteen liittyviä tutkimuksia tekivät ensimmäisinä Abdel-khalik, Snowball & Wragge (1983), Brown (1983) ja Schneider (1984). Abdel-khalik ym. (1983) havaitsivat, että raportointisuhteet, joilla pyrittiin kuvailemaan tarkastuksen objektiivisuutta olivat tärkein kriteeri, johon tilintarkastajat perustivat luottamuksensa sisäiseen tarkastukseen. Ristiriitaisia tuloksia löysi mm. Schneider (1984), jonka mukaan tärkeimmiksi tekijöiksi luotettavuudessa nousivat pätevyys ja työn laatu. Myöhemmin suomalaisella aineistolla tutkittuna sisäisen tarkastajan pätevyys havaittiin tärkeimmäksi tekijäksi (Jokipii 2001). Kartoittaessaan tekijöitä laajemmin Tiessen & Colson (1990) käyttivät tutkimuksessaan kahtatoista muuttujaa. Tutkituista muuttujista tärkeimmiksi tekijöiksi nousivat edelleen työn laatu, tarkastajan pätevyys ja objektiivisuus.

Sisäisen tarkastuksen laatua on tutkittu myös niiden tekijöiden suhteen, jotka voivat vaikuttaa sisäisen tarkastajan tekemien päätösten objektiivisuuteen. Tekijöinä on käytetty muun muassa IIA:n jäsenyyden vaikutusta (Harrell, Taylor & Chewing 1989) ja tarkastajan etiikkaa (Buchman 1983). Tulokseksi on saatu, että sisäisen tarkastajan tekemien päätösten laatuun vaikuttavat positiivisesti ammatilliset tutkinnot, IIA:n jäsenyys ja kokemus. Edellä esiteltyjen tilintarkastusstandardeissa käsiteltyjen tekijöiden lisäksi myös muiden kuin sisäiseen tarkastajaan liittyvien tekijöiden vaikutusta sisäisen tarkastuksen laatuun on tutkittu. Näitä ovat muun muassa arvioivan tilintarkastajan ominaisuudet (Mills 1996), tilintarkastuspalkkion suuruuden vaikutus (Gramling 1999) sekä tilintarkastajan aiemmat kokemukset sisäisen tarkastuksen toiminnasta (Cambell 1993).

Toinen tutkimuksen osa-alue tarkastelee miten tilintarkastaja tarkastussuunnitelmaa tehdessään käyttää hyödykseen sisäistä tarkastusta. Tutkimuksissa on havaittu, että tilintarkastajat luottavat sisäisen tarkastajan tekemään työhön tietyillä osa-alueilla, kuten esimerkiksi sisäisten valvontajärjestelmien testauksessa. Tutkimuksissa huomattiin lisäksi, että tilintarkastajat vähentävät suunniteltuja tarkastustunteja, jos he voivat luottaa suoritettuun sisäisen tarkastukseen (Maletta & Kida 1993; Felix, Gramling & Maletta 1998; Al-Twaijry, Brierley & Gwilliam 2004).

Kolmas osa-alue on keskittynyt tutkimaan muun muassa tarkastuspalkkioiden yhteyttä sisäisen tarkastuksen ja tilintarkastuksen väliseen yhteistyöhön. Esimerkiksi Wallace (1984) havaitsi, että yhteistyö tarkastajien välillä vähensi asiakkaalta veloitettavaa tilintarkastuspalkkiota kymmenellä prosentilla. Myös Felix, Gramling & Maletta (2001) havaitsivat, että jos sisäinen tarkastus oli osallisena taloudellisten raporttien tarkastuksessa, oli tällä tilastollisesti merkittävä vaikutus tilintarkastuskustannuksiin.

Tutkimus koskien sisäisen tarkastuksen ja muiden corporate governance -toimijoiden välisiä suhteita on vielä vähäistä. Nämä tutkimukset ovat esimerkiksi keskittyneet tarkastelemaan, onko tarkastusvaliokuntaan liittyvillä ominaisuuksilla vaikutusta siihen, minkälaiseksi suhde tarkastusvaliokunnan ja sisäisten tarkastajien välillä muodostuu (Carcello, Hermanson & Neal 2002; Goodwin & Yeo 2001) tai vaikuttavatko tarkastusvaliokunnan ominaisuudet sisäisen tarkastuksen ja tilintarkastuksen väliseen suhteeseen (Zain, Subramaniam & Steward 2006). Sisäisen tarkastuksen ja johdon välisiä näkemyseroja ovat tutkineet mm. Haka & Chalos (1990) sekä Cooper ym.(1996).

Tulisiko sisäisen tarkastuksen tehtävät hoitaa yrityksen sisäisinä toimintoina vai ulkoistaa: Sisäisen tarkastuksen ulkoistamista koskeva tutkimus

Toimintojen rationalisointi ja ydintoimintojen ulkopuolisten palvelujen ulkoistaminen yleisesti on vaikuttanut myös sisäisen tarkastustoiminnon ulkoistamiseen. Ulkoistaminen erityisesti sisäisen tarkastuksen yksiköiden kohdalla tuli ajankohtaiseksi 1990-luvulla. Tutkimus aiheesta käynnistyi samoihin aikoihin (esim. Allot 1996; Rittenberg & Covaleski 1997). Tutkimuksissa on keskitytty selvittämään syitä ulkoistamisen lisääntymiselle ja sen mahdollisia vaikutuksia sisäiseen tarkastukseen, tilintarkastukseen ja yrityksen muihin toimijoihin.

Ulkoistamiseen johtavia tekijöitä on esitetty useita. Esillä ovat olleet paremman laadun tavoittelu, erityisosaamisen saatavuus, kustannussäästöt, tarkastuksen riippumattomuuden ja joustavuuden lisääminen sekä valvonnan tehokkuuden vastuun siirtäminen ulkopuoliselle toimijalle. Ulkoistamista vastaan on lueteltu muun muassa seuraavia tekijöitä:

osaamisen katoaminen organisaatiosta, tietoturvariskien lisääntyminen, tarkastajien lojaalisuuden ja toimialan erityispiirteiden tuntemisen vähentyminen sekä pitkäaikaisen suunnitelmallisuuden heikkeneminen. Covaleski, Dirsmith & Rittenberg (2003) mainitsivat tutkimuksessaan ulkoistamisen tärkeimmäksi syyksi taloudelliset tekijät. Samaan tulokseen tulivat myös Carey, Subramaniam & Ching (2006). Myös ulkopuolisen asiantuntemuksen saamisen yritykseen on havaittu olevan merkittävä tekijä yrityksen sisäisen tarkastuksen ulkoistamispäätöksessä (Abbott, Parker, Peters & Rama 2004). Niin ikään Burnaby & Hass (2004) ja Carey ym. (2006) havaitsivat tärkeäksi ulkoistamiseen vaikuttavaksi tekijäksi teknisten taitojen puutteen yrityksessä, jolloin nämä taidot ostetaan ulkopuoliselta tuottajalta. Toinen Burnabyn ym. (2004) havaitsema merkittävä tekijä oli yrityksen kokoon nähden liian pieni sisäisen tarkastuksen yksikkö, jolloin se ei voinut suoriutua kaikista sille annetuista tehtävistä. Widener & Selton (1999) mukaan sisäinen tarkastus sen sijaan halutaan pitää yrityksessä, jos sillä voidaan lujittaa yrityksen kilpailustrategiaa, erityistietämystä ja sen avulla harjoitetaan henkilöstöä. Muun muassa Selim & Yiannakas (2001) esittelevät artikkelissaan menetelmiä sisäisen tarkastuksen ulkoistamiseen ja arvioivat ulkoistamisen tuomia mahdollisuuksia.

Sisäisen tarkastuksen ulkoistamisen vaikutuksia on tutkittu myös tilintarkastajan riippumattomuuden kannalta (mm. Lowe, Geiger & Pany 1999; Swanger & Chewning 2001). Tutkimuskohteena on ollut tilinpäätösten hyväksikäyttäjien suhtautuminen tilintarkastajan riippumattomuuteen tilanteessa, jossa sama yhteisö on tuottanut sekä tilintarkastus- että sisäisen tarkastuksen palveluja yritykselle. Tutkimuksissa on havaittu, että tilintarkastajien riippumattomuus koetaan vahvaksi silloin, kun sisäinen tarkastus on ulkoistettu toiselle yhteisölle kuin sille, joka hoitaa varsinaisen tilintarkastuksen. Lisäksi riippumattomuuteen vaikuttaa positiivisesti se, että tilintarkastusyhteisön sisällä eri henkilöt suorittavat sisäisiä tarkastuksia kuin tilintarkastuksia. Ulkoistamista on tutkittu myös sisäisen tarkastajan objektiivisuuden säilymisen kannalta. Ahlawat & Lowe (2004) totesivat tutkimuksessaan, että ulkoistamisella ei sinällään ollut vaikutusta sisäisen tarkastajan objektiivisuuteen, mutta tarkastuksen toimeksiantajalla sen sijaan oli merkitystä.

Yhteenveto

Tilintarkastuksella ja sisäisellä tarkastuksella on yhteiset juuret kaukana historiassa. Tuhansien vuosien ajan omistus ja päätöksenteko oli keskittyneenä samoille henkilöille, jolloin silloisen tarkastuksen tehtävät olivat yksinkertaisia ja niin samankaltaisia, ettei erillisiä ammattikuntia syntynyt. Kun yritystoiminta kehittyi ja kasvoi myös yritysten omistaminen hajaantui ja toisaalta niiden johtaminen siten, että johtaja itse voisi valvoa kaikkia toimintoja kävi mahdottomaksi. Tällöin voitiin havaita, että tarkastus tuli eriyttää omistajan etua valvovaksi tilintarkastukseksi ja johtajan apuvälineenä toimivaksi sisäiseksi tarkastukseksi.

Kun ammatillinen toiminta käynnistyi oli tilintarkastus se haara, joka jatkoi vanhoja perinteitä noudattaen. Aikaisemmin yhteinen tarkastus oli rakentunut omistajien edun suojelemiseen ja tällä periaatteella tilintarkastus toimi edelleen. Hieman erityyppisten ongelmien eteen joutunut sisäinen tarkastus sen sijaan joutui pohtimaan tavoitteitaan ja niiden toteuttamiseksi käytettäviä keinoja alusta alkaen. Tällä selittyy tilintarkastuksen nopea kehitys ja sisäisen tarkastuksen hieman rauhallisempi eteneminen. Toisaalta tilintarkastus myös tuli huomattavasti suuremman yritysjoukon jokavuotiseksi toiminnoksi, kun taas sisäinen tarkastus keskittyi koskemaan lähinnä suuria yrityksiä, joissa johdon resurssit vastata asianmukaisesta varainhoidosta omistajille olivat riittämättömät. Lisäksi tilintarkastuksen asema vakiinnutettiin nopeasti lainsäädännöllisin keinoin, kun taas sisäinen tarkastus edelleen on pääosalle yrityksistä vapaaehtoista.

Vähitellen ammattitutkinnot kehittyivät molempiin ammattikuntiin mutta kovin eriaikaisesti. Nykyisen tilintarkastusalan ammattitutkinnon edeltäjä syntyi vuonna 1896. Kesti lähes kahdeksankymmentä vuotta aina vuoteen 1974 saakka, kunnes ensimmäinen sisäisen tarkastuksen ammattitutkinto syntyi. Tänä päivänä molemmissa ammattikunnissa toimii aktiiviset jäsenyhdistykset, jotka järjestävät koulutusta, seminaareja ja erilaisia tapaamisia ammattikunnan kesken.

Kun ammatillinen tietotaito alkoi eriytyä ja ammattikunnat vakiinnuttivat asemansa osana käytännön yritystoimintaa, heräsi myös tieteellinen mielenkiinto tilintarkastukseen ja sisäiseen tarkastukseen. Ensimmäiset tieteelliset tutkimukset syntyivät 1970-luvulla mutta varsinainen tutkimustoiminta käynnistyi vasta 1980-luvun puolella.

Tilintarkastukseen liittyvän tieteellisen tutkimuksen keskeiset osa-alueet ovat niitä, jotka ammatillisellakin puolella jo kauan ovat mietityttäneet tilintarkastajia. Keskeisin niistä on raportointi. Mitä informaatiota tilintarkastusraportin tulisi sisältää ja kenelle se tulisi suunnata? Millä perusteella tilintarkastaja tekee päätökset raportoinnin pohjaksi? Millainen korvaus tehdystä työstä tulisi saada? Nämä ammatilliset kysymykset ovat luoneet pohjan mittavalle tieteelliselle tutkimukselle aihepiiristä. Nämä aihepiirit ja niistä tehty tutkimus on pyritty esittelemään artikkelissa monipuolisesti.

Sisäisen tarkastajan ammatillinen historia on vielä niin lyhyt, että tieteellisen tutkimuksen kenttä on huomattavasti kapeampi kuin tilintarkastuksen osalta. Selvät painopistealueet tutkimuksessa löytyvät sisäisessä tarkastuksessa kuitenkin samalla tavoin lähtökohtaisesti keskeisistä ammatillisista kysymyksistä. Mikä on sisäisen tarkastajan ammatinkuva ja rooli? Millainen suhde sisäisellä tarkastuksella ja sen lähisukulaisella tilintarkastuksella on? Tulisiko sisäisen tarkastuksen tehtävät hoitaa yrityksen sisäisinä toimintoina vai tulisiko ne ulkoistaa? Artikkelissa on esitelty näitä kysymyksiä pohtivia tieteellisiä tutkimuksia.

Tämä artikkeli on esitellyt sen pitkän historiallisen tien, jonka tilintarkastus ja sisäinen tarkastus ovat yhdessä kulkeneet. Vuosien kuluessa niiden molempien tehtävät ovat eriytyneet ja muodostaneet omat selkeät kokonaisuutensa. Sekä ammatillisessa että tieteellisessä mielessä niiltä löytyy paljon yhtymäkohtia, mutta molemmilla on myös selkeästi erilliset tavoitteet ja päämäärät. Molempien tehtävien osalta voidaan todeta, että ammatillinen kehitys on ollut erittäin nopeaa ja ammattitutkinnon arvostus on noussut viime vuosina huimaa vauhtia. Sekä tilintarkastukseen että sisäiseen tarkastukseen on myös syntynyt erittäin laaja ja syvällinen tieteellinen tutkimuskenttä, joka on pitkälti rakentunut ammatillisista kysymyksistä nousseiden ongelmien ratkaisemiseksi. Tieteellisen tutkimuksen tarve kasvaa kuitenkin nopeasti uusien tutkimuskysymysten noustessa ammattia kohtaavien haasteiden myötä.

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Kaksi tornia

Marko Järvenpää

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

Järvenpää, Marko (2007). Kaksi tornia (The two towers). In: *Contributions to Accounting and Finance. Essays in Honour of Professor Paavo Yli-Olli.* Acta Wasaensia No. 173, 115–126. Eds Timo Rothovius and Jussi Nikkinen.

In this article, the recent development of control mechanisms is compared to the two towers of the book written by Professor J.R.R. Tolkien. It is argued, that company management – as well as employees – is more and more tightly controlled in the (post) modern world of transparency, while expensive and exhaustive surveillance watch-towers like SOX, IFRS, ERP-systems, GRI, BSC, ABC and TQM have been established and implemented during recent years. Furthermore, company managers and employees are analogously connected with the little hobbits. Both are trying to survive under the shadow of the towers and the penetrating eye of accounting. In the trilogy "Lord of The Rings", the black tower tumbled down in the last book "The Return of The King". In the real business life and academic world, we are still in the middle of the part II "The Two Towers", and we can only make sophisticated guess, what will happen in the future.

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JOHDANTO

J.R.R. Tolkienin klassikkotrilogian toinen osa on nimeltään kaksi tornia. Tornien kautta pimeyden ruhtinas Sauron ja pahuuden puolelle luisunut velho Saruman kykenevät kontrolloimaan laajoja alueita Keskimaassa. Tornin yläpuolella hehkuva Sauronin silmä pystyy näkevään moneen paikkaan hyvin kattavasti. Länsi-Mannun hobitit, Rohanin ratsastajat ja Gondorin kerran niin uljas kansa joutuvat kulkemaan aika lailla kyykyssä, jotta eivät olisi valvovan silmän tuijotuksessa. (Tolkien 1954–1955.)

TORNIEN PYSTYTYS

Tornien pystytys alkaa Yhdysvalloissa

2000-luvun alussa myös todellisuudessa maailmaan on pystytetty kaksi melkoista valvontamekanismia, tornia. Molempien syntysija on Yhdysvalloissa, jota tosin en sinänsä tässä yhteydessä ole muuten yhdistämässä Sormusten herran Mordoriin, pimeyden valtakuntaan. 2000-luvun vaihteessa nimenomaan USA:ssa tapahtui kaksi kansakuntaa ja koko maailmaa järkyttänyttä kriisiä, jotka käynnistivät globaalin, miljardeja maksavan vartiotornien pystytyksen. Ensimmäinen kriisi aiheutui terroristien hyökkäyksestä WTC:n torneihin 11.9.2001, mikä johti globaalin lentoliikenteen, kulunvalvonnan ja yleensäkin turvallisuustarkkailun voimakkaaseen kiristymiseen. Maailmalla vallitsee yhä pelon ilmapiiri ja sadat tuhannet ihmiset valvovat satojen miljoonien ihmisten liikennettä ja väijyvät epäilyttäviä yksilöitä yötä päivää. Koska artikkelini liittyy laskentatoimeen, en kuitenkaan jatka tästä sinänsä mielenkiintoisesta tornista sen enempää.

Toinen kriisi aiheutui merkittävien yritysten, etunenässä Enronin talousraportoinnin ja sen valvonnan pettämisestä, minkä johdosta tuhannet sijoittajat menettivät rahansa ja luottamus taloudellisen raportoinnin luotettavuuteen ja sen valvontaan heikkeni merkittävästi. Alkoi taloudellisen vartiotornin pystytys, jonka perustaksi tuli Yhdysvalloissa vuonna 2002 säädetty Sarbanes-Oxley-laki (SOX) tarkoituksenaan parantaa taloudellisen raportoinnin luotettavuutta. Laki *kasvattaa yritysjohdon vastuuta* taloudellisesta raportoinnista, *yhtiön sisäisistä kontrolleista ja valvonnasta* sekä korostaa tilintarkastajien riippumattomuutta ja *lisää tilintarkastajien raportointia ja valvontaa.* Lain myötä perustettiin myös SEC:n alainen Public Company Accounting Oversight Board (PCAOB) valvomaan julkisesti listattujen yhtiöiden tilintarkastusta. Sarbanes-Oxley -lain säännökset eivät rajoitu pelkästään Yhdysvaltoihin, vaan koskevat myös esim. Suomessa kaikkia Yhdysvaltain arvopaperimarkkinoita valvovan SEC:n alaisissa pörsseissä listattuja yrityksiä, niiden tytäryrityksiä sekä tilintarkastajia.

Sarbanes-Oxley -lain mukanaan tuoma keskeinen muutos liittyy yritysten sisäisiin kontrolleihin. Pykälä 404 velvoittaa yritysjohdon antamaan vuosittain raportin sisäisistä kontrolleista. Raportissa johdon tulee todeta vastuunsa taloudelliseen raportointiin liittyvistä sisäisistä kontrolleista ja antaa arvionsa kontrollien tehokkuudesta tilinpäätöksen yhteydessä. Tilintarkastajan puolestaan on annettava lausunnot sekä johdon arviosta että taloudelliseen raportointiin liittyvien kontrollien tehokkuudesta. Sisäisiin kontrolleihin liittyy myös pykälä 302, joka velvoittaa yrityksen toimitusjohtajan ja talousjohtajan antamaan tilinpäätöksen yhteydessä vakuutuksen tilinpäätöksen laadintaan liittyvien kontrollien järjestämisestä yrityksessä.

SOX-säännösten soveltaminen on johtanut käytännössä todella työlääseen sisäisten kontrollien rakentamiseen. Sarbanes-Oxley -lain pykälää 404 on myös paljon kritisoitu. Kritiikki kohdistuu keskeisesti lisääntyneeseen paperityöhön ja byrokratiaan sekä merkittävästi kohonneisiin tilintarkastus- ja konsulttipalkkioihin (Helviö & Siikanen 2005, Pollock 2006, Tackett et al. 2006, Kaartinen, 2006).

Myös raporttien runsauden aiheuttama informaatiotulva ja hämmennys osakemarkkinoilla ovat herättäneet kritiikkiä. Vaatiihan Sarbanes-Oxley 404 yhteensä neljä eri raporttia entisen yhden sijaan. Erilaisten mukautettujen raporttien yhdistelmien mahdollinen määrä nousee, jolloin sijoittajien on hankala tulkita kaikkia raportteja. (Tackett et al. 2006, Kaartinen, 2006)

Esim. Tackettin et al. (2006) mielestä sisäisten kontrollien merkitystä sijoittajien luottamuksen palauttamisessa on liioiteltu. Jos tilinpäätös on olennaisesti oikein, taloudellisen raportoinnin sisäisillä kontrolleilla ei ole merkitystä sijoittajien arvioidessa yhtiön nykyisiä tai tulevia tuottoja. Hänen mukaansa väärinkäytökset esim. Enronin tai WorldComin tapauksissa eivät olisi olleet vältettävissä Sarbanes-Oxley -lailla. Niissähän normaalit taloudellisen raportoinnin sisäiset kontrollit olivat olemassa ja toiminnassa jo väärinkäytösten tapahtuessa. Yleensä vakavimpiin väärinkäytöksiin liittyy ylimmän johdon petos, johon sisäisillä kontrolleilla ei voida lopultakaan vaikuttaa. Jos ylin johto haluaa vääristellä taloudellista informaatiota, se tekee sen joka tapauksessa. (Tackett et al. 2006, Kaartinen 2006.)

SOX-lain kielteiset vaikutukset ovat jo näkyvissä USA:laisten pörssien toiminnassa. Vuoden 2006 ensimmäisellä neljänneksellä NYSEen ja Nasdaqiin listautui ainoastaan 14 ulkomaalaista yritystä. Lontoon pörssiin listautui 50 ulkomaalaista yritystä. Yhdysvaltalaisten pörssien kustannuksella ovatkin hyötyneet erityisesti eurooppalaiset pörssit etunenässä Lontoo sekä Toronton pörssi. (Kauppalehti 25.7.2006.)

Tornit Euroopassa ja Suomessa

SOX-lainsäädännön ohella myös suomalainen tilintarkastuslainsäädäntö on muuttumassa ja esityksen mukaan kaikissa tarkastettavissa yrityksissä tulee olla auktorisoitu tilintarkastaja. Tämä lisää luonnollisesti tilintarkastuksen laatua, mutta samalla myös kustannuksia. Mikroyritykset tosin vapautettaneen tilintarkastuspakosta, vaikkakin ulkoista rahoitusta haettaessa siitä saattaa käytännössä muodostua vapaaehtoinen pakko. Vaikka SOX-lainsäädäntö ei sellaisenaan ulottuisikaan kovin voimakkaasti Suomeen, tulee sisäisten kontrollien tarkastus kuitenkin kasvamaan, koska se sisältyy uuden tilintarkastuslain edellyttämään ISA-standardien noudattamiseen.

Suomalaiset USA:ssa listatut pörssiyhtiöt UPM-Kymmene, Nokia, Stora-Enso ja Metso joutuvat noudattamaan SOX-lakia 31.7.2006 jälkeen päättyvien tilikausien osalta, eli käytännössä 2006 päättyviltä tilikausilta. Lisäksi Suomessa on lukuisia USA:ssa listattujen yritysten tytäryhtiöitä, jotka myös kuuluvat lainsäädännön piiriin.

SOX-lainsäädännön puitteissa on pystytetty korkea vartiotorni ja on mielenkiintoista seurata, kyetäänkö yksittäisiä väärinkäytöksiä ehkäisemään tornia näin merkittävästi korottamalla. Epäilijöitä ainakin tuntuu riittävän.

Suomessa ovat viime vuosina puhuttaneet taloudellisen valvonnan ja ohjauksen osalta ennen kaikkea Soneran ja Fortumin tapaukset. Soneran tapauksessa yhtiössä realisoitui miljardien riskit yrityksen ostettua Keski-Euroopasta "ilmatilaa" tulevan sukupolven mobiiliteknologialle, joka ei koskaan realisoitunut käytännön kassavirroiksi. Fortumin tapauksessa puolestaan johtoa palkittiin yleisen mielipiteen mukaisesti jossakin määrin ansiottomasti ylisuurilla johdon optioilla. Todennäköisesti kumpaakaan kotimaista kohutapausta olisi tuskin näillä uusilla valvontajärjestelmillä kyetty sinänsä hallitsemaan. Kuitenkin, huolimatta ikävistä piirteistään molemmat tapaukset ovat herättäneet keskustelua riskienhallinnasta ja johdon palkkioiden sudenkuopista.

Kotimaisen tarkastelutason lisäksi on mielenkiintoista seurata, miten yhtenäisesti Eurooppa ylipäätään seuraa USA:n mallia, vain kykeneekö se oppimaan siellä tehdyistä ylilyönneistä ja toimimaan viisaammin. Euroopassa halutaankin nyt selvittää mahdollisten uudistusten hyötyjen ja kustannusten suhdetta. Yhdysvaltalainen lainsäädäntö nähdään liian työläänä ja kustannuksia vaativana havaittuihin hyötyihin verrattuna. Eurooppalaisessa käytännössä korostetaan sen sijaan periaatteita (kuten noudata tai selitä) ja vapaaehtoista vaatimusten noudattamista. Direktiiveillä on säädetty sisäisiin kontrolleihin liittyen ainoastaan tarkastusvaliokunnan tehtävästä valvoa sisäisen kontrollijärjestelmän tehokkuutta sekä vaatimuksesta esittää taloudelliseen raportointiin liittyvän kontrollijärjestelmän kuvaus osana tilinpäätöstä. Direktiivien lisäksi sisäisiin kontrolleihin liittyviä ohjeita löytyy tällä hetkellä eri valtioiden omistajaohjauksen koodeista, kansallisesta lainsäädännöstä ja arvopaperipörssien säännöistä. Keskustelussa ja joissakin kansallisissa koodeissa on kuitenkin korostunut myös muiden kuin taloudelliseen raportointiin liittyvien sisäisten kontrollien merkitys. Joissakin jäsenvaltioissa kansallisiin koodeihin onkin esim. jo otettu mukaan piirteitä Sarbanes-Oxley -lain kontrollien tehokkuuden arvioinnista. (Kaartinen 2006.)

ULKOISEN LASKENTATOIMEN TORNIN MUUT KERROKSET

IFRS – kansainvälinen kontrollijärjestelmä

SOX-ilmiö on kuitenkin vain tornin kattokerros. Torni rakentuu monista kerroksista ja sen hypnoottinen silmä tuijottaa niin osakkeenomistajista ja yhteiskunnasta johtajiin päin kuin johdosta yritysten sisäpuolelle. Transparenssia eli läpinäkyvyyttä peräänkuuluttavat myös muut tornin rakentajat. Laskentatoimen kansainvälistä harmonisointia on toteutettu tiiviisti jo reilut kolmekymmentä vuotta ja vauhti on jatkuvasti tiivistynyt. Käytännössä tämä on tarkoittanut mm. IFRS:n käyttöönoton nopeata lisääntymistä.

Vuoden 2005 alussa Suomessa voimaantulleen uuden kirjanpitolain mukaan julkisesti noteerattujen yritysten on noudatettava konsernitilinpäätöksessään IFRS-normeja. Euroopan parlamentti ja Euroopan unionin neuvosto antoivat heinäkuussa 2002 asetuksen (EY N:o 1606/2002) kansainvälisten tilinpäätösstandardien soveltamisesta. Asetus tuli voimaan 14. päivänä syyskuuta 2002. Asetuksella velvoitetaan jäsenvaltioiden listautuneet yritykset laatimaan konsernitilinpäätöksensä 1 päivänä tammikuuta 2005 ja sen jälkeen alkavilta tilikausilta IFRS- (entisten IAS-) standardien mukaisesti.

EU:n IAS-asetuksen mukaan standardien tuli olla ovat Euroopan yleisen edun mukaisia ja täyttää ne ymmärrettävyyden, olennaisuuden, luotettavuuden ja vertailtavuuden vaatimukset, joita edellytetään taloudellisessa päätöksenteossa ja yritysjohdon toimien arvioinnissa tarvittavalta tilinpäätösinformaatiolta. Hallituksen esityksen (HE126/2004) mukaan IAS-standardien käyttöönottaminen parantaa tilinpäätösten kansainvälistä vertailukelpoisuutta ja *läpinäkyvyyttä*, mikä puolestaan *hyödyttää yritysten sidosryhmien*, niin omistajien, velkojien kuin markkinoilla toimivien yleistä *informaatiotarvetta*. Standardien käyttöönotto edistää myös *viranomaisten* mahdollisuuksia saada läpinäkyvää ja vertailukelpoista informaatiota yrityksistä. Vaikkakin IFRS on Eurooppaeikä USA:laisjohtoinen projekti, on Yhdysvaltojen USGAAP-pohjainen kontrolli itse asiassa vielä yksityiskohtaisempaa.

Myös IFRS:n käyttöönotto oli erittäin merkittävä ponnistus suomalaisilta listayhtiöiltä vuosina 2003–2004. Läpinäkyvyyttä on pyritty lisäämään mm. käyvän arvon periaatetta korostamalla. Niinpä, kun esimerkiksi goodwill kirjattiin aikaisemmin vaikutusaikanaan poistoina kuluiksi systemaattisesti, tulee sen arvo nykyisellään testata, jos se katsotaan aiheelliseksi. Goodwill voi siis ennusteiden ollessa kunnossa jäädä taseeseen ikuisiksi ajoiksi tai toisaalta ennusteiden heikentyminen voi johtaa goodwillin dramaattisiinkin alaskirjauspaineisiin. Vaikutukset voivat olla merkittävät, kun goodwill saattaa olla omaa pääomaa suurempi erä yrityksen taseessa. Sekä SOX:in että IFRS:n avulla yrityksiä yritetään läpivalaista samalla tavalla kuin matkustajien matkalaukkuja lentokoneeseen noustaessa. Lisääntyykö läpinäkyvyys ja raportoinnin luotettavuus enemmän kuin raportoinnista aiheutuneet uudet riskit? Tähän saamme lopullisen vastauksen vasta ajan myötä, mutta valvontatornia on näiltä osin ainakin rakennettu monta sataa metriä korkeammaksi ja on yleisesti tiedossa, että rakentaminen on kallista, varsinkin Suomessa.

GRI – globaali valvonta-aloite

Muutama kerros vartiotornia rakentuu myöskin yrityksen yhteiskuntavastuun raportoinnin kehittymisestä. Perinteisen taloudellisen raportoinnin lisäksi hyvin suuri joukko suuryrityksiä raportoi nykyisin sidosryhmilleen taloudellisten vaikutusten lisäksi myös sosiaalisista ja ympäristöön liittyvistä vaikutuksista. Keskeisin viitekehys markkinoilla on ns. GRI-viitekehys (2001), jonka mukaan raportoitavia kohteita tulee mukaan kuvaan useita kymmeniä, esimerkiksi energian ja veden kulutus, kasvihuonepäästöt, otsonikatoa aiheuttavien aineiden päästöt, jätemäärä, öljy- ja kemikaalivuodot, kierrätys, ympäristömenot, tapaturmat, koulutus, turvallisuusjärjestelyt, tasa-arvo, ihmisoikeusnäkökohdat, lapsityövoiman käyttö yms. Ne ovat luonnollisesti erittäin tärkeitä asioita, mutta myös työläitä raportoida. Yhteiskuntavastuun raportointi tulisi olla myös varmennettua, eli mukaan tulee tilintarkastusta jäljittelevä kontrolli. Valvontakoneisto siis kiristää otettaan myös näiltä osin.

JOHDON LASKENTATOIMEN KERROKSET

Mutta jos ulkoisten sidosryhmien ja yhteiskunnan valvova silmä kääntyilee tarkasti yritysten perässä, on tilanne aivan vastaava myös yritysten sisällä. SOX 404:n mukainen sisäisten kontrollien kehittäminen tarkoittaa sisäisen valvonnan voimakasta tiivistymistä, mikä koskee suurta osaa yritysten työntekijöistä.

ERP:n avulla verkko kiristyy

Lisäksi päivittäistä toimintaa valvomaan on yrityksissä uhrattu viimeisten vuosien aikana miljardeja euroja integroitujen toiminnanohjausjärjestelmien (ERP), kuten SAP/R3, OROS, BAAN, implementointiin. Niiden avulla yritykset ja työntekijät pakotetaan standardoituihin muotteihin ja yksiköiden ja työntekijöiden edesottamuksia kyetään paitsi koordinoimaan, myös seuraamaan lähes reaaliajassa globaalisti (esim. Dillard et al. 2005), eikä pakoon pääse edes piiloutumalla Lorienin metsään, Morian luolaan tai Kalmansuohon, kuten hobitit sentään kykenivät kätkeytymään tiukan paikan tullen Sauronin silmältä. Integroidut toiminnanohjausjärjestelmät ovatkin olleet vuosituhannen vaihteen yksi merkittävimmistä panostuksista kontrollin lisäämiseen.

Toimintolaskennalla turhat pois organisaatioista

Toimintolaskennan (ABC) (Cooper & Kaplan 1987) avulla voidaan puolestaan laskea jokaiselle organisaation toiminnolle hintalappu ja kyetään seuraamaan toimintojen ja yksilöiden tehokkuutta, paikallistaa tehottomat toiminnot tai toiminnot, joissa ei synny mitattavaa lisäarvoa. Teorian mukaan ne tulee eliminoida. Ehkä noin neljännes suomalaisyrityksistä – pienyritykset poislukien – soveltaa tänä päivänä tavalla tai toisella toimintolaskentaa ja liimailee hintalappuja ja elimoi turhaa 'läskiä' pois organisaatioista. Toivoa sopii, että luovuus ja organisaatioiden pitkän tähtäimen kehittäminen ei vaarannu tämän tornin kerroksen edessä, eikä tehdä virheellisiä saneerauksia eikä heitetä asiakkaiden joukosta pois tulevaisuuden helmiä, jos ne nyt sattuvat osoittautumaan ns. kannattamattomiksi asiakkaiksi, joiden sanottiin joskus mm. tuovan lähinnä kuraa yrityksen marmorilattialle.

TQM – valvonta ulottuu myös tekemiseen

Laatujohtamisen (esim. TQM, kokonaisvaltainen laatujohtaminen) eräs piirre on pyrkimys toiminnan laadun pitämiseen tasaisena. Tämä merkitsee prosessien tarkkaa, jopa tilastollista seurantaa ja mittaamista, virheiden eliminointia ja toiminnan ohjeistamista, standardointia. Laatujohtamisen kautta valvonta laajenee usein hieman aggregaateista ja ylimalkaisista talousluvuista toiminnan valvomiseen ja mittaamiseen. Mittareita asetetaan usein hyvinkin yksityiskohtaiselle tasolle ja toiminta ohjeistetaan joskus yksittäistä kädenliikettä myöten. Laadun kannalta ja liikkeenjohdon tavoitteiden osalta nämä asiat ovat useimmiten järkeviä ja perusteltuja, mutta työntekijä saattaa toisinaan kokea olevansa Max Weberin (1958) rautahäkissä (iron cage). Ei ihme, että työntekijöiden puhekielessä esim. laatujohtamismenetelmä six sigmaan saattaa joskus vilahtaa kaksi kuutosta lisää tuntemuksia kuvaamaan.

BSC valvoo kaikkea, ”mikä liikkuu”

Varsin samantyyppisen kontrolliarsenaalin tarjoaa Balanced Scorecard (BSC) eli tuloskortti (Kaplan & Norton 1992), joka on levinnyt yrityksiin hyvin laajalti (Malmi, 2001). Verrattuna laatujohtamiseen, se tuo mittaukseen ja valvontaan strategisen perspektiivin. Tutkijat (Cooper & Ezzamel, 2003) ovatkin kritisoineet sitä mekaanisen command and control menetelmän paluuna liikkeenjohtoon. Siinä ylin johto sanelee strategiset suuntaviivat ja tavoitteet, jotka sitten ”BSC-laatikoston” välitykselle ”viestitetään” organisaatioon eli jaetaan alaspäin yksiköille ja vastuuhenkilöstölle. Paljon siitä, millaiseksi välineeksi tuloskortti muodostuu, riippuukin tuloskortin käyttöönotto- ja soveltamistavasta. Tavoista riippumatta joka tapauksessa BSC tarjoaa kortillisen uusia valvontamittareita mm. talouden, henkilöstön, oppimisen, prosessien, laadun ja asiakkaan osalta. Niiden avulla laskentatoimen valvova silmä penetroituu yhdessä laatujohtamismittareiden kanssa organisaation joka sopukkaan (ks. Vaivio 2006) ja strategia voi kaiken mittauksen ja valvonnan lopulta jäädä saman alkuhämärän peittoon, jossa se olikin.

Mielenkiintoista on myös se, että sekä toimintolaskenta, tuloskortti että kokonaisvaltainen laatujohtaminen ovat lähtöisin Yhdysvalloista, kuten Sarbanes-Oxleykin. Laatujohtamisen osalta USA:ssa tosin pyrittiin lähinnä vastaamaan japanilaisten laatuhaasteeseen mallintamalla ja tuotteistamalla heidän toimintatapansa amerikkalaiseen kokonaisvaltaiseen muottiin. Nämä johdon ohjauksen toimintatavat on kuitenkin otettu myös Euroopassa käyttöön siinä missä Yhdysvalloissakin.

Aineeton varallisuus kontrolliin

Tämäkään ei ole vielä riittänyt vaan valvontaan ja läpivalaisuun on otettu myös yritysten aineeton varallisuus, aineeton pääoma tai osaamispääoma, joka on purettu edelleen tarkemmin kontrolloitaviksi asiakaspääomiksi (ulkoiset rakenteet), rakenteellisiksi pääomiksi (sisäiset rakenteet) ja inhimilliseksi pääomiksi (yksilöiden kompetenssit) (Sveiby 1997, Edvinsson, 1997, Stewart 1998, Meritum 2002) Inhimillinen pääoma tarkoittaa määritelmän mukaan osaamista, jonka työntekijät vievät mukanaan lähtiessään yrityksestä iltaisin kotiin. Silti sillekin on kehitelty mittauksen viitekehys ja joukko mittareita. Ei ehkä olekaan ihme, että suurista odotuksista huolimatta aineettoman varallisuuden tai osaamispääoman mittaus ei ole ehkä kuitenkaan johtanut kovinkaan merkittäviin tuloksiin ainakaan toistaiseksi. Ehkä aivan kaikkea ei sentään korkeastaan tornista kaiken näkevällä silmällä voida kontrolloida. Jäihän Sauronillekin Sormusten herrassa pahoja katvealueita Keskimaassa.

JOHTOPÄÄTÖKSET JA KESKUSTELUA TULEVAISUUDESTA

Akateemisesta tarkkailijasta tuntuukin, että 1980-luvun lopun ja laman jälkeen 1990-luvun loppupuolen laskentatoimen toiveikkaat kehittämisnäkymät, kuten talousjohdon roolin muutos liiketoimintaa tukevaan suuntaan ja jota toimintolaskennalla, laatumittareilla, aineettoman varallisuuden mittauksella ja tuloskortilla alun perin tavoiteltiin, ovat kääntyneet globaaliksi valvonnan ja kontrollin tornin muuraamiseksi, jota edustavat ennen kaikkea SOX-säännöstö, tilintarkastuksen tiivistyminen, kansainväliset laskentastandardit, integroitujen toiminnanohjausjärjestelmien käyttöönotto sekä toimintolaskelmien ja tuloskorttimittareiden yksilötasoinen kokeminen päätöksenteon tukemisen sijaan yksiköiden ja yksilöiden kontrolloinniksi.

Kirjatrilogian Taru sormusten herrasta kolmannessa osassa ”Kuninkaan paluu” molemmat tornit lopulta kukistuivat – valkoinen antautui ja musta sortui – kunhan sormus oli ensin saatu – valvovilta torneilta piilossa – heitettyä tulivuoren tuliseen pätsiin. Aika näyttää, miten tosielämän torneille tulee tapahtumaan, olemmehan nyt vasta trilogian toisessa osassa ”Kaksi tornia”. Ei kuitenkaan kannata vaipua synkkyyteen. Töitä ja kysyntää laskentaihmisillä riittää kaikkia näitä – ja uusia – muutoksia tehtäessä. Lisäksi pitää muistaa, että tosielämän torneja eivät ole rakentaneet pimeyden ruhtinaat, kuten sormusten herrassa, vaan niiden avulla yritetään päinvastoin suojautua ”pimeän ja pahuuden voimilta”, kuten taloudellisilta väärinkäytöksiltä ja organisaatioiden turhalta tehottomuudelta. Kummassakin tapauksessa – Tolkienin kirjassa ja tosi elämässä - pikku hobitit, jotka haluavat elää rauhassa ja tehdä omia bisneksiään, tahtovat vain jäädä jalkoihin.

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Importance of the U.S. macroeconomic news information on the Finnish stock market

Juha-Pekka Kallunki, Petri Sahlström, and Janne Äijö

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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This study investigates the importance of U.S. macroeconomic news announcements on stock valuation in Finland. Based on the earlier literature, the impact of the reports on Employment, Fed`s interest rate decisions, Producer Price Index and National Association of Purchasing Management are analyzed. The empirical analyses are conducted using implied volatilities from the Helsinki Stock Exchange´s options markets. It is hypothesized that on important announcement days, implied volatility drops as uncertainty is resolved by the market participants. The results of the study confirm the hypothesized effect in respect to Employment report, Producer Price Index report and Fed's interest rate decisions. Thus, those reports are regarded as important source of information on the Finnish stock market.

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1. Introduction

This study investigates whether investors on the Finnish stock market regard U.S. news macroeconomic announcements as an important source of information when valuing stocks. To achieve this goal, the behavior of implied volatilities around four important scheduled U.S. macroeconomic news announcements on Finnish stock markets are analyzed. The macroeconomic news announcements investigated are selected based on their importance on the U.S. stock market according to Graham et al. (2003). Those reports are Employment, Producer Price Index and NAPMM (National Association of Purchasing Management report: manufacturing). Moreover, since Nikkinen and Sahlström (2004a) suggest that the Fed's interest rate decisions are relevant when pricing the U.S. stocks, also the Fed's meeting days are included as news announcements. Domestic, i.e. Finnish, macroeconomic news announcements are excluded from the analysis since the earlier studies show that they are not regarded as value relevant by the traders on the Finnish stock market (see e.g. Nikkinen and Sahlström 2004b).

The research question is relevant given the vast empirical evidence on the cross-country market integration (see e.g. Bracker and Koch 1999; Martens and Poon 2001). This literature shows that the stock markets of industrial countries are close integrated. Moreover, the U.S. stock market seems to be the leading source of information. Consequently, it can be hypothesized that the Finnish stock market is affected by the important U.S. macroeconomic news releases.

Because the release dates of these macroeconomic indicators are known in advance, but their contents are unknown, market uncertainty measured by using implied volatility is affected by the forthcoming releases (see e.g. Ederington and Lee 1996). Consequently, implied volatility is used to measure the importance of the news announcements with respect to stock valuation.

The results of the study show that all news announcements examined, expect NAPMM report, have impact on the Finnish implied stock market volatility. This finding suggests that the traders on the Finnish stock market regard U.S. macroeconomic news announcements as an important source of information when valuing Finnish stocks.

The rest of the study is organized as follows. Section 2 provides theory regarding the behavior of implied volatility around scheduled news announcements. Section 3 presents the data used in the study and Section 4 describes the research methodology. Section 5 shows the empirical results and, finally, summary and concluding remarks are given in Section 6.

2. Implied volatility behavior around important macroeconomic news announcement

Option pricing theory implies that the option value is a nonlinear function of underlying stock price, time to expiration of the option, exercise price of the option, risk-free interest rate and underlying asset price volatility. An alternative way to use option pricing models is to plug in current market price of an option and other inputs, except volatility, and then solve the underlying asset price volatility. This procedure gives a market's assessment of the future volatility of the underlying asset price. In more details, this estimate is a market's assessment of the future volatility over the remaining life of the option (see e.g. Mayhew 1995).

Stock prices are more volatile around scheduled information releases such as macroeconomic news announcements and earnings announcements than on non-announcement days (see e.g. Graham et al. 2003). The reason for this is that the news announcements contain relevant information about stock values and thus affect the pricing process of stocks. The empirical evidence clearly supports this notion, also on other than stock markets. For example, by Ederington and Lee (1993) using data from interest rate and foreign exchange rate markets, by Fleming and Remolona (1999) using data from the U.S. treasury market, by Christie-David and Chaudhry (1999) using data from interest rate and interest rate futures markets, and by Christie-David, Chaudhry and Koch (2000) using data from gold and silver markets document this phenomena.

Similar results on the stock markets are reported by McQueen and Roley (1993), Buckle et al. (1998), Chang et al. (1998), Veronesi (1999), Steeley (2001), Jones et al. (2005) and Nikkinen et al. (2006).

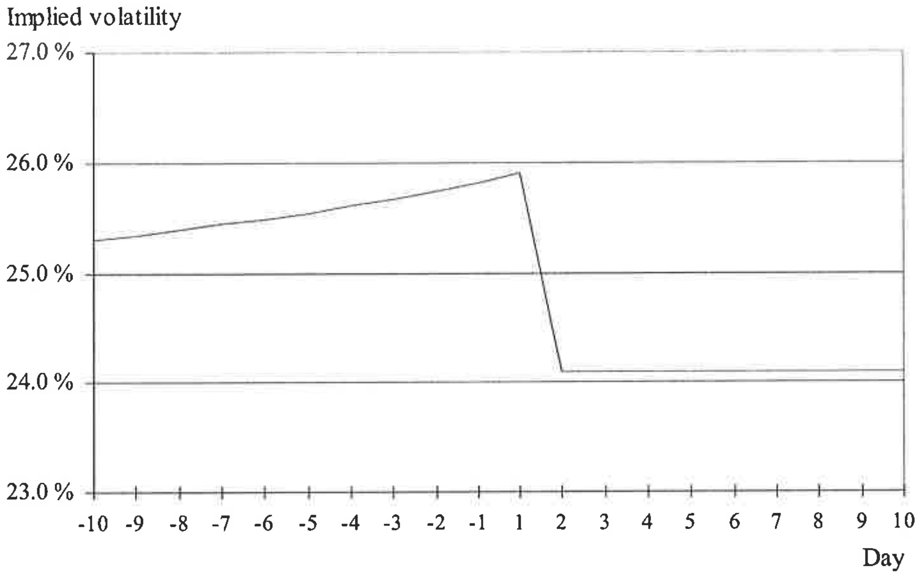
Because the Black-Scholes (1973) option pricing model assumes that daily stock returns are independently and identically distributed random variables, daily variances are additive. Thus, the average implied variance over the remaining life of the option contract can be calculated by summing the individual daily variances and dividing this sum by the number of days until the expiration date (see Merton, 1973). This result can be applied when the scheduled announcements are investigated.

Assuming that the news announcement occurs during the life of the option, the average variance $\sigma^2_{average}$ until the expiration day of the option can be expressed as

$$\sigma^2_{average} = \frac{T-1}{T}\sigma^2_{NAD} + \frac{1}{T}\sigma^2_{AD}, \tag{1}$$

where σ^2_{NAD} and σ^2_{AD} are respectively the stock return variances on a non-announcement day (NAD) and on the news announcement day (AD), and T is the number of days to the expiration date of the option (see Donders and Vorst 1996). Consequently, the theoretical implied volatility is a function of time (see Merton 1973).

An illustration of the implied volatility behavior around a scheduled news announcement is provided e.g., in Nikkinen and Sahlström (2004b) as shown in Figure 1. It can be seen that the implied volatility increases gradually prior to the scheduled announcement and drops immediately after the announcement has been made and the information has been incorporated into the stock prices. This example assumes that the volatility is constant on non-announcement days and twice higher than normal on the scheduled announcement day.



An example of theoretical implied volatility assuming that volatility is constant, -24.1 per cent, except on the event day, 48.2 per cent. Expiration day is 20 trading days after the event day. It is assumed that there is a single scheduled macroeconomic announcement the day before the maturity of the option.

Figure 1. Behavior of implied volatility around scheduled macroeconomic news announcement (Nikkinen and Sahlström 2004b).

3. Data

3.1 U.S. macroeconomic news announcements

The sample consists of monthly reports on Employment (EMP), Producer Price Index (PPI) and NAPMM (National Association of Purchasing Management report: manufacturing) from the U.S. economy. The data period is from January 1996 to December 1999. Furthermore, the Federal Open Market Committee's (FOMC) meeting days from the U.S. markets are included since they contain relevant information about the short term interest rates. See Table 1 for the list of the announcements.

Table 1. Macroeconomic news announcements investigated in the study.

Report	Symbol	Number of reports
Employment	EMP	48
Producer Price Index	PPI	48
National Association of Purchasing Management: manufacturing	NAPMM	48
Fed`s interest rate report	FOMC	32

The usual release day of the Employment report is the first Friday of the month. Correspondingly, the Producer Price Index (PPI) report is usually released around 13th day of the month while the NAPM report is released usually on the first trading of the month. All news releases are made at 8:30 a.m. Eastern Time (ET), i.e. 3:30 p.m. in Finnish time. At the time of news releases the Finnish stock market is still open and thus the effect of the news releases is incorporated into the closing prices of stocks and their implied volatilities. The FOMC′s meetings are usually held on Tuesdays and the FOMC issues a statement shortly after the meeting. Therefore, the statement is issued when the Finnish stock market is not open. Thus, uncertainty related to the meeting is resolved on the European stock markets on the following day. The release calendar and the reports are provided by the Federal Reserve and they are available in the Fed's web pages.

3.2 Implied volatility measure

The implied volatilities from the Finnish market are calculated from the daily closing prices of the Finnish stock index options by the Helsinki Stock Exchange (HSE). The underlying of these options is the Finnish Options Index (FOX) that is a value-weighted index of 25 major stocks quoted on the HSE. Nowadays, the same index is called as OMXH25 index. The options are European type options and they expire six times a year. In the volatility index construction, the HSE uses the weighting method suggested by Latane and Rendleman (1976). This method weights the individual put and call options on the basis of the partial derivative of the option price with respect to the standard deviation of the stock return. The weighting method puts the highest weight on the options that are at the money (see Day and Lewis, 1992).

Table 2 presents summary statistics of implied volatility index and its logarithmic changes on Finnish markets. The same statistics are also reported after removing outliers based on the Weisberg (1985) test. The summary statistics seem to very similar in both the cases.

Table 2. Descriptive statistics of Finnish implied volatility index.

	Raw data		Outliers removed[b]	
Statistics	Level	Change[a]	Level	Change[a]
Number of observations	955	954	947	946
Mean	24.78	0.0002	24.81	-0.0005
Median	23.50	-0.0023	23.50	-0.0025
Minimum	14.74	-0.3632	15.90	-0.2985
Maximum	45.09	0.4160	45.09	0.2752
Standard deviation	4.86	0.0770	4.86	0.0714
Skewness	1.2741	0.2872	1.2835	0.2028
Kurtosis	2.0066	3.1344	1.9988	1.3236

[a] Change: $\ln(ISD_t / ISD_{t-1})$, where ISD_t is implied volatility at day t.

[b] Outliers are detected by Weisberg's test.

4. Estimation of the macroeconomic news effects on the Finnish stock market

Based on theory presented in Section 2, implied volatility is hypothesized to gradually increase prior to the important macroeconomic news releases, namely Employment, PPI, NAPMM and Fed's interest rate reports. Furthermore, it is hypothesized that the implied volatility drops back to its normal level after the news releases, i.e. on the announcement day.

To investigate whether hypothesized implied volatility behavior is observed, the following regression model, similar to e.g. Ederington and Lee (1996) and Graham et al. (2003), is estimated:.

$$\ln(ISD_t / ISD_{t-1}) = \alpha_2 + \alpha_1 D_t^{EMP} + \alpha_2 D_t^{PPI} + \alpha_3 D_t^{NAPMM} + \alpha_4 D_{t-1}^{FOMC} + \varepsilon_t , \qquad (2)$$

where ISD_t is implied volatility at day *t*. Dummy variables D_t^{EMP}, D_t^{PPI}, D_t^{NAPMM}, and D_t^{FOMC} identify the days on which the EMP, PPI, NAPMM and FOMC's reports are released. It is worth noting that since the FOMC's report is released when the Finnish stock market is close, time *t-1* is used in the analysis for the FOMC's reports in order to observe their impact on the Finnish market.

Based on theory, it is hypothesized coefficients of the dummy variables are lower than zero for the important macroeconomic news releases, i.e. implied volatility decreases on the announcement day. Furthermore, it is expected that $\alpha > 0$ because on days with no scheduled news releases implied volatility is expected to increase.

In the model specification, the Godfrey's test indicates significant first-order autocorrelation. Thus, an AR(1) term is added to the model. Furthermore, the Lagrange Multiplier (LM) test for the ARCH effect indicates conditional heteroscedasticity in error terms. Therefore, GARCH(1,1) is fitted. The coefficients of the GARCH equation are statistically significant and the LM test shows that the specification is adequate.

To examine the effect of potential outliers on the results, the analyses are done also after the removal of the outliers. Possible outliers are detected using the Weisberg (1985) test. It detects eight outliers at the five per cent significance level. However, as the next Section shows, the results are virtually the same with and without these outliers.

5. Empirical results

The regression results of Equation (2) are reported in Table 3. The results show that the reports on Employment, PPI and FOMC's meetings have significant effects on the Finnish implied volatility. Moreover, the sign of the coefficient is negative as hypothesized. On the contrary, NAPMM report has no effect on the implied volatility.

This is rather surprising since the NAPMM report is one of the closely followed news releases on the U.S. markets.[1] Thus, the hypothesis that implied volatility drops after the macroeconomic news release is confirmed in a case of those three news releases. If the magnitude of the reports is compared, the coefficients show that the FOMC's meeting has the biggest impact while the Employment report has the second biggest impact and the PPI report has the lowest impact. The intercept term is not significantly different from zero thus hypothesis regarding the intercept term is not confirmed.

Table 3. Importance of the U.S. macroeconomic news on the Finnish stock market.

The regression is of the following form:

$$\ln(ISD_t / ISD_{t-1}) = \alpha_2 + \alpha_1 D_t^{EMP} + \alpha_2 D_t^{PPI} + \alpha_3 D_t^{NAPMM} + \alpha_4 D_{t-1}^{FOMC} + \varepsilon_t$$

where ISD_t is implied volatility at day t. Dummy variables D_t^{EMP}, D_t^{PPI}, D_t^{NAMPM}, and D_t^{FOMC} identify the days on which the Employment, PPI, NAPMM and the Fed's interest rate reports are released. Autocorrelation and heteroscedasticity are corrected with AR and GARCH terms.

	Raw data		Outliers removed	
Coefficient	Estimate	Prob. of t-stat.	Estimate	Prob. of t-stat.
Intercept	0.0013	0.429	0.0014	0.425
EMP	**-0.0267**	0.006	**-0.2790**	0.003
PPI	**-0.0199**	0.021	**-0.0204**	0.016
NAPMM	0.0023	0.200	0.0007	0.951
FOMC	**-0.0305**	0.000	**-0.0269**	0.001
AR(1)	**0.3480**	0.000	**0.3428**	0.000
ARCH(0)	**0.0021**	0.000	**0.0014**	0.001
ARCH(1)	**0.2173**	0.045	**0.1373**	0.001
GARCH(1)	**0.3616**	0.000	**0.5363**	0.000
Adj. R-square	0.162		0.141	

Notes:

Estimates that are significant at the five per cent level are shown in bold.
Outliers are detected by Weisberg's test.

[1] However, Nikkinen et al. (2007) also found NAPMM not to be significant in respect to implied risk premium on the U.S. markets.

In general, the results of the study show that the important U.S. macroeconomic news announcements are important also when valuing stock on the Finnish stock markets. This finding is consistent with Nikkinen and Sahlström (2001, 2004b) that U.S. macroeconomic news releases have impact on the stock valuation also on the European stock markets.

6. Summary and conclusions

This study investigates whether investors on the Finnish stock market regard U.S. news macroeconomic announcements as an important source of information when valuing stocks. In particular, by utilizing option-implied volatilities the importance of the U.S. macroeconomic news information on the Finnish stock market can be examined. The investigated U.S. macroeconomic news announcements are selected based on the earlier literature (see Graham et al. 2003). The investigated announcements are Employment (EMP), Producer Price Index (PPI), Federal Open Market Committee´s (FOMC) meeting and National Association of Purchasing Management (NAPMM) reports.

Since the release dates, but not the content of these important announcements are known in advance, their impacts on uncertainty, as measured by implied volatilities, are expected to be the following: Implied volatilities should increase prior to the scheduled important news announcement and decrease on the announcement day, as uncertainty is resolved by the market participants. This is further consistent with the higher realized volatility on the announcement day, which is empirically well-documented in the literature (see e.g. Nikkinen et al. 2006).

The empirical results of this study show that on important macroeconomic news announcement days implied volatility drops, as uncertainty is resolved by the market participants. It is found that from the investigated news announcements this holds for EMP, PPI and FOMC`s reports. FOMC´s report seems to have largest impact on stock valuation in Finland followed by EMP and PPI reports. Interestingly, implied volatilities do not seem to be responding to release of NAPMM report.

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Cox regression in payment default prediction: Evidence from Finland

Erkki K. Laitinen

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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Survival analysis (SA) is a powerful statistical technique that is generally applied to longitudinal data from the survival process of a risk set. However, in financial distress (FD) prediction the relevant data available typically cover only a short time series and is non-stationary. Typically such data include only 1–5 observations for each firm. This study is an attempt to apply the SA to such data consisted of a large data base of Finnish firms from a short, five-year period (1997–2001). One prior to default the estimation data include 2,769 default and 27,244 non-default firms. All the observations are used to estimate a proportional hazard (Cox regression) model. The years (1 to 5) to default are used as the time variable. Financial ratios, size, industry, and age are used as covariates in estimation. The proportionality assumption of hazards is tested by time-varying variables and shown to hold. The exponential hazard is compared to a logistic risk measure estimated from data one year prior to default. When considering a longer view, the hazard is shown to give a more accurate forecast of default. The baseline hazards for the five years prior to default, are summarized as a scalar and calibrated with a Weibull distribution to facilitate interpretation. The study is an extension of Laitinen (2005).

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Key words: survival analysis – financial distress – Cox regression – Finnish evidence

1. INTRODUCTION

Survival analysis (SA) can be generally defined as a collection of such statistical procedures for data analysis for which the outcome variable of interest is time until an event occurs in a substantive process (Kleinbaum 1997: 4). The time variable in this analysis is usually referred to as survival time that gives the time that an individual has survived over a follow-up period. The event is often understood as a failure (negative event) such as death, although it can also be a positive event like recovery. The substantive process described in SA refers to that an individual may change from a discrete state ("alive") to another discrete state ("dead") at any random point in time caused by characteristics measured with either time-constant or time-dependent covariates (independent variables). In principle, survival analysis is focused on modelling an individual's probability to survive over the next period on the condition that the individual has survived until the current period, that is, on *the survival function*. This survival function estimated by statistical procedures is specific to an individual with a specific set of covariate values. The function is directly related to *the hazard function* which is based on a conditional failure rate (rather than a probability). SA is characterized with censoring which occurs when there is some information about individual's survival time but the exact survival time is not known. There are several types of censoring, such as right censoring, left censoring, and interval censoring. SA is a natural statistical method for medicine analyses (for example cancer treatment) but also for engineering (time to breakdown) and laboratory experiments (time to development of some symptom). A good example of SA is Austin, Rothwell and Tu (2002) which makes use of seven different statistical strategies for analysing the association between patient characteristics and post-operative length of stay (LOS).

SA has also been applied in several disciplines of accounting, especially in financial distress analysis (FDA) (for a review see LeClere 2000 and 2005). LeClere (2000: 169-170) states that the advantage of SA, firstly, lies in the manner in which it handles censored observations and time-varying covariates. SA models use estimation methods that incorporate information from censored and uncensored observations to provide consistent parameter estimates. In contrast, typical statistical methods in FDA such as regression analysis cannot incorporate information from censored observations.

Secondly, a clear advantage of SA deals with the way to treat the value of covariates over the observation period. These covariates can be time-invariant or time-varying. When time-varying covariates are gathered for SA, one observation is is required for each time period. SA employs estimation methods that consider changes in the value of covariates over time. Thus, they determine if the probability of an event changes as the covariates change over time. Typical statistical methods in FDA are cross-sectional and only view the individual at a snap-shot in time. Such methods include regression analysis, linear discriminant analysis, logit analysis, recursive partitioning, and neutral networks (for reviews see Zavgren 1983, Jones 1987, and Laitinen and Kankaanpää 1999). Shumway (2001: 103) also points that survival (hazard) models are preferable because they may produce more efficient out-of-sample forecasts by utilizing much more data. The hazard ("proportionate odds") model can be thought as a binary logit model that includes each firm year as a separate observation. However, the logit model deals with whether a firm survives while the hazard model examines how long a firm survives (see Chen and Lee 1993: 682).

The application of SA in FDA is however not problem-free. For example, Abdel-Khalik (1993) has presented critics on SA when applied in FDA like Chen and Lee (1993). Chen and Lee applied the Cox proportional hazard model (CPHM, the Cox regression) on a sample 175 oil- and gas-producing firms. Of these companies, about 40% experienced some form of financial distress during the observation period 1981–1988. Chen and Lee analysed covariates at the onset of an economic adversity that is the oil turmoil in 1980. They used financial, operational, size, and age information from 1981 to predict the survival time that was defined as the length of time between the end of 1981 and the occurrence of the earliest sign of FD. Abdel-Khalik (1993: 697) states that although it is feasible to apply SA to evaluate the intrinsic factors of a phenomenon such as FD, the application in this case cannot be expected to expand the scope of knowledge beyond the well-established inferences that high leverage and low liquidity firms are likely to be victims of FD. Even the base-line hazard function is of limited interest because it would simply describe time to failure of the firms in their natural habitat without adequate assessment of the phenomenon of interest. Abdel-Khalik (1993: 698) also criticizes the proportionality assumption of CPHM by the following example: the risk of FD does not double when the debt-to-equity ratio increases, for example, from 0.05 to 0.10, but it might more than double when that ratio increases from 1.50 to 3.00. He (1993: 699) states that the need of SA arises because of the censoring feature of the data collected but questions the cost-benefit ratio of SA. Finally, he ends (1993: 704) with the following two questions useful for future research. First, under what conditions would SA models offer information that cannot be generated with less complex analysis? Second, what are the policy implications for regulators, managers, or other groups of being able to assess the probability of survival to be slightly greater for, say, nine months than probability of surviving up to a year?

The questions presented by Abdel-khalik are important to answer in any SA research. The prior SA studies in FDA deal with these questions in very different ways. LeClere (2000: 177-183) presents a summary of twelve such studies beginning with Lane, Looney, and Wansley (1986) and ending with George, Spiceland, and George (1996). In addition to these studies, for example Luoma and Laitinen (1991), Shumway (2001), Catanach and Perry (2001), Turetsky and McEwen (2001), and Duffie and Wang (2003) have contributed to SA research in FDA. The idea of these studies is typically to benefit from the capability of SA to handle with censored observations and, consequently, to develop a model predicting the length of time before FD for a company using either time-invariant (fixed) or time-varying covariates. The present study is not an exception. However, it includes a couple of special features worth of analysing. First, we use a large data base of Finnish firms from a short, five-year period (1997-2001). It is a usual practice in Finland that banks and other credit institutions have a large data base which however covers only a short period, typically five years. This is because the relevance of older data is questioned by these institutions when predicting the future of a firm. In present environments changes are so fast that, say, financial ratios 6-7 years ago do not have any predictive power. In addition to this, the financial and operative behaviour of companies is changing all the time which makes older data largely irrelevant. Moreover, these kinds of data are usually characterized by a rather small number of default companies (2–5%) which makes every default observation valuable. The time-series of firms typically include missing observations and, in addition to that, the population is not stationary because exits and entries happen all the time. These kinds of characteristics make the application of SA challenging. *The present study is an attempt to analyse how SA can be benefited in these kinds of data usually available in credit institutions.*

Secondly, we estimate only one survival model that alone describes the five-year FD process. This is impossible to do consistently with familiar single-period cross-sectional estimation procedures. The idea is to take account of all the observations in estimation which thus includes from 1 to 5 observations of every firm. In this way we can get observations enough to depict the different phases of the FD process when the analysis is constrained by the limited number of default firms. This obviously leads to two kinds of problems. The procedure may lead to incorrect test statistics because all the observations are not independent which must be taken into account when interpreting the results. Furthermore, the baseline hazard may be biased because the estimation data do not correspond to a proper risk set assumed by SA. To depict the multi-period FD process with a single model is difficult because the significance of covariates vary in time when FD is approaching (see Zavgren and Friedman 1988). For example, Lane, Looney, and Wansley (1986) got very different PH models when estimated using data one or two years prior to failure. In this study we use all the five-year data to estimate a PH model which provides us with a (biased) constant time-profile of hazard (base-line hazard) and a hazard dependent on the value of covariates (exponential hazard). The application of this kind of model in practice would require that we can a priori identify the starting point for the five-year process. Turetsky and McEwen (2001) for example use a volatile decrease of cash flow from continuing operations as a sign of this point. In practice, especially when dealing with short-time series this point is not always observable. Thus, we shall reduce the time-profile of hazard to a constant which makes the model independent of time. It is then applicable without any knowledge of the stage of the FD process. This modification makes the PH (Cox regression) model to approach a logistic regression model as applied to similar data.

Thus, in summary, the objective of this study is to attempt to apply a SA model to FD prediction when the time-series data for observation is not long and stationary as usual in practice in survival analysis. These kinds of data characteristics may set special requirements for the analysis. The study is related to Laitinen (2005) that present evidence that is more concise from the same data. The paper is organized as follows. This introductory section presented the background and objectives of the study. The second section deals with the FD process to give a theoretical foundation for the selection of the independent variables (covariates). In this context four kinds of default types are referred to (bankruptcy, restructuring, liquidation, and other payment defaults). In addition, three factors which may affect the process are shortly discussed (size, industry, and age). These factors are empirically analysed as a strata when estimating the PH model. The empirical data and statistical methods are discussed in the third section. We shall use a large data base that includes almost all the Finnish firms which publish financial statements. The sample of companies is divided into estimation data (80%) and test data (20%). For example, in the first year prior to default the data include 27,244 no-default firms and 2,769 default firms. The SA model is estimated by the Cox regression using the SPSS package. This method allows powerful strata analysis. Logistic regression analysis is used to get a benchmark for the efficiency of the model. The fourth section presents the empirical results. First, the FD processes for different default types are analysed. The time profile of the processes is similar but more serious default types are associated with more serious symptoms. Second, the PH model is estimated using covariates such as financial ratios, size, industry, and age. All the three strata factors are statistically significant. The PH assumption is tested using time-varying covariates. Third, the prediction ability of the exponential hazard is analysed and compared with a cross-sectional logistic model. For a longer term prediction, the exponential hazard is superior to the logistic probability. Fourth, the base-line hazard is reduced to a scalar and calibrated using a Weibull distribution to be suitable for a practical interpretation. The last section summarizes the study and gives outlines for further research on the topic.

2. PAYMENT DEFAULT PROCESS

2.1. Financial distress process

When modelling empirically the FD process, we need a theoretical description of it to be able to choose the covariates in a consistent way. In this section we will present a brief description of such a process. The target phenomenon in this study is *payment default* which is usually a result of multi-year failure process. This phenomenon can in general be defined as the inability of the firm to pay its financial obligations when they come due (see for example Beaver 1966 and Altman 1968). In this stage of insolvency the firm has not financial resources enough *and* is unable to get such resources immediately to pay the mature obligations in time. The reasons for the start of the FD process are often associated with the relationship between growth and profitability (see Laitinen 1991). The level of the annual operating cash flow (before interest and taxes) is the higher, the higher is the profitability of the firm. In addition, this flow is the lower; the higher is the rate of growth. The FD process will start when there is an exceptional large positive difference between growth and profitability (high growth rate & low profitability). This may be due to a fast growth strategy or to a diminished profitability, or to both. Consequently, the cash flow is low and the firm is not able to pay taxes and interest expenses without outside financing that is typically debt. Because the firm needs financing for taxes and interest expenses, it is not usually to get share capital to this purpose.

Thus the firm takes more debt. If the cash flow continues to be low, the firm is running into a vicious circle. It needs more debt to pay its taxes and interest expenses which leads to deeper indebtedness and higher interest expenses. When approaching the moment of default, the firm may be so indebted that it will not get long-term debt due to the lack of securities. Thus, at the final stages of the FD process, the firm tries to get more current debt to avoid a default of payments. Finally, its financial assets become very low (critical) because they have used to pay financial obligations. Simultaneously, If it does not get any additional current debt, it has no financial assets or possibilities to get more debt to pay the mature obligations. This state evidently leads to a default of payments if the firm is standing alone. When we use this kind of process to depict the path to FD, there may be a couple of external factors which may be lead to wrong interpretations. First, the owner of the firm may be rich enough to finance the operations of the firm over the distressed years. This owner may be a (group of) private person(s) or a (mother) firm. In that case, the firm can get external owner's capital, which does not lead to any default of payments. If we classify this kind of firm as a default firm based on high growth, low profitability and resulting low cash flow, we will make a classification error of type 2. Secondly, if we follow carefully the FD process outlined above, we may classify a default firm as a non-default firm. This is because all of the default firms do not follow the process described above. For example, a firm may have a default because of insufficient control system for payments. In addition, it can be run into a default for instance because of a sudden death of the MD or of a loosing of its main customer. These kinds of phenomena will lead to a classification error of type 1. Thirdly, sometimes the process starts with negative growth in net sales which deteriorates the profitability of the firm (due to fixed expenses), and runs it into a FD process. In that case we do not observe any positive difference between growth and profitability.

Figure 1 shows the FD process outlined above. This figure only describes a typical process which may hold for the majority of default firms. However, exceptions are not rare as shown above. Table 1 presents a table where the stages of the FD process are associated with financial indicators which may give a warning of approaching default in this stage. The stage of process indicates the period where the indicator may be effective at the first time. Thus, it is possible that the earliest warning signals will maintain their significance throughout the process. However, it can presupposed that the when the FD process is going on, the significance of the indicators associated with the reasons of the start will continuously diminish and, at the same time, that of the outcome indicators will be more visible. This means that predictive power of growth and profitability (reasons) may not be high at the final stages of the process in comparison to that of equity ratio, cash flow and quick ratio (outcomes). Moreover, it should be take account that it is not the pure effect of growth and profitability alone which starts the process. It is the interaction between these factors which is observable in the low level of cash flow. Therefore the stand-alone significance of growth and profitability may not be high. *Thus, when modelling the whole FD process we can present a hypothesis that cash flow, equity ratio, and quick ratio will be the most significant covariates (hypothesis 1).* This hypothesis is partly supported by Zavgren and Friedman (1988). They showed that, in a logit model, quick ratio will be significant in three last years before failure while (long-term) equity ratio is significant in all five years except the third year before failure. In addition, the return on investment ratio was not significant in any of the five years. Zavgren and Friedman did not use any cash flow measures.

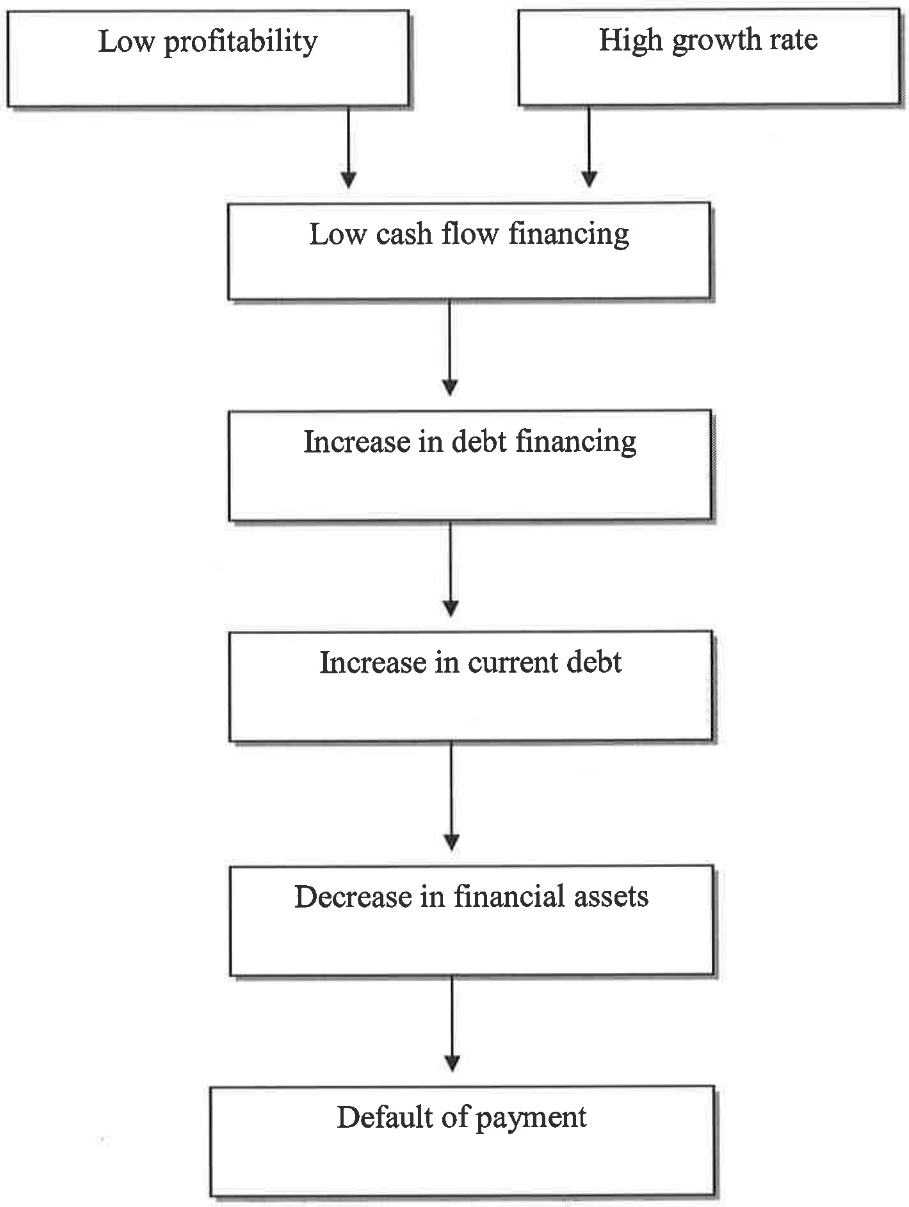


Figure 1. Financial distress process.

Table 1. Financial ratios as indicators of the financial distress process.

Financial distress process stage	Financial indicator
1. Low profitability & High growth rate	1. Return on investment ratio & Net profit to net sales ratio & Growth in net sales
2. Low cash flow financing	2. Cash flow to net sales ratio
3. Increase in debt financing	3. Equity ratio & Cash flow to debt ratio
4. Increase in current debt	4. Equity ratio & Quick ratio
5. Decrease in financial assets	5. Quick ratio
6. Default of payment	

2.2. Different default types

There are many different default types which can be used as the target phenomenon in a FD study. For example, Beaver (1966: 71) included in his sample failed firms which were characterized by bankruptcy, involvement of non-payment of preferred stock dividends, bond defaults, and overdrawn of bank account. This study only deals with four types of defaults which are briefly described below. First, *bankruptcy* is the most serious type of default. According to Finnish Bankruptcy Act (1 §) it means that the assets of the firm are given to the bankrupt's estate and divided by the debtors of the firm. Bankruptcy can be voluntary and the firm can itself file a bankruptcy petition or a debtor can file it against the firm if there is a indisputable default of payment and the firm is unable to pay it when demanded. Bankruptcy can be withdrawn if the firm takes care of the payment later. It can be cancelled if the bankrupt's estate is empty and can not afford the bankruptcy proceedings. Second, *company restructuring* can be used to avoid bankruptcy is the firm is unable to pay its financial obligations. The objective of Finnish Company Restructuring Act (1 §) is to recover a financially distressed firm that is expected to be able to pay its obligations later. During the restructuring period the firm is saved against the demands of debtors. The restructuring petition is can be filed by the firm itself or by the debtors. It can be filed also in the case when the bankruptcy petition was active. Thus it is often used as a way to avoid the bankruptcy. The Act (7 §) also says that the firm to be restructured should be viable (so that it can be recovered) and it should have financial assets enough to afford the restructuring proceedings (which are not cheap). Third, *liquidation* deals with limited companies and is therefore regulated by Finnish Companies Act (13 §). It has twofold meanings. It can be voluntary which means the owners of a firm want to assess its financial state for example due to a disagreement or to a desire to dissolve the company. However, the firm can get into the liquidation also if it has a deficiency in equity which means that the equity makes less that half of the share capital (13:2 §). Thus in Finnish practice liquidation *cannot* be regarded as a proper default of payment. Fourth, there are a number of *other defaults* which may be financially as serious as bankruptcy or re-structuring (for a list see http://www.asiakastieto.fi/en/asiakastieto/koti.htm). In Finland, the most common types of payment default are private-judicial draft protest published or not published, unaccounted tax withholdings and value-added tax installments published by the tax authorities, insolvency or other impediment stated in connection of execution proceedings, and judgment by default on demand for payments. In fact, more than 40% of the payment defaults in Finland are private-judicial draft protests.

When modelling the FD process, it would be confusing to develop a model separately for each type of default. However, an efficient application of one model would imply that the FD processes are similar for these types. Bankruptcy may be the most serious outcome of the FD process. It ends with a statement that the firm is permanently unable to pay its financial obligations. This means that the symptoms of the process (behaviour of financial ratios) may be clearly observable for a bankrupt firm. When a firm files a petition for company restructuring, it is seriously threatened by bankruptcy. However, this firm may not be permanently insolvent but can be recovered through restructuring proceedings. Thus the process for a restructuring firm is expected to be similar with the FD process for a bankruptcy firm but with weaker symptoms of default. The situation with liquidation is different. If it is based on a deficiency in equity, the process can be similar as in bankruptcy and restructuring firms. It is usually a poor profitability that weakens the equity ratio of a liquidation firm and leads to a deficiency not legally allowed. Anyway, there may not be any defaults of payment as a result of this deficiency. Thus the process only partly would resemble the process outlined above. Moreover, if the liquidation is voluntary and based on demands by the owners, it may have nothing to do with the FD process. The other default types represent pure default phenomena and may thus follow the typical process. However, these types are not as serious as bankruptcy and restructuring. Typically they can only mean a short break in the business operations of a firm. After this break the firm can continue its operations if it is able to pay the obligation demanded. In many cases a firm can have several (tens of) such defaults. It is also possible that a series of small (other) defaults precede a more default phenomenon like bankruptcy or restructuring. Turetsky and McEwen (2001) have applied SA to model such a series of financial events. *In summary, we hypothesize that the FD processes are similar to bankruptcy, restructuring, and other default types but that the seriousness of the symptoms will decrease in this order (hypothesis 2). The process for liquidation is expected to be different in particular if voluntary liquidations are common in the set of firms considered (hypothesis 3).*

2.3. Different processes

The FD process outlined above describes a typical process. There may be several factors which may affect the temporal profile of the process. In this context we briefly consider only three such factors. First, the *size* of the firm can be an important determinant of the process. For example, Altman, Haldeman, and Narayanan (1977), Ohlson (1980), Betts and Belhoul (1987), and Shumway (2001) have provided evidence on the significance of the size effect. In the PH model estimated by Turetsky and McEwen (2001) a size measure (logarithm of total assets) was not significant when analyzing the (total) period from volatile decrease in cash flows to bankruptcy. However, it was statistically significant when modeling the (sub) periods from volatile decrease in cash flows to default and, in addition, from default to bankruptcy. Second, the FD processes may be different in different *industrial categories*. For instance, El Hennawy and Morris (1983), Platt and Platt (1990) and McGurr and Devaney (1998) have shown the industrial effect when predicting failure. El Hennawy and Morris (1983) used a familiar dummy variable procedure to describe the industry of the firms. Platt and Platt (1990) examined the effects of industry-relative financial and operating ratios and the changes in industry output on the likelihood of corporate failure. They developed a justification for the stability of industry-relative ratios, and a corporate failure model was built using industry-relative financial ratios and measures of industry growth. McGurr and DeVaney (1998) applied failure prediction models developed on mixed industry samples, to retailing. They observed that this kind of model had a low classification accuracy due to the industry effect. Third, the *age* of the company is often recognized as an important variable affecting the failure risk. For example, Keasey and Watson (1987) and Shumway (2001) have used it as a covariate in a FD model. Shumway (2001: 112) added a natural logarithm of age in his hazard model to extract an accelerated failure-time model. Moreover, Laitinen (1992) has shown that the FD process may be different to just-founded firms due to the lack of capital and cash flow generation.

The size can be affected on the FD process in many ways. Small companies do not usually have resources for an efficient credit control systems as the larger companies do. However, if we think about micro firms which employ less than 10 employees, the situation may be different. The number of payments in such firms may be so small that the manager can easily control the payments without any sophisticated systems. The number of payments in large companies may be so large that (other) payment defaults may incidentally happen without any insolvency. Moreover, a large company may be composed of a large set of small daughter companies which may be as vulnerable to (other payment) defaults as standing-alone small firms. However, when considering bankruptcy and restructuring the situation is changed. Micro companies cannot usually afford restructuring proceedings. Moreover, their assets are usually so small that debtors rarely file a bankruptcy petition against them because it easily leads to the cancellation of proceedings. Large companies go rarely into bankruptcy because they can afford restructuring proceedings. Moreover, they can sell their property to finance temporal deficiencies in cash and postpone insolvency for years. Thus it seems that very small (micro) and large firms form groups where the FD process may be different from the typical one.

Firms in different industries can also behave in different ways prior to default. For example, the operative processes in manufacturing, construction, trade, and service are very different. Manufacturing companies have factories, machines and storages which implies an advanced logistics. They have usually several products and use several raw materials. Construction firms are often concentrated on a narrow sector and have only on large project at the same time which leads to a cyclical development. Trade firms may have several thousands of products which are stored and sold further to customers. Service companies have intangible products which cannot be stored and which can be mass products or customer-tailored products. This all means, first, that the financial ratios for these industries are very different. The balance sheets (asset structure) and income statements (expense structure) are not similar. Secondly, the operations of the firms from different industries are totally different and may lead to different behaviour of the ratios in time. For example, a construction firm can fail if it only takes one unprofitable project. A trade firm may collapse if it looses agency of one important product. A service firm may run into a bankruptcy due to a relatively small payment default because it has no assets to sell or secure additional debt. Moreover, it is easier to a manufacturing firm to get into restructuring (in Finland), than to others. The FD process may be affected also by the age of the company. Argenti (1976: 151–168) describes three typical failure processes which all are associated with the age of the firm. Type 1 failure occurs only to firms newly formed and small. The general health of the firms never rises above poor and it probably fails within five years. Type 2 also occurs to very young firms although they usually survive longer than Type 1. Type 2 shoots upwards to fantastic heights before crashing down again. Type 3 failure occur only to older, mature firms which have been trading successfully for a number of years or decades. In these firms, there is first a partial collapse from a good level of performance, followed by a plateau, after which there is a rapid decline to insolvency. The failure processes described by Argenti show that especially the processes of newly-formed firms may be different that the typical process. Type 3 may not significantly differ from this process. It is clear that young firms may often suffer from lack of capital and difficulties to start the generation of positive cash flows. Especially the first five years may be very risky with respect to payment defaults (the Valley of Death). *Thus, in summary, we can hypothesize that the size, industry, and age of the firm have a significant effect on the FD process (hypothesis 4).*

3. EMPIRICAL DATA AND METHODS

3.1. Empirical data

The database used in this study does not correspond to traditional survival data for several reasons. The basic characteristics of the data base are typical for data bases maintained by credit institutions and credit information firms although the number of firms is exceptionally high. It has been obtained from Suomen Asiakastieto Oy (Finska Ltd, see http://www.asiakastieto.fi) and contains financial information from a large number of disguised Finnish firms for the five-year period 1997-2001. These data are statistically representative, within the population of firms which publishes financial statements, with respect to size, industry, age, and geographical area. In addition, it is representative with respect to each type of default so that the ratio of defaults to non-defaults is identical with the population. The payment defaults in the data are distributed over the years 1998-2002 so that the data include 1-5 annual observations for each default firm. For the non-default firms we know that they do not have experiences a default until the end of 2002. Thus these data are right-censored for the non-default firms and left-truncated for the default firms. Moreover the sample is not stationary but instead includes exit and entries of firms due to the intensity of firms to publish their financial statements. This intensity is not constant during the period because of changes in Finnish Accounting Act. These are the characteristics of the data which we should deal with when estimating a survival model to predict a default. In practice it is important that a model is based on fresh data because the FD behaviour of firms may change all the time. Thus, a longer time-series would be useful in estimation but could make the results obsolete in the eyes of experts in practice.

Traditional type of survival data in a FD study would include the value of the proposed covariates in the beginning of the process of interest and the survival time for each firm until the default of payment. However, in practice it is very difficult (or impossible) to identify an exact starting point for the FD process. Turetsky and McEwen (2001) for example identified this starting point as a decrease from positive to negative in cash flows from continuing operations. From the Compustat data base they found finally

2671 firms which did fulfil this condition. Of these firms, only 311 firms became classified as business failures experiencing bankruptcy. Of the 2360 non-failure firms, 232 firms experienced a (technical or payment) default. Hence the majority of companies which had a decrease in cash flow were not failure or default firms at all. In addition, it is probable that Compustat includes a lot of such default firms which did not experience any early decrease in cash flow. The arbitrariness of the starting point of course would also make the survival time arbitrary. However, we know the *ending* point of the FD process exactly, that is the exact time of default. Thus it is possible to calculate survival time from the time of default backwards to the moment of closing of accounts in each year. This factually means that we can use the values of financial variables at the end of year as covariates to forecast the survival time until the default. Thus, it is possible to use all the annual observations from every firm to estimate the survival model. This is important because usually the number of (different types of) default firms (for example bankruptcy or restructuring firms) is small for an efficient estimation.

The firms are organized in the data so that each annual observation is taken into the data. This factually means that there are 1-5 observations for each firm. Table 2 shows how the observations are organized. The first firm is a non-default firm which is represented with five censored observations in the data. The second firm has experienced a default in 2002. It has also five observations with a survival time from 1 to 5. The third firm has only two censored observations. Finally, the fourth firm has experienced a default in 2001 but has only two observations (from 1998 and 1999). Table 3 presents the number of observations organized in the way explained above. The number of both non-default and default observations is large. The sample is split randomly into the parts, to the estimation data and to the test data. For example, the data one year prior to default include 37,471 firms. Of these firms, 30,013 firms are included into the estimation data and 7,458 into the test data. The estimation data have in all 2,769 default firms. The majority of them (2,052) have experienced a default other than bankruptcy (208), restructuring (39), or liquidation (470). The number of firms varies annually so that it is smallest in five year prior to default (21,030). The rather small number of firms in 2001 is an outcome of the fact that the data was gathered during the summer 2002. By this date, only a part of the firms had published their financial statements. Because of the non-stationary of the data and the organization of the observations, the table does present any time-series of a proper risk set.

Table 2. Illustration of the nature of the reorganized survival data.

		Calendar year:							
Obser-vation	**Firm**	**1997**	**1998**	**1999**	**2000**	**2001**	**Status**	**Survival time**	**Censo-ring**
1	1	Data					No default	5	Yes
2	1		Data				No default	4	Yes
3	1			Data			No default	3	Yes
4	1				Data		No default	2	Yes
5	1					Data	No default	1	Yes
6	2	Data					Default 2002	5	No
7	2		Data				Default 2002	4	No
8	2			Data			Default 2002	3	No
9	2				Data		Default 2002	2	No
10	2					Data	Default 2002	1	No
11	3				Data		No default	2	Yes
12	3					Data	No default	1	Yes
13	4		Data				Default 2001	3	No
14	4			Data			Default 2001	2	No

Table 3. Description of the data.

PANEL 1. Estimation data.

Distress type:	5	4	3	2	1	0	-1	-2
	Time (years) to default:							
No payment default	20475	35027	50940	50340	27244			
Bankruptcy	65	172	302	331	208	**84**	57	26
Company restructuring	10	25	48	52	39	**29**	18	8
Liquidation	156	365	591	713	470	**121**	13	2
Other payment default	324	882	1663	2188	2052	**1396**	957	483
In total	**21030**	**36471**	**53544**	**53624**	**30013**	**1630**	**1045**	**519**

PANEL 2. Test data.

No payment default	5073	8778	12977	12777	6732			
Bankruptcy	24	46	77	86	43	**20**	8	6
Company restructuring	2	7	5	13	17	**8**	5	3
Liquidation	48	79	141	162	124	**32**	5	1
Other payment default	88	216	384	538	542	**397**	224	146
In total	**5235**	**9126**	**13584**	**13576**	**7458**	**457**	**242**	**156**

The variables which will be used to develop the SA model are chosen on the basis of the FD process stages and their financial indicators presented in Table 1. In all, seven financial variables are chosen. The growth of the firm is measured by the annual change in net sales while there are two measures for the profitability: the return on investment and the net profit to net sales ratios. Quick ratio is employed as the measure of short-term liquidity. Two different cash flow measures are applied, that is the cash flow to net sales and the cash flow to total debt ratios. Traditional cash flows are used instead of cash-based flows, because their behaviour before failure tends to be more stable (see Laitinen 1994). Finally, the equity ratio (shareholder capital to total debt ratio) is applied to measure the solidity (indebtedness) of the firm. These variables are used to test the first research hypothesis on that cash flow, equity ratio, and quick ratio will be the most significant covariates in modelling the FD process (hypothesis 1). The chosen variables are largely comparable with the covariates used in previous failure studies (see

Mossman, Bell, Swartz, and Turtle 1998 and Turetsky and McEwen 2001: 325-326). The similarity of the FD processes for different default types (bankruptcy, restructuring, liquidation, and other default) is analysed by the median values of the variables during the process (hypotheses 2 and 3). The effects of the hypothesized factors (size, industry, and age) on the FD process are analysed with the aid of net sales and employee size class (size), industry dummy variables (industry), logarithmic age and age groups (age) (hypothesis 4).

3.2. Statistical methods

Survival analysis can benefit from a large set of different statistical methods (see LeClere 2000). However, the special characteristics of the present data will limit the choice of estimation methods. For this reason we will use the PH (proportional hazards, Cox regression) model developed by Cox (1972). The PH model can be presented as follows (see for example Kleinbaum 1997: 94)

$$\lambda(t, \mathbf{X}^i) = \lambda_0(t) \exp[\mathbf{X}^i \beta] \qquad (1)$$

where $\lambda(t, \mathbf{X}^i)$ gives the hazard rate for the firm i, $\mathbf{X}^i$ is the set of p covariates for the firm i, β is the constant coefficient vector, and $\lambda_0(t)$ is the baseline hazard.

The benefit of the PH model in this case is in the way in which the β coefficients are estimated without any knowledge about the baseline hazard. This estimation method is called as the method of partial likelihood (see LeClere 2000: 173-174). In this method the likelihood function has the following form

$$L(\beta) = \prod_{i=1}^{r} \frac{\exp(\mathbf{X}_i \beta)}{\sum_{l \in \mathbf{R}_i} \exp(\mathbf{X}^l \beta)} \qquad (2)$$

where r is the number of time periods, $\mathbf{X}_i$ the vector of covariates associated with the firms observed to experience a default at time i, i=1, 2, ... , r and $\mathbf{R}_i$ is the risk set at time i. The interpretation of the likelihood is not standard when analysing the data organized as above. In these data, the nominator of (2) includes the firms that will experience a default after i time periods. The risk set at time t will include these firms and in addition, all the earlier observations from these firms, and the present and earlier observations from the censored (no-default) firms. Thus it includes all the observations until the period i which could have belonged to the stage (year) i of the FD process and did or did not. All the observations which are not yet known *whether or not they* belong to the stage i are omitted. This means that the hazard rate in this case roughly measures the proxy risk of an annual observation of a firm to belong to the stage (year) i of the FD process when all the potential observations are included in the risk set. What is most important is that the method utilises maximum amount of data when estimating the coefficient vector β. The equation (2) factually compares the data of the firms that will experience default after i periods to the data from their present and earlier periods and to all the present and earlier data from the censored firms. Thus the model can provide us with statistically very powerful results. However, in a standard hazard model, each firm's lifespan is one observation. This means that the correct value of n for test statistics is the number of firms in the data, not the number of firm years (compare with Shumway 2001: 112). The overestimation in test statistics can be cancelled by dividing test statistics by the average number of firm years per firm, which in this case are about 3.

The partial likelihood estimation of the PH model may give us consistent estimates of the coefficients β which are independent of time. Thus the estimated coefficients provide us with a method to assess the exponential risk. In a standard version of the analysis the hazard of a firm at time i is dependent on the baseline hazard at that time as (1) shows. However, in this application the baseline hazard estimates are largely useless because of the organization of the data and to the peculiar definition of the risk set. It is herein important that the model does not depend on time because the starting point for the FD process is unknown. That kind of time-invariant (exponential) model would provide us with a tool which can be applied to any annual data of a firm to assess the risk to experience a default. The model can then be linked to the time with the aid of the logarithmic age of the firm. Shumway (2001: 112) states that is the natural logarithm of age is used as a covariate in a hazard model; it will become an accelerated failure-time model. However, without a proper baseline hazard estimate the figure given by the exponential hazard is anyway difficult to interpret. Hence, in order to transform the exponential hazard to a more interpretable form we shall utilize the Weibull distribution applied to the FD process as described by the exponential hazard calculated at the mean of the covariates. All the statistical estimations are carried out by the SPSS. The exponential coefficients are estimated by the SPSS survival tool making use of the Cox regression. Standard statistics are used to test the significance of the model and the estimates. Strata analysis is utilized to test the PH assumption and, at the same, to develop covariates for the model. The classification accuracy of the estimated exponential hazard is tested by deciles as in Shumway (2001) both in the estimation and test data. A cross-sectional logistic regression model estimated from the data one year prior to default is used as a benchmark. The Weibull distribution is applied by means of the Excel program.

4. EMPIRICAL RESULTS

4.1. Default processes

Appendix 1 shows the median values of the financial variables separately for each default type in five years before default, in default year, and two years after it. First, panel 1 presents the median values for non-default firms. The time-series are stable and can be described as a random walk with two exceptions. The median net sales measure in the last year (2001) is exceptionally high. This is a bias that is due to the fact that the data have gathered during the summer 2002 and covers only a part of the population. Obviously, the larger firms publish their annual statements faster than the smaller ones. The second exception is that there is a positive drift in the time series of equity ratio. This describes the general trend in Finnish firms to improve capital structure systematically after the depression in the early years of the 1990 decade. Thus, systematic change in financial behaviour emphasizes the importance of fresh data.

Second, panel 2 shows that a typical bankruptcy firm is greater than a median non-default firm. All the financial ratios diminish systematically during the FD process when bankruptcy is approaching, with one exception. The rate of growth does not behave in a stable way but has large oscillations. The panel shows that the FD process covers all the five years. The signs of approaching bankruptcy are observable already in the fifth year prior to default. The median firm is very indebted, and has a low cash flow and liquidity in that stage. However, profitability as measured by the return on investment is still at average level. Anyway, the net profit to net sales ratio shows a low profitability. The difference between these ratios is due to that the return on investment ratio is based on profit before interest expenses whereas the net profit to net sales ratio is based on profit after this item and taxes. Because of high indebtedness interest expenses make the net profit low. Thus it seems that, for bankruptcy firms, the five-year FD process will start when the firm is heavily indebted and profitability begin to deteriorate. For the surviving firms, the financial situation will improve already in the year of the bankruptcy (year 0) which explains why the bankruptcy is cancelled. However, the firm does not grow and has a low quick ratio still one year after the default (year -1).

Third, panel 3 presents the FD process for a typical restructuring firm, which is significantly larger than a median bankruptcy firm. The process seems to begin in a way described in Table 2. In the early stages (years 5 and 4) the growth of the median firm is fast which together with a low profitability considerably weakens the equity ratio. The first serious signs of approaching restructuring are visible not before the year 3. In that year the financial situation deteriorates badly and the negative development begins in every financial variable. In addition, the rate of growth diminishes systematically. In the years 1 and 0 (default year), the situation is more serious than for a median bankruptcy firm and all variables refer to a deep distress. Reorganization typically means that unprofitable operations are sold or finished, and the capital structure will be reorganized. These actions can be observed from the variables. The median size drops dramatically, while the equity ratio and the quick ratio recover fast after the default.

Fourth, the process of a median liquidation firm is very different from the previous ones as can be seen from panel 4. The growth and profitability diminish systematically but the decline in profitability is slow so that it is still at a moderate level one year before default. However, cash flow measures and quick ratio are good and stable during the process. What is more significant is that the equity ratio is high and tends to rise all the time. The liquidity year (0) is very bad for profitability and cash flows. However, it is not possible to draw any conclusions about the development in this year and after that because of the small number of observations (liquidation usually means that business operations are deceased). The FD process of other default firms is not dramatic as that of others. Typically the firm of this type is smaller than the median firm and the growth rate is stable until the default year. Profitability as measured by the return on investment will slowly decrease and is not very low even one year before default. For the same reason as above, the net profit to net sales ratio reveals better the FD process. Cash flows and the equity ratio deteriorate little by little when the default is approaching. Already five years before default, the equity ratio is quite low. After the default, recovering is systematic but slow.

In summary, the medians in appendix 1 show that the FD processes are different for different default types when strictly analysed. For the bankruptcy firms the process tends to be long so that the signs of default are observable already five years before bankruptcy. The earliest stages are associated with low equity value and deteriorating profit. Restructuring firms follow the hypothetical process outlined in table 1. The earliest signs are associated with a fast growth and a low profitability. After that (three years prior to default), the other signs of the FD process will become visible. The other default firms are characterized by a process where all the financial ratios are slowly deteriorated when the default is approaching. However, the signs of default will become visible not until two years before default. In all these types, all the financial ratios are low two and one years prior to default. The ratios in the last year before default are extremely low for the restructuring firms and exceptionally low also for the bankruptcy firms.

Thus, the FD processes for the bankruptcy, restructuring, and other default firms are different especially in the early stages. In the last two years, all the ratios are low for all these types. However, the levels of the ratios are different so that the restructuring firms show the lowest ratios and the other default firms the highest ratios. In addition, during the FD process all the types share a common characteristic that is a low equity ratio. *Thus the hypothesis 2 is only partly supported by the evidence.* The FD processes in these types have common characteristics. However, the signs of default in restructuring firms are in the last years more serious than for the bankruptcy firms, which contradict the hypothesis. This may be because a company-restructuring petition is filed only as a way to avoid an immediately threatening bankruptcy. *The results fully support hypothesis 3*. The liquidation firms do not follow a similar process and show a very high figure for the equity ratio in every period. These results are illustrated by figure 2 and 3 which show the FD processes in different types of default firms as measured by the return on investment ratio and the equity ratio. This shows that liquidation has in these data only little doing with a payment default. *Thus the liquidation firms are excluded from the rest of the following analyses.* It is not reasonable to try to develop one common SA model that also describes the behaviour of liquidation firms. The results already at this descriptive level give support to hypothesis 1 on the significance of the ratios when forecasting a default. They also show how difficult (or impossible) is to try to identify a clear starting point for the processes in each type which supports the method of modelling used here.

FIGURE 2. Return on investment in different groups.

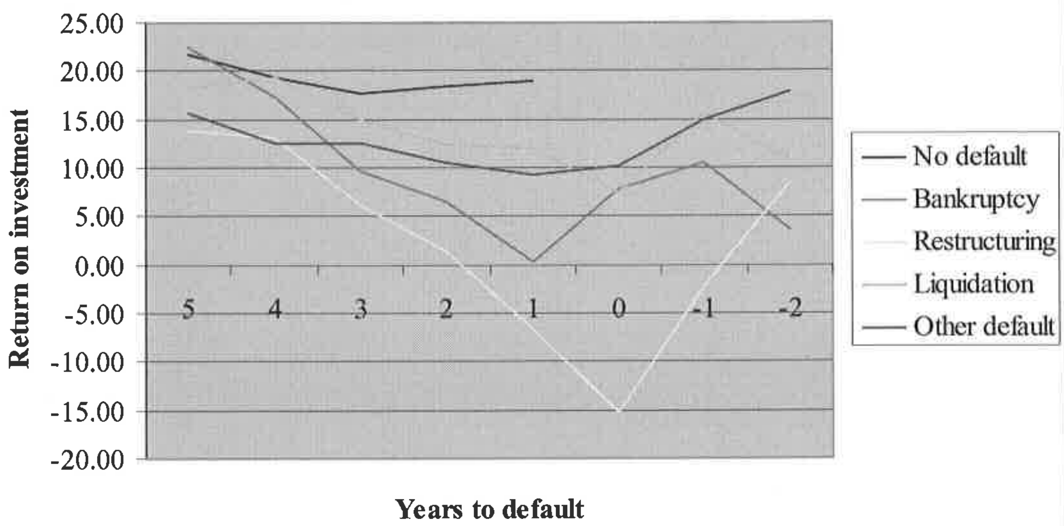
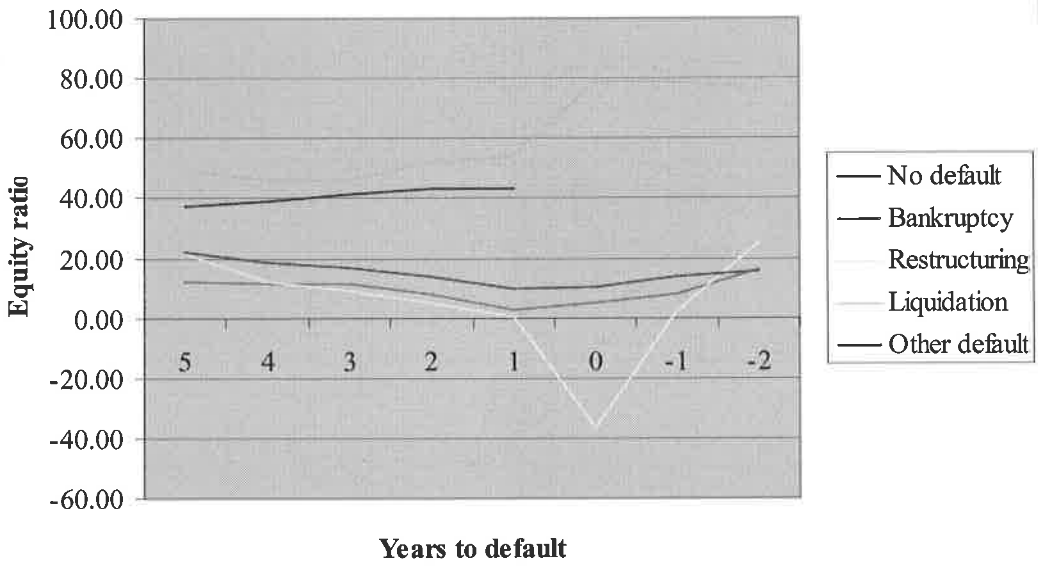


FIGURE 3. Equity ratio in different groups.



4.2. Cox regression

Financial covariate model

The Cox regression model was developed in several stages to evaluate the PH assumption and to develop new variables. First, a model based on financial measures only was estimated. In a SA model, as in any forecasting model, it is important to limit the number of covariates to avoid the dimensionality problem. This was done by applying a conditional forward stepwise Cox regression on the financial variables based on the FD process description. In addition to the original variables, two dummy variables was included in the analysis to describe a firm year with growth rates respectively greater than +30% and less than -10%. The idea of these variables is, first, to describe an exceptional fast growth which associated with the proposed FD process. Second, the negative growth rate is used to describe a situation where the FD process is linked to diminishing sales which may lead to a deterioration of profitability. These dummy variables are used to take account of the hazard which is associated with these special situations only. Appendix 2 presents the original results for the stepwise Cox regression. When interpreting the statistics, the nature of the observations (the effect of n) should be considered. Thus the main attention is paid to compare the mutual importance of variables.

The results show the equity ratio is clearly the most important variable when all the FD process is considered. In addition, the cash flow to debt ratio, the fast growth dummy, and the quick ratio are very important covariates. After the fourth step, the significance of the covariates rapidly decreases. The return on investment ratio will not be included into the model in any step. *Thus the results fully support the hypothesis 1.* It is also remarkable that the growth dummy variables are more important that the pure growth rate. Table 4 shows the results for the Cox regression applied to the chosen variables. Because the estimation method used depends on maximizing the partial likelihood function, the log likelihood test is important when assessing the significance of the model. The (unadjusted) chi-square test shows a very high statistical significance. Moreover, the Wald statistics show that all the four covariates are significant at a high-risk level. The hazard ratio (exp(B)) is exceptionally high for the fast growth dummy which shows its importance when assessing the default risk of a firm.

Table 4. Cox regression model based on financial variables.

PANEL 1. Omnibus tests of the Cox regression model.

Omnibus Tests of Model Coefficients

-2 Log Likelihood	Overall (score)			Change From Previous Block		
	Chi-square	**df**	**Sig.**	**Chi-square**	**df**	**Sig.**
129888.0435	3157.302807	4	0.000000	3056.70493	4	0.000000

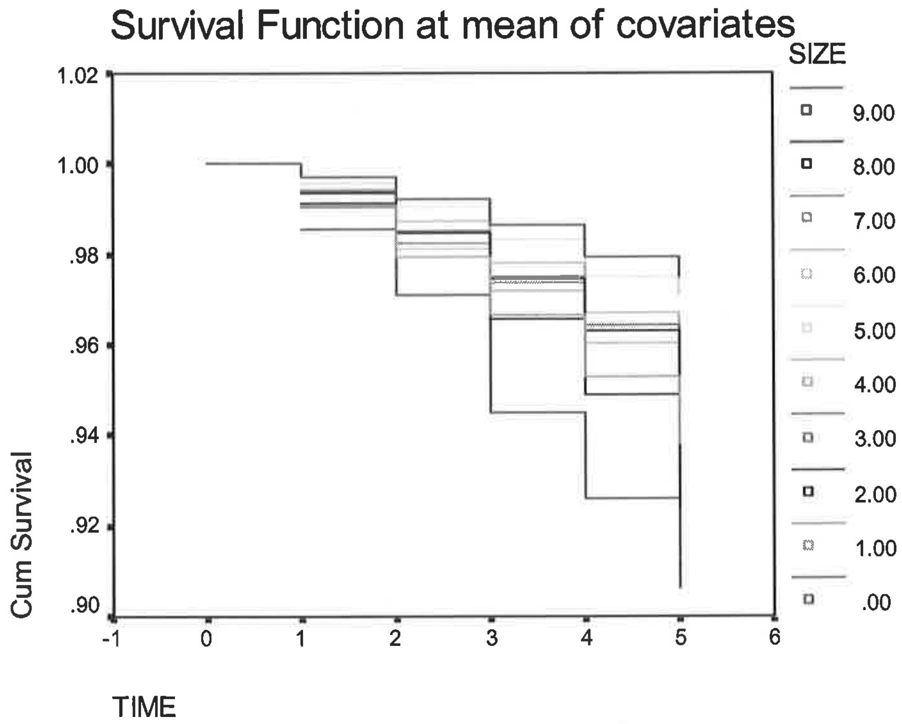
Initial Log Likelihood function: -2 Log likelihood: 132944.748

PANEL 2. Parameters of the Cox regression model.

Variables in the equation	B	SE	Wald	df	Sig.	Exp(B)
Quick ratio	-0.074827	0.008029	86.8525	1	0.000000	0.927904
Equity ratio	-0.010322	0.000302	1170.9127	1	0.000000	0.989731
Cash flow to debt	-0.004996	0.000270	342.8705	1	0.000000	0.995016
Growth > 30% (dummy)	0.406436	0.032352	157.8300	1	0.000000	1.501457

Effect of hypothesized factors

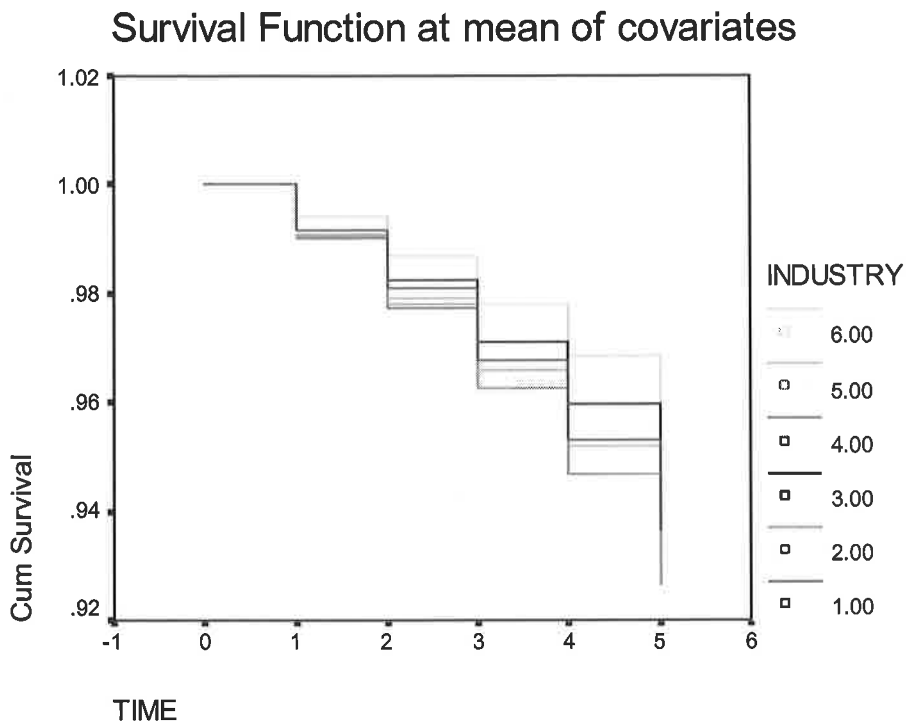
The next step in SA model building is to analyse the effects of the three hypothesized factors (size, industry, and age) on the hazard function and the PH assumption. The size of the firm was measured by the (natural) logarithm of net sales and it was included in the Cox regression in addition the financial covariates above. Figure 4 shows the resulted survival functions with respect to the size groups based on the number of employees. For the present data, these functions do not have the traditional interpretation but are useful in graphically assessing the PH assumption and developing the model. The functions show that the default risk is during the FD process clearly at highest level in largest firms with more than 1000 employees (size class 9). In this group the general default risk is 11.4% (in the estimation data) when it for the entire sample is only 6.0%. Similarly, it seems that the risk is lower for the size group 0 than for the other groups. The risk for this group is only 3.7%. This size group is consisted of such firms which have no employees (or the number cannot be defined). This typically means that these firms are usually run by people as a secondary occupation on the side of the principal occupation. When testing the dummy variables for each size group in the regression, the dummies for these groups were the only statistically significant dummy variables. Appendix 2 shows the resulted Cox model when these two dummy variables in addition to the logarithmic net sales are included in the previous model. The Wald statistics for the size class 9 dummy is not high. This is due to the fact that the number of firms in this class is very small when compared with the sample size. *The statistical significance of the logarithmic net sales and the dummy variables anyway supports hypothesis 4 with respect to the size effect.*



Legend:
Number of employees by size groups:
0 = 0
1 = 1–4
2 = 5–9
3 = 10–19
4 = 20–49
5 = 50–99
6 = 100–249
7 = 250–499
8 = 500–999
9 = 1000–

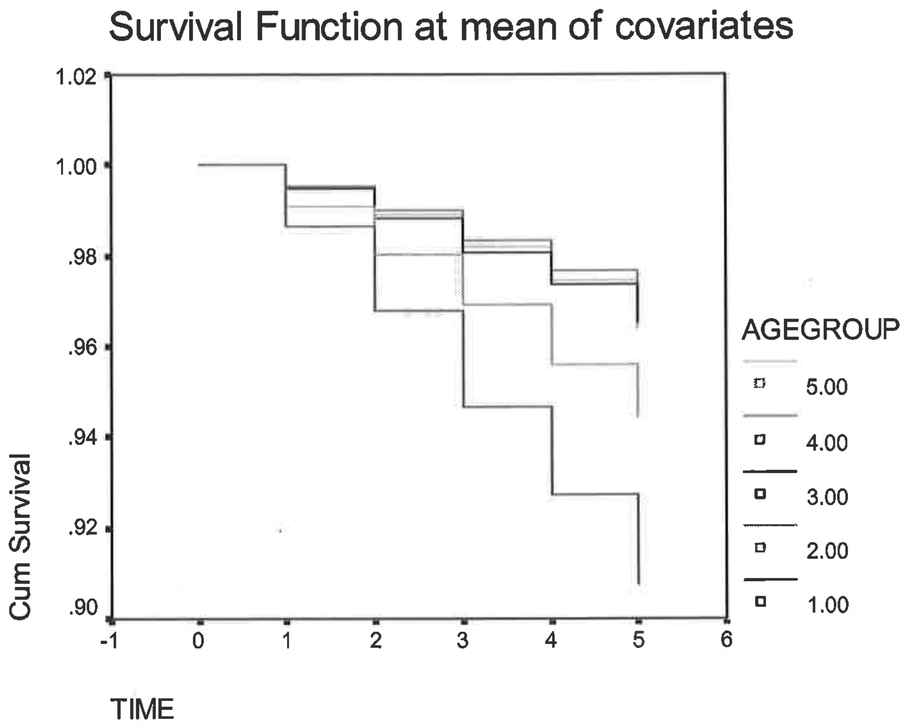
Figure 4. Survival functions for different size classes.

The effect of industry was assessed by dummy variables for six industrial categories. Figure 5 presents the the survival functions calculated by the Cox regression model with financial and size covariates. This figure shows that the risk of default is at an exceptionally low level in service (category 6) and also low in trade (category 3). In addition, it seems to be rather high in construction. However, only the dummy variables associated with service and trade were statistically significant in the Cox regression. Appendix 4 shows the results for the model including financial, size, and industry variables. The industry effects are highly significant and the hazard ratios are exceptionally low showing a remarkable diminishing effect on hazard. *Hence, the results give clear support to hypothesis 4 with respect to the industry effect.* The age of the firm is measured beginning from the year of incorporation which is not always economically meaningful measure because a firm can be incorporated as a small speculative concern or as a large holding company (see Shumway 2001: 113). However, we believe that for a large majority of firms this measure gives a good approximation of age. First, the natural logarithm of the age (in years) was included in the regression model. Then, the survival functions presented in Figure 6 were estimated. This figure shows that the logarithmic age alone cannot explain all the age effect on hazard. The 0-5 years old firms (age class 1) still have a very high risk in the FD process in comparison to other groups. Moreover, the hazard for 5-10 years old firms (age class 2) is also exceptionally high. The dummy variables associated with these classes are both statistically significant in addition to the logarithmic age. *Thus, the results support hypothesis 4 with respect to the age effect.* Table 5 shows the final Cox regression model when financial, size, industry, and age variables are included in the analysis. The logarithmic net sales became insignificant, when the logarithmic age was included in the model and was thus dropped. The model and all the coefficients are highly statistically significant with an exception for the size class 9 effect (due to the reason above). Appendix 5 also shows the model with a number of time-dependent covariates. None of these covariates are statistically significant which supports the PH assumption.



Legend:
Industrial category:
1 = Manufacturing
2 = Construction
3 = Trade
4 = Hotels and restaurants
5 = Transport, storage and communications
6 = Service

Figure 5. Survival functions for different industries.



Legend:
Age class with respect to age in years:
1 = 0-5
2 = 6-10
3 = 11-15
4 = 15-20
5 = 20-

Figure 6. Survival functions for different age groups.

Table 5. Cox regression model based on financial variables, size, industry, and age.

PANEL 1. Omnibus tests of the Cox regression model.

Omnibus Tests of Model Coefficients

-2 Log Likelihood	Overall (score)			Change From Previous Block		
	Chi-square	**df**	**Sig.**	**Chi-square**	**df**	**Sig.**
185390.3785	6515.7324	11	0.000000	6345.6811	11	0.000000

Initial Log Likelihood function: -2 Log likelihood: 191736.060

PANEL 2. Parameters of the Cox regression model.

Variables in the equation	**B**	**SE**	**Wald**	**df**	**Sig.**	**Exp(B)**
Quick ratio	-0.054775	0.006009	83.0955	1	0.000000	0.946698
Equity ratio	-0.010269	0.000266	1486.2648	1	0.000000	0.989784
Cash flow to debt	-0.004539	0.000231	384.5619	1	0.000000	0.995471
Growth > 30% (dummy)	0.317392	0.028725	122.0839	1	0.000000	1.373541
Size class = 0 (dummy)	-0.776824	0.088037	77.8600	1	0.000000	0.459864
Size class = 9 (dummy)	0.517027	0.242996	4.5272	1	0.033360	1.677035
Industry = service (dummy)	-0.609476	0.030693	394.3146	1	0.000000	0.543636
Industry = trade (dummy)	-0.403930	0.028924	195.0298	1	0.000000	0.667691
Age group = 1 (dummy)	0.655734	0.057578	129.7010	1	0.000000	1.926556
Age group = 2 (dummy)	0.343705	0.040259	72.8863	1	0.000000	1.410163
Logaritmic age	-0.212838	0.026828	62.9375	1	0.000000	0.808287

Classification accuracy

The classification accuracy of the resulted exponential hazard model was assessed using the deciles of the hazard like Shumway (2001). In addition, a cross-sectional logistic regression model was estimated to get a benchmark for the assessment. This logistic model was estimated using the same covariates as for the Cox regression model but only applied to the data one year prior to default. This procedure gives an advantage to the logistic model in two respects. First, it is based on the covariates which have been proved to be statistically significant for the whole FD process. The question is only how the coefficients are changed in the logistic model. Second, the model is estimated from the data one year prior to default which gives an advantage when assessing the classification accuracy in the first years. The main attention will in the assessment be given to the percentage of default firms in the first two deciles calculated for all firms in the period considered. Table 6 presents the statistics for the estimated logistic model. All other covariates than the fast growth dummy and the size class 9 dummy are statistically significant. It is logical that the fast growth dummy is not significant in this model because it is usually a sign for the start of the FD process but does not emerge in the later stages of the process.

Table 7 shows the classification accuracy in the estimation data. In the first year prior to default the Cox model slightly outperforms the logistic model when bankruptcy firms are considered. When the restructuring firms are dealt with, 79.5% of the firms belong to the deciles 1-2 when forecasted with the aid of the Cox model while the percentage for the logistic model is 74.3%. However, if the analysis is limited to the decile 1 only, the logistic model is more accurate. For other default types, the logistic model outperforms the Cox model. This is expected because the logistic model is estimated from the data of the first year. In the second year prior to default, the Cox regression model is significantly more accurate when predicting bankruptcy or restructuring. However, the models are rather equal for the other types of default. In the later periods, the Cox model clearly outperforms the logistic model. This shows that the Cox model is a powerful forecasting model in each stage of the FD process but especially in the longer run when compared with the logistic model. Appendix 6 shows the classification results for the test data. Especially for the restructuring firms in earlier stages of the FD process the number of observations is too small to give any generalizable results. However, the overall results are consistent with the ones obtained in the estimation data. For example, in the first year prior to bankruptcy, the logistic model outperforms the Cox model when the decile 1 is considered. However, the percentile of bankruptcy firms which belong to the decile 1 or 2 is for the Cox model 65.1% and for the logistic model only 53.5%. In the earlier stages of the FD process the Cox model is generally superior to the logistic model. *Thus, the exponential hazard of the Cox regression model* *estimated on the basis of the partial likelihood provides us a very useful forecasting tool when developing a model for the whole FD process.*

Table 6. Estimated cross-sectional binary logistic regression model.

PANEL 1. Model summary tests.

Model summary

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
12285.4129	0.1186	0.2819

Hosmer and Lemeshow Test

Chi-square	df	Sig.
149.5194	8	0.0000

PANEL 2. Parameters of the binary logistic regression model.

Variables in the equation	B	S.E.	Wald	df	Sig.	Exp(B)
Quick ratio	-0.066567	0.016144	17.0014	1	0.000037	0.935600
Equity ratio	-0.017486	0.000664	694.1849	1	0.000000	0.982666
Cash flow to debt	-0.005337	0.000563	89.9337	1	0.000000	0.994677
Growth > 30% (dummy)	-0.075054	0.061243	1.5019	1	0.220380	0.927694
Size class = 0 (dummy)	-0.679982	0.204578	11.0479	1	0.000888	0.506626
Size class = 9 (dummy)	0.546018	0.493166	1.2258	1	0.268221	1.726365
Industry = service (dummy)	-0.646880	0.065594	97.2567	1	0.000000	0.523677
Industry = trade (dummy)	-0.339881	0.061119	30.9243	1	0.000000	0.711855
Age group = 1 (dummy)	-1.940110	0.156776	153.1412	1	0.000000	0.143688
Age group = 2 (dummy)	-1.203327	0.098539	149.1241	1	0.000000	0.300194
Logaritmic age	-2.353742	0.101408	538.7289	1	0.000000	0.095013
Constant	4.310581	0.281345	234.7429	1	0.000000	74.483783

Table 7. Forecast accuracy in the estimation data.

	Proportional hazard model:			Cross-sectional logit model:		
	Percent of observations in decile:					
Decile	Bankruptcy	Restructuring	Other default	Bankruptcy	Restructuring	Other default
PANEL 1. One year prior to default.						
1	**50.96**	**53.85**	**41.81**	**50.00**	**58.97**	**46.69**
2	**16.83**	**25.64**	**18.36**	**15.38**	**15.38**	**16.68**
3	13.94	2.56	12.14	13.46	7.69	11.50
4	9.13	7.69	9.08	3.85	0.00	6.52
5	5.77	2.56	5.38	5.77	5.13	5.68
6	0.00	2.56	5.28	2.88	0.00	3.41
7	1.92	2.56	3.50	4.33	7.69	2.81
8	0.96	0.00	1.63	3.37	0.00	3.60
9	0.00	2.56	1.68	0.96	2.56	1.97
10	0.48	0.00	1.14	0.00	2.56	1.14
Obs	**208**	**39**	**2026**	**208**	**39**	**2026**
PANEL 2. Two years prior to default.						
1	**42.64**	**45.10**	**35.71**	**35.89**	**31.37**	**36.27**
2	**17.48**	**15.69**	**19.04**	**21.78**	**33.33**	**19.37**
3	12.88	17.65	13.59	11.66	7.84	12.66
4	14.42	5.88	8.80	8.28	7.84	9.17
5	7.36	3.92	8.29	6.13	3.92	6.05
6	1.84	3.92	4.93	4.91	0.00	4.28
7	0.92	3.92	3.07	4.29	5.88	4.00
8	1.53	1.96	2.75	6.13	3.92	4.00
9	0.92	1.96	2.05	0.61	3.92	2.42
10	0.00	0.00	1.77	0.31	1.96	1.77
Obs	**326**	**51**	**2148**	**326**	**51**	**2148**
PANEL 3. Three years prior to default.						
1	**37.37**	**38.30**	**33.44**	**24.92**	**21.28**	**28.87**
2	**19.19**	**23.40**	**16.90**	**26.94**	**25.53**	**19.12**
3	12.46	17.02	13.14	13.47	17.02	14.56
4	12.79	0.00	11.41	9.76	14.89	11.17
5	8.75	8.51	7.59	9.09	8.51	8.27
6	3.03	6.38	5.80	3.70	0.00	5.55
7	1.35	6.38	4.01	3.03	2.13	3.39
8	3.03	0.00	3.21	6.73	6.38	4.38
9	1.01	0.00	2.59	1.68	4.26	2.78
10	1.01	0.00	1.91	0.67	0.00	1.91
Obs	**297**	**47**	**1621**	**297**	**47**	**1621**

PANEL 4. Four years prior to default.

1	**35.71**	**20.00**	**25.44**	**19.05**	**20.00**	**21.47**
2	**16.67**	**24.00**	**19.02**	**25.00**	**16.00**	**23.57**
3	14.29	20.00	15.29	20.83	24.00	16.22
4	12.50	16.00	9.33	12.50	16.00	11.44
5	13.10	8.00	9.92	6.55	0.00	7.47
6	3.57	4.00	8.40	4.76	12.00	5.95
7	2.38	8.00	4.20	1.19	0.00	4.32
8	0.60	0.00	3.73	6.55	4.00	4.20
9	0.60	0.00	3.03	2.98	8.00	3.38
10	0.60	0.00	1.63	0.60	0.00	1.98
Obs	**168**	**25**	**857**	**168**	**25**	**857**

PANEL 5. Five years prior to default.

1	**28.33**	**20.00**	**25.57**	**23.33**	**10.00**	**23.95**
2	**25.00**	**20.00**	**15.53**	**16.67**	**20.00**	**15.53**
3	8.33	20.00	13.27	15.00	0.00	9.39
4	15.00	0.00	9.71	13.33	10.00	13.27
5	8.33	10.00	11.00	8.33	30.00	9.71
6	5.00	10.00	7.77	1.67	0.00	7.44
7	1.67	10.00	4.53	5.00	10.00	4.21
8	3.33	10.00	4.85	3.33	10.00	6.80
9	1.67	0.00	5.18	6.67	10.00	6.47
10	3.33	0.00	2.59	6.67	0.00	3.24
Obs	**60**	**10**	**309**	**60**	**10**	**309**

Calibration of the Cox model

For the analysis of the FD process the baseline hazard estimates given by the Cox model are not useful due to the data. In addition, they are dependent on the start of the payment default process that is difficult or even impossible to identify. It is important that the model is independent of the starting point for the process for the reasons explained above. Thus, we shall apply *only one baseline hazard* calibrated to support the interpretation of the exponential hazard score in the meaning of a SA model. The most important outcome of a SA model in a FD analysis is the expected survival time for a firm. Therefore we shall calibrate the exponential hazard score to give an estimate of this time consistent with the present data. The task is to find a baseline hazard estimate which transforms the exponential hazard score to a consistent survival time. In this transformation we shall use the Weibull distribution which is the most common distribution in SA (see for example http://www.weibull.com/). For the Weibull distribution the hazard function can here be presented as

$$\lambda(t, \mathbf{X}^i) = \alpha\, t^{\alpha-1}\, \phi \exp[\mathbf{X}^i \beta] = \alpha\, t^{\alpha-1}\, \phi\, \lambda^i \qquad (3)$$

where t is calendar time, λ^i gives the exponential hazard score for the firm i, α is the parameter of the Weibull distribution and ϕ is the standardizing coefficient. The expected survival time for the firm i, can now be calculated as

$$t^* = (1/(\phi\, \lambda^i))(1/\alpha)\, \Gamma(1+(1/\alpha)) \qquad (4)$$

where $\Gamma(.)$ is the Gamma function.

The calibration of the baseline hazard is based on the task to find a value for the parameter α so that the expected survival time is consistent with the observed survival times. Because we want to get an estimate for the survival time, we use in the calibration the exponential hazard score calculated at the mean of the covariates. Numerical experiments immediately show that a consistent estimate of α is located between 0.1 and 0.2. Panel 1 in Table 8 shows experimental values for the expected survival time for the FD process when α gets values from 0.1 to 0.3. If we chose a value $\alpha = 0.2$, the expected survival time for a firm with average values in the fifth year before default would be about 5 years which seems consistent. However, the expected values for the years 2, 3, and 4 are rather close to each other. We would prefer the value $\alpha = 0.1$ which gives a consistent value for other years than the fifth year. It may be so that the signs of default in the fifth year are so weak that the FD process in majority of default firms are in its initial stage or even has not began yet. Thus, in this case we would prefer the value $\alpha = 0.1$. Figure 7 shows the Weibull hazard calculated for this parameter value. It shows that the baseline hazard will strongly increase in the first year prior to default. *The idea of the calibration is that we can implicitly apply this Weibull distribution but do not anyway need to know the stage of the FD process when applying it because the expected survival time (4) is not dependent on time.* The coefficient ϕ = 5.585 when applying the implicit Weibull hazard distribution with $\alpha = 0.1$. Panel 2 shows the Weibull survival functions ($\alpha = 0.1$) calculated for the exponential hazard score at the mean of covariates in the five years prior to default. For example, a firm with the covariate values identical with the means in the first year prior to default has a survival function according to which 49.9% of similar firms have survived at least two years. Similarly, a firm with the covariate values like the means in the fifth year is confronted by a function telling that 78.2% of similar firms will survive at least five years. Thus, we can forecast a Weibull survival function for any firm without knowledge about the stage of the FD process.

Table 8. Numerical values for the Weibull distribution with different values of alfa.

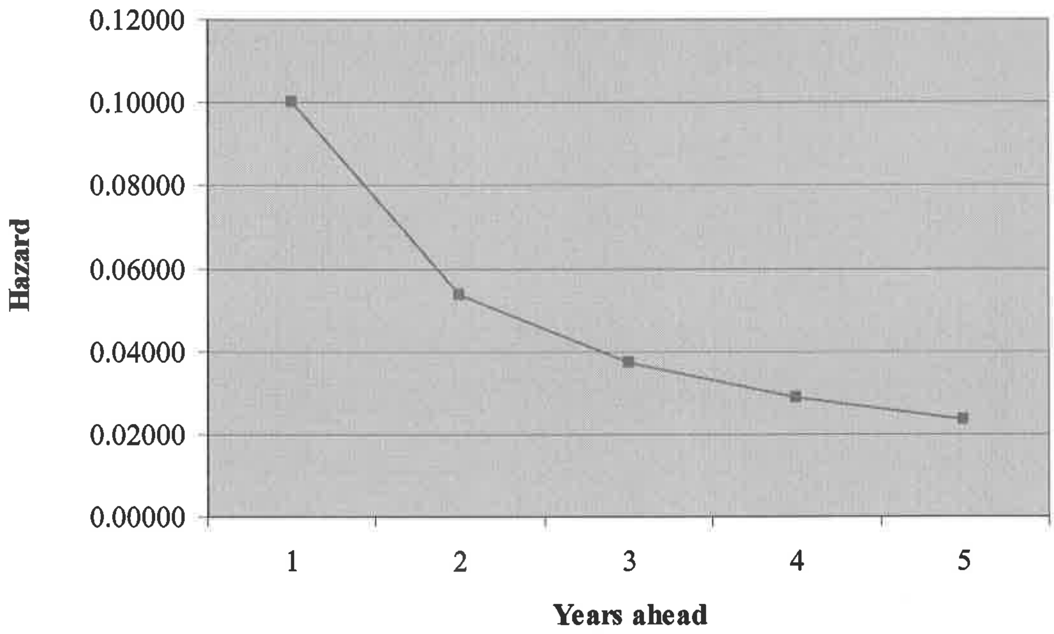
PANEL 1. Expected survival times.

		Expected survival time as standardized for t*=1 for year 1:				
Years prior to default	**Exponential hazard at mean of covariates**	**alfa = 0.1**	**alfa = 0.15**	**alfa = 0.2**	**alfa = 0.25**	**alfa = 0.3**
1	0.8104	1.0000	1.0000	1.0000	1.0000	1.0000
2	0.7657	1.7620	1.4588	1.3274	1.2543	1.2078
3	0.7114	3.6778	2.3826	1.9178	1.6836	1.5436
4	0.6981	4.4425	2.7024	2.1077	1.8157	1.6439
5	0.5868	25.2457	8.6058	5.0245	3.6381	2.9336

PANEL 2. Survival function values at the mean of covariates for alfa = 0.1.

	Years prior to default:				
Years ahead	**1**	**2**	**3**	**4**	**5**
1	0.6360	0.7071	0.7815	0.8419	0.9039
2	0.4990	0.5873	0.6848	0.7677	0.8563
3	0.4217	0.5162	0.6247	0.7201	0.8247
4	0.3703	0.4673	0.5820	0.6854	0.8012
5	0.3329	0.4308	0.5493	0.6582	0.7824

FIGURE 7. Weibull hazard (alfa = 0.1 & lambda = 1).



5. SUMMARY OF THE STUDY

The purpose of this study was to make an attempt to analyse how SA can be benefited in the FD analysis when we have non-stationary data which may include a number of firms but only a couple of years of each. Because of the non-stationary data, the population does not describe the development of any proper risk set. Moreover, the short time-series does not allow us to analyse the longer-term financial behaviour of firms to estimate a survival from a definite starting point. Because of the nature of the data and of the absence of a definite starting point the model to be developed should not be dependent on time. In order to get real benefits from the large sample we reorganized the data in that way that the application of the partial likelihood method in the Cox regression will use maximum amount of data when estimating the exponential hazard function. This method proved to be efficient and provided us with a forecasting model which operates well also in the long perspective. When trying to avoid a payment default, the time to default is a critical factor. Any model which lengthens the perspective in forecasting is valuable. When estimating this model, several hypotheses were tested at the same time. The analysis showed that the FD processes in different default types are different while having similar characteristics, especially two and one year prior to default. Of financial covariates, the equity ratio, cash flow, and quick ratio are the most significant variables along with a fast growth dummy. The FD process was shown to be affected by the size, industry, and age of the firm. The resulted Cox regression model took all these factors into account in the form of logarithmic variables (size and age, in the final model only age) and binary dummy variables. In order to make the estimated exponential hazard model more consistent to interpret with the data, we calibrated the model with the Weibull distribution to give an estimate of average survival time. This transformation provided us with a simple tool to assess the survival function of a firm without any knowledge of the stage of the FD process.

In summary, as a response to the questions presented by Abdel-Khalik (1993) and cited in the introductory section, we can state that the SA when applied as in this study gives us a more powerful long-run forecasting method of the FD process than the more simple cross-sectional methods (like the familiar logistic analysis) do. In addition, we believe that the time-independent survival assessment with the aid of the calibrated model provides a financial analyst with a valuable tool. This is because it is important in practice to have an idea of the probability to survive in following periods for any target firm when making financial decisions. The present study has several drawbacks which may give hints for the further research in the SA area. First, the effect of the reorganization of the data on the exponential hazard estimates should be analysed more carefully both theoretically and empirically. Second, the effect of the calibration on the forecasted implicit survival functions and their reliability should be analysed more accurately. For example, the justification and the estimation of the parameters of the Weibull distribution should be evaluated. Moreover, other distributions should be tested as well.

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List of tables, figures, and appendices

Tables

Figures

Appendices

APPENDICES

APPENDIX 1. Median value of the financial variables in different groups.

PANEL 1. No payment default firms.

Years to default	Net sales (1000 Euro)	Growth in net sales	Return on investment	Net profit to net sales	Quick ratio	Cash flow to net sales	Equity ratio	Cash flow to debt
5	247.0	9.00	21.70	4.40	1.10	8.80	37.20	25.67
4	217.0	6.40	19.30	4.30	1.10	8.50	39.00	25.34
3	242.0	4.00	17.60	4.20	1.10	8.50	41.50	24.30
2	273.0	5.90	18.40	4.10	1.10	8.60	43.00	25.10
1	518.0	5.10	18.95	4.20	1.10	8.20	43.40	25.68

PANEL 2. Bankruptcy firms.

5	399.0	4.30	22.45	0.80	0.80	3.90	11.90	8.20
4	371.5	10.10	17.40	0.95	0.80	3.00	11.50	9.04
3	365.0	4.05	9.60	0.40	0.70	2.35	11.75	6.13
2	433.0	10.65	6.50	0.00	0.60	1.30	8.10	3.49
1	373.5	0.70	0.35	-2.10	0.50	0.10	2.85	0.21
0	**317.5**	**-4.45**	**7.75**	**-1.15**	**0.50**	**2.50**	**4.80**	**4.73**
-1	368.0	0.00	10.60	1.30	0.50	5.00	8.00	7.00
-2	385.5	4.75	3.55	-1.05	0.60	4.45	16.30	10.01

PANEL 3. Company restructuring firms.

5	1316.5	17.20	13.90	2.20	1.00	7.05	21.70	18.45
4	1472.0	16.40	13.20	2.10	0.70	5.70	12.00	13.56
3	1376.0	6.65	6.20	-0.15	0.55	2.60	9.45	5.08
2	1159.0	3.20	1.40	-2.50	0.40	1.10	5.10	1.45
1	966.0	-0.90	-6.60	-7.20	0.40	-3.20	0.30	-4.17
0	**1010.0**	**-5.65**	**-15.30**	**-16.80**	**0.50**	**-11.30**	**-36.50**	**-7.95**
-1	465.5	-10.05	-2.30	-0.55	0.90	3.95	2.00	6.90
-2	2656.5	16.15	8.45	1.20	0.95	2.55	24.85	7.45

PANEL 4. Liquidation firms.

5	227.0	5.60	18.30	5.70	1.30	9.75	48.90	26.70
4	215.0	4.00	19.40	4.40	1.30	7.70	46.20	25.21
3	270.0	1.20	14.90	2.80	1.30	6.30	46.00	19.05
2	305.0	0.30	12.35	3.00	1.30	6.10	51.80	22.08
1	304.0	-3.80	12.00	2.45	1.30	6.60	54.20	24.75
0	**143.0**	**-25.60**	**7.45**	**1.80**	**1.20**	**3.70**	**78.85**	**5.17**
-1	30.0	0.00	15.60	54.30	2.50	54.30	79.10	67.08
-2	387.0	2.00	10.70	6.05	25.85	7.20	76.80	121.64

PANEL 5. Other payment default firms.

5	182.0	6.30	15.60	1.80	0.90	4.35	21.85	14.80
4	174.5	8.15	12.50	1.10	0.80	4.50	18.35	12.51
3	187.0	9.70	12.50	1.00	0.70	4.10	16.70	10.98
2	199.0	9.15	10.60	0.50	0.70	3.60	13.90	8.94
1	208.0	7.30	9.25	0.30	0.60	3.40	9.95	7.16
0	**236.0**	**4.10**	**10.10**	**0.50**	**0.60**	**3.60**	**10.30**	**8.03**
-1	265.0	5.30	14.85	1.70	0.60	5.00	14.00	10.33
-2	308.0	5.90	17.95	2.50	0.60	5.50	15.70	11.75

APPENDIX 2. Conditional forward stepwise Cox regression analysis.

Omnibus Tests of Model Coefficients

	-2 Log Likelihood	Overall (score)			Change From Previous Step		
Step		**Chi-square**	**df**	**Sig.**	**Chi-square**	**df**	**Sig.**
1	106612.03	2959.8493	1	0.000000	2331.9483	1	0.000000
2	106365.78	2973.6105	2	0.000000	246.2462	1	0.000000
3	106144.12	3147.5872	3	0.000000	221.6563	1	0.000000
4	106039.57	3152.0523	4	0.000000	104.5554	1	0.000000
5	105986.28	3356.1473	5	0.000000	53.2903	1	0.000000
6	105948.89	3437.0106	6	0.000000	37.3921	1	0.000000
7	105901.11	3505.4740	7	0.000000	47.7769	1	0.000000
8	105883.63	3507.4157	8	0.000000	17.4782	1	0.000029

Legend: Variable entered at step number 1: Equity ratio
Variable entered at step number 2: Cash flow to debt
Variable entered at step number 3: Growth over 30% (dummy)
Variable entered at step number 4: Quick ratio
Variable entered at step number 5: Cash flow to net sales
Variable entered at step number 6: Growth less than -10% (dummy)
Variable entered at step number 7: Growth in net sales
Variable entered at step number 8: Net profit to net sales
Variable not entered: Return on investment

APPENDIX 3. Cox regression model based on financial variables and size.

PANEL 1. Omnibus tests of the Cox regression model.

Omnibus Tests of Model Coefficients

-2 Log Likelihood	Overall (score)			Change From Previous Block		
	Chi-square	**df**	**Sig.**	**Chi-square**	**df**	**Sig.**
189756.0684	4703.9158	7	0.000000	4386.8349	7	0.000000

Initial Log Likelihood function: -2 Log likelihood: 194142.903

PANEL 2. Parameters of the Cox regression model.

Variables in the equation	**B**	**SE**	**Wald**	**df**	**Sig.**	**Exp(B)**
Quick ratio	-0.056179	0.005855	92.0526	1	0.000000	0.945370
Equity ratio	-0.011115	0.000254	1909.2558	1	0.000000	0.988947
Cash flow to debt	-0.004580	0.000233	386.9754	1	0.000000	0.995430
Growth > 30% (dummy)	0.416674	0.028603	212.2181	1	0.000000	1.516908
Size class = 0 (dummy)	-1.068825	0.088728	145.1066	1	0.000000	0.343412
Size class = 9 (dummy)	0.716045	0.246113	8.4647	1	0.003621	2.046324
Logarithmic net sales	-0.044058	0.006105	52.0766	1	0.000000	0.956898

APPENDIX 4. Cox regression model based on financial variables, size and industry.

PANEL 1. Omnibus tests of the Cox regression model.

Omnibus Tests of Model Coefficients

-2 Log Likelihood	Overall (score)			Change From Previous Block		
	Chi-square	**df**	**Sig.**	**Chi-square**	**df**	**Sig.**
189224.9912	5187.775032	9	0.000000	4917.91203	9	0.000000

Initial Log Likelihood function: -2 Log likelihood: 194142.903

PANEL 2. Parameters of the Cox regression model.

Variables in the equation	**B**	**SE**	**Wald**	**df**	**Sig.**	**Exp(B)**
Quick ratio	-0.054031	0.005759	88.0319	1	0.000000	0.947402
Equity ratio	-0.010660	0.000255	1743.8186	1	0.000000	0.989397
Cash flow to debt	-0.004660	0.000233	399.7687	1	0.000000	0.995351
Growth > 30% (dummy)	0.428910	0.028632	224.4076	1	0.000000	1.535582
Size class = 0 (dummy)	-0.898608	0.089186	101.5193	1	0.000000	0.407136
Size class = 9 (dummy)	0.676627	0.246164	7.5553	1	0.005983	1.967230
Logarithmic net sales	-0.054281	0.006181	77.1283	1	0.000000	0.947166
Industry = service (dummy)	-0.622375	0.030740	409.9049	1	0.000000	0.536668
Industry = trade (dummy)	-0.389032	0.028864	181.6578	1	0.000000	0.677713

APPENDIX 5. Forecast accuracy in the test data.

	Proportional hazard model: Percent of observations in decile:			Cross-sectional logit model:		
Decile	**Bankruptcy**	**Restructuring**	**Other default**	**Bankruptcy**	**Restructuring**	**Other default**

PANEL 1. One year prior to default.

1	**37.21**	**62.50**	**41.60**	**46.51**	**50.00**	**44.40**
2	**27.91**	**6.25**	**20.15**	**6.98**	**31.25**	**19.78**
3	4.65	12.50	11.75	11.63	0.00	11.01
4	20.93	18.75	8.02	9.30	6.25	8.02
5	0.00	0.00	6.34	2.33	0.00	5.04
6	0.00	0.00	3.54	2.33	0.00	3.17
7	2.33	0.00	3.54	6.98	12.50	2.99
8	0.00	0.00	2.43	11.63	0.00	3.17
9	2.33	0.00	2.24	0.00	0.00	1.12
10	4.65	0.00	0.37	2.33	0.00	1.31
Obs	**43**	**16**	**536**	**43**	**16**	**536**

PANEL 2. Two years prior to default.

1	**51.16**	**38.46**	**34.47**	**37.21**	**46.15**	**37.50**
2	**12.79**	**23.08**	**20.45**	**23.26**	**23.08**	**16.48**
3	8.14	15.38	13.07	10.47	15.38	12.50
4	16.28	15.38	10.42	9.30	7.69	11.74
5	5.81	0.00	6.44	8.14	0.00	6.63
6	3.49	7.69	6.63	1.16	0.00	3.98
7	0.00	0.00	2.08	3.49	0.00	3.98
8	0.00	0.00	3.60	5.81	7.69	3.60
9	2.33	0.00	1.33	1.16	0.00	2.27
10	0.00	0.00	1.52	0.00	0.00	1.33
Obs	**86**	**13**	**528**	**86**	**13**	**528**

PANEL 3. Three years prior to default.

1	**36.00**	**40.00**	**31.20**	**20.00**	**20.00**	**29.60**
2	**14.67**	**20.00**	**19.73**	**20.00**	**20.00**	**17.60**
3	16.00	0.00	16.53	20.00	0.00	19.20
4	12.00	0.00	7.73	10.67	20.00	8.27
5	12.00	20.00	7.20	9.33	20.00	5.87
6	4.00	0.00	6.13	5.33	0.00	5.33
7	0.00	0.00	4.53	4.00	0.00	4.00
8	1.33	0.00	3.73	5.33	0.00	4.80
9	2.67	20.00	1.87	5.33	0.00	4.27
10	1.33	0.00	1.33	0.00	20.00	1.07
Obs	**75**	**5**	**375**	**75**	**5**	**375**

PANEL 4. Four years prior to default.

1	**34.09**	**57.14**	**22.17**	**20.45**	**42.86**	**19.70**
2	**18.18**	**14.29**	**17.73**	**27.27**	**28.57**	**18.72**
3	20.45	0.00	11.82	25.00	0.00	18.72
4	6.82	14.29	8.87	4.55	0.00	9.36
5	15.91	0.00	12.32	6.82	14.29	5.91
6	2.27	0.00	7.88	2.27	0.00	6.40
7	2.27	0.00	6.90	0.00	0.00	4.93
8	0.00	0.00	5.42	9.09	0.00	7.88
9	0.00	14.29	3.94	4.55	0.00	5.91
10	0.00	0.00	2.96	0.00	14.29	2.46
Obs	**44**	**7**	**203**	**44**	**7**	**203**

PANEL 5. Five years prior to default.

1	**40.91**	**100.00**	**25.93**	**31.82**	**100.00**	**25.93**
2	**18.18**	**0.00**	**14.81**	**22.73**	**0.00**	**14.81**
3	9.09	0.00	16.05	0.00	0.00	14.81
4	4.55	0.00	9.88	13.64	0.00	11.11
5	22.73	0.00	11.11	13.64	0.00	9.88
6	4.55	0.00	7.41	0.00	0.00	7.41
7	0.00	0.00	6.17	0.00	0.00	2.47
8	0.00	0.00	4.94	13.64	0.00	3.70
9	0.00	0.00	0.00	4.55	0.00	7.41
10	0.00	0.00	3.70	0.00	0.00	2.47
Obs	**22**	**2**	**81**	**22**	**2**	**81**

APPENDIX 6. Cox regression model with time-dependent covariates.

PANEL 1. Omnibus tests of the Cox regression model.

Omnibus Tests of Model Coefficients

-2 Log Likelihood	Overall (score)			Change From Previous Block		
	Chi-square	**df**	**Sig.**	**Chi-square**	**df**	**Sig.**
185383.6091	6520.3017	17	0.000000	6352.4504	17	0.000000

Initial Log Likelihood function: -2 Log likelihood: 191736.060

PANEL 2. Parameters of the Cox regression model.

Variables in the equation	**B**	**SE**	**Wald**	**df**	**Sig.**	**Exp(B)**
Quick ratio	-0.054747	0.006010	82.9868	1	0.000000	0.946725
Equity ratio	-0.010274	0.000267	1486.1370	1	0.000000	0.989779
Cash flow to debt	-0.004538	0.000231	384.3197	1	0.000000	0.995472
Growth > 30% (dummy)	0.317651	0.028731	122.2333	1	0.000000	1.373896
Size class = 0 (dummy)	-0.925756	0.206483	20.1014	1	0.000007	0.396232
Size class = 9 (dummy)	0.391525	0.551125	0.5047	1	0.477450	1.479235
Industry = service (dummy)	-0.650535	0.070193	85.8917	1	0.000000	0.521767
Industry = trade (dummy)	-0.344296	0.065697	27.4648	1	0.000000	0.708719
Age group = 1 (dummy)	0.711173	0.081829	75.5337	1	0.000000	2.036379
Age group = 2 (dummy)	0.477873	0.077758	37.7692	1	0.000000	1.612641
Logaritmic age	-0.212599	0.026831	62.7829	1	0.000000	0.808480
Time * Size class = 0 (dummy)	0.060607	0.074484	0.6621	1	0.415825	1.062481
Time * Size class = 9 (dummy)	0.052917	0.205141	0.0665	1	0.796444	1.054342
Time * Industry = service (dummy)	0.017605	0.026648	0.4364	1	0.508849	1.017761
Time * Industry = trade (dummy)	-0.025410	0.025178	1.0186	1	0.312856	0.974910
Time * Age group = 1 (dummy)	-0.023498	0.024804	0.8974	1	0.343467	0.976776
Time * Age group = 2 (dummy)	-0.058090	0.028705	4.0954	1	0.043001	0.943565

ACTA WASAENSIA

Kirjanpitorikos

Asko Lehtonen

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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The study investigates the conditions for punishability that are applied to bookkeeping offences and negligent bookkeeping offences based on the general provisions of the Penal Code. The associated delimitation problems are also discussed. At the outset, attention is paid to the juridification and internationalization of bookkeeping, spurred in Finland primarily by the impact of the European Community legislation. The research problems are not so much traditional aspects of criminal law; rather, they are questions of interpretation pertaining to delimitation problems studied mainly from the perspective of bookkeeping.

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1. Johdanto

Kirjanpito on ollut traditionaalinen esimerkki alueesta, jossa yhdentyvät laskentatoimi ja oikeustiede. Tyypillisenä verifiointina on yleensä mainittu yritysverotus, jonka syvällinen hallinta ei ole mahdollista ilman hyvää ja perusteellista kirjanpidon tietoja ja taitoja. Kirjanpito on vuosien kuluessa entistä enemmän muuttunut hyvään kirjanpitotapaan kuuluvien konventioiden tietämyksestä lainopillisen osaamisen suuntaan. Kirjanpitolain säännösten määrä on moninkertaistunut ja asioista säädetään aikaisempaa yksityiskohtaisemmin laissa. Sisältö ei määräydy enää entiseen tapaan alan käytäntöjen perusteella, vaan ratkaisut joudutaan tekemään erimielisyystilanteissa tuomioistuimissa;

EU- ja ETA-alueella viime kädessä Euroopan yhteisön tuomioistuimessa siltä osin kuin sääntely perustuu EY:n asetuksiin ja direktiiveihin. Puhutaan kirjanpidon oikeudellistumisesta.

1.1. Kirjanpitolainsäädännön eurooppalaistumisesta

Kirjanpitolainsäädännön eurooppalaistuminen Suomessa alkoi Euroopan unioniin liittymisen myötä 1.1.1995 lukien. Liittymisen seurauksena kirjanpitolaki tuli uudistettavaksi. Lakiesitys (HE 173/1997) uudesta kirjanpitolaista annettiin tosin vasta vuonna 1997, vaikka muutokset olisi tullut saattaa voimaan jo vuoden 1995 alusta.[1] Muutostarve johtui Euroopan yhteisön neljännestä ja seitsemännestä yhtiöoikeudellisesta direktiivistä eli tilinpäätösdirektiivistä (78/660/ETY)[2] ja konsernitilinpäätösdirektiivistä (83/349/ETY),[3] joiden edellyttämät säännökset tuli implementoida Suomen lainsäädäntöön. Lukumääräisesti huomattavin osa muutoksista koski tilinpäätöksessä esitettäviä tietoja. Kirjanpitolakiin oli direktiivien pakottavien artikloiden vuoksi otettava muun muassa säännökset yleisistä tilinpäätösperiaatteista, vaikka niitä oli Suomessa aikaisemmin noudatettu hyvänä kirjanpitotapana. Uuden kirjanpitolain säännökset tilikauden aikaisesta juoksevasta kirjanpidosta vastasivat pääsääntöisesti aikaisempaa oikeustilaa.[4]

Nykyinen kirjanpitolaki (30.12.1997/1336) tuli voimaan 31.12.1997. Uusi laki ei säilynyt muuttumattomana pitkään. Vuonna 1999 annettu direktiivi (1999/60/ETY) pakotti EU:n jäsenvaltiot muutoksiin. Keskeisin muutos liittyi pieniä kirjanpitovelvollisia koskeviin helpotuksiin.[5]

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[1] HE 173/1997: 7.

[2] Neljäs neuvoston direktiivi 78/660/ETY perustamissopimuksen 54 artiklan 3 kohdan g alakohdan nojalla yhtiömuodoltaan tietynlaisten yhtiöiden tilinpäätöksistä.

[3] Seitsemäs neuvoston direktiivi 83/349/ETY perustamissopimuksen 54 artiklan 3 kohdan g alakohdan nojalla konsolidoiduista tilinpäätöksistä. Direktiivien keskeisestä sisällöstä ks. esim. Räty & Virkkunen 2004: 32–37. Ks. lisäksi Kaisanlahti 1999: 445–446.

[4] HE 173/1997: 1, 3 ja 7. Kaikki kirjanpitolain muutokset eivät perustuneet EU:n säännöksiin, vaan osa niistä oli kansallista perua. Esimerkiksi kirjanpitolautakunnan aloitteesta mahdollistettiin automaattisen tietojenkäsittelyn tehokkaampi hyödyntäminen.

[5] HE 189/2000: 4. Samassa yhteydessä kirjanpitolakiin tehtiin myös muita muutoksia.

Kirjanpitolain suurremontti oli edessä vuonna 2004. Muutostarpeen aiheuttivat tällä kertaa EU:n uudet säädökset: IAS-asetus[6] ja kaksi direktiiviä eli ns. fair value -direktiivi (2001/65/EY) ja modernisointidirektiivi (2003/51/EY). Kirjanpitolain muutoksella (30.12.2004/1312) saatettiin kansallisesti voimaan molemmat direktiivit. Edellinen direktiivi koskee rahoitusvälineiden ja muiden hyödykkeiden arvostamista tilinpäätöksissä. Jälkimmäisellä direktiivillä ajanmukaistettiin tilinpäätösdirektiivien perusrakennetta sekä poistettiin tilinpäätösdirektiivien ja IAS-standardien välisiä ristiriitoja.[7] IAS-asetuksen sisällöllinen merkitys on siinä, että sillä tuotiin EU:n jäsenvaltioiden kirjanpitolainsäädäntöön kansainväliset tilinpäätösstandardit. IAS-asetus merkitsi myös uutta lainsäädäntösystemaattista ratkaisua Suomen kirjanpitolainsäädännössä. Ensimmäistä kertaa Suomen itsenäisyyden aikana kirjanpitoon on suoraan sovellettava muuta kuin kotimaista lainsäädäntöä. Tämä johtuu EY:n perustamissopimuksen (ns. Rooman sopimuksen) 249 artiklan säännöksistä, joiden mukaan EY:n asetus on kaikilta osiltaan velvoittava ja sitä sovelletaan sellaisenaan kaikissa jäsenvaltioissa. EY:n asetus ei edellytä erillisiä kansallisia täytäntöönpanotoimia, paitsi jos asetuksessa on toisin säädetty.[8] IAS-asetus on kansallisen lainsäädännön sijasta suoraan sovellettavaa ja välittömästi voimassa olevaa oikeutta niiden yhtiöiden konsernitilinpäätöksen osalta, joiden arvopapereita on tilinpäätöspäivänä julkisen kaupankäynnin kohteena.[9] Kysymys on IAS-asetuksen 4 artiklan pakottavista säännöksistä, jotka velvoittavat sanotut yritykset laatimaan konsernitilinpäätöksensä kansainvälisten standardien mukaisesti. Muissa tapauksissa IAS-asetus antaa jäsenvaltioille mahdollisuuden sallia tai vaatia tilinpäätöksen laatimisen kansainvälisten standardien mukaisesti. Suomi käytti valintaoikeuttaan siten, että ns. erillistilinpäätös[10] on laadittava kansainvälisten standardien mukaisesti KPL 7a luvun 2 pykälän 2 momentin tarkoitetuissa tapauksissa,[11] mutta muutoin kirjanpitovelvollinen saa itse päättää "ei estettä, ei pakkoa" -periaatteen mukaisesti, noudattaako se tilin-

[6] Euroopan parlamentin ja neuvoston asetus (EY) N:o 1606/2002 kansainvälisten tilinpäätösstandardien soveltamisesta, joka on annettu 19.7.2002.
[7] HE 126/2004: 5-6 ja TaVM 29/2004: 1–2.
[8] Joutsamo, Aalto, Kaila & Maunu 2000: 66-68 ja Rother 2003: 86–87 ja 103.
[9] HE 126/2004: 1 ja 14.
[10] Termiä "erillistilinpäätös" käytetään hallituksen lakiesityksen perusteluissa. Kysymys on yksittäisen yhtiön omasta tilinpäätöksestä. Ks. HE 126/2004: 1, 4, 7, 15 ja 26. Termiä koskevasta kritiikistä ks. Englund, Prepula, Riistama & Tuokko 2005: 37.
[11] KPL:n säännös koskee kirjanpitovelvollisia, jotka eivät ole velvollisia laatimaan konsernitilinpäätöstä, mutta joiden liikkeeseen laskemat arvopaperit ovat julkisen kaupankäynnin kohteena.

päätöksessään kansainvälisiä standardeja.[12] Ilmaisun "kansainvälinen tilinpäätösstandardi" sisältö määritellään IAS-asetuksen 2 artiklassa.[13] Tämän säännöksen mukaan näitä standardeja voivat olla IAS- ja IFRS-standardit sekä niitä koskevat tulkinnat, jos komissio on hyväksynyt ne sovellettavaksi Euroopan yhteisössä IAS-asetuksen 3 artiklassa säädetyssä järjestyksessä. Hyväksytyt tilinpäätösstandardit julkaistaan Euroopan yhteisön virallisessa lehdessä komission asetuksina yhteisön kaikilla virallisilla kielillä. Standardit tulevat siten voimaan ja sovellettavaksi EU-alueella vain komission myötävaikutuksella ja hyväksymissä rajoissa. IASB:n hyväksymät standardit ja niiden tulkinnat (IFRIC-tulkinnat) eivät ole suoraan sovellettavaa normistoa ja oikeutta EU:ssa. IASB:lle ei ole annettu lainsäädäntövaltaa EU:ssa, vaan se on edelleen pidätetty EY:n perustamissopimuksen mukaisesti yhteisön toimielimillä. IASB:n julkaisemat standardikokoelmat ovat kaupallisia vuosijulkaisuja. Ne ovat auktoritatiivisia ohjeita ja suosituksia samalla tapaa kuin kirjanpitolautakunnan yleisohjeet ja lausunnot. Molemmilta puuttuu oikeudellisesti sitova vaikutus.[14] EY:n asetuksien ja direktiivien soveltamis- ja tulkintaerimielisyydet tulevat viime kädessä Euroopan yhteisön tuomioistuimen ratkaistavaksi esimerkiksi rikkomis-, kumoamis- tai laiminlyöntikanteiden perusteella tai kansallisen tuomioistuimen ennakkoratkaisupyynnön nojalla.[15] Kirjanpitolainsäädännön eurooppalaistuminen ei ole merkinnyt vain oikeudellistumisen lisääntymistä vaan myös lainsäädäntö- ja tuomiovallan siirtymistä kotimaisilta valtiovallan käyttäjiltä Euroopan yhteisön toimielimille.

Suomen kansalliset tuomioistuimet voivat myös joutua ratkaisemaan kirjanpitolainsäädännön soveltamis- ja tulkintaerimielisyyksiä. Tyypillisimmät tilanteet koskevat rikosoikeudenkäyntejä, joissa ajetaan syytettä kirjanpitorikoksesta.[16] Tuomioistuin jou-

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[12] HE 126/2004: 7–8 ja 26.

[13] Kirjanpitolain 7a luvun 1 §:ssä on informatiiviseksi tarkoitettu viittaussäännös IAS-asetukseen.

[14] HE 126/2004: 5, 9 ja 27. Kirjanpitolautakunta voi KPL 8 luvun 2 §:n 3 momentin nojalla antaa lausuntoja standardien soveltamisesta. Sen sijaan lautakunta ei voi myöntää standardeja koskevia poikkeuslupia, koska sellaista toimivaltaa ei ole IAS-asetuksessa eikä muuallakaan annettu jäsenvaltioiden kansallisille hallintoviranomaisille. Ks. Kaisanlahti 1999: 448 ja Leppiniemi & Leppiniemi 2005b: 23.

[15] HE 126/2004: 9, Kaisanlahti 1999: 449 ja Rother 2003: 73–75.

[16] Kirjanpitorikosten vahingollinen vaikutus liiketoiminnassa on saanut yleisessä tietoisuudessa aivan uuden merkityksen esim. Enronin ja WorldComin rikosjuttujen johdosta. Näiden tapaus-

tuu tällöin tarvittaessa esi- eli ennakkokysymyksenä ottamaan kantaa, onko kirjanpitovelvollisen menettely ollut kirjanpitolainsäädännön vastaista rikostunnusmerkistön edellyttämissä rajoissa syytteessä kuvatulla tavalla. Sama kannanotto voi tulla tehtäväksi EY:n oikeuteen kuuluvien normien osalta. Syytetty saattaa puolustautua sillä, että hänen menettelynsä on sallittua yhteisön oikeuden mukaan, mihin kotimainen sääntely perustuu. Jäsenvaltion tuomioistuimella on oikeus esittää ennakkoratkaisupyyntö EY:n tuomioistuimelle yhteisön normin tulkinnasta tai yhteisön toimielimen antaman säännöksen pätevyydestä. EY:n tuomioistuimen kanta sitoo oikeudellisesti jäsenvaltion tuomioistuinta.[17]

1.2. Kirjanpitorikosten tunnusmerkistöt

Kirjanpitorikoksista säädetään rikoslaissa ja kirjanpitolaissa sekä niiden lisäksi eräissä erityislaeissa, kuten eräitä yhteisöjä koskevissa laeissa.[18] Kirjanpitorikosten perustunnusmerkistönä voidaan pitää rikoslain 30 luvun 9 §:ssä kriminalisoitua kirjanpitorikosta,[19] jonka rangaistavuus edellyttää tahallisuutta. Tuottamuksellinen kirjanpitorikos on säädetty rangaistavaksi rikoslain 30 luvun 10 §:ssä. Kirjanpitorikoksen kvalifioidusta tekomuodosta säädetään rikoslain 30 luvun 9a §:ssä, joka sisältää rikossäännöksen törkeästä kirjanpitorikoksesta. Kirjanpitolain 8 luvun 4 §:ään on otettu kirjanpitorikkomusta koskeva säännös, jossa on kriminalisoitu vain neljä eri käyttäytymistapaa.[20]

Tässä yhteydessä ei ole mahdollista käsitellä perusteellisesti kaikkia kirjanpitorikoksia. Kirjanpidollisesta näkökulmasta on keskeisintä selvittää rikoslain yleissäännösten mu-

ten saama julkisuus on vahvistanut merkittävällä tavalla kirjanpitorikosten rangaistusuhan yleisestävää vaikutusta.

[17] Ks. Rautio 2002: 161–162 ja Rother 2003: 75.

[18] Eräitä yhteisöjä ja toimialoja koskeviin lakeihin sisältyvistä kirjanpitorikossäännöksistä ks. tarkemmin Lehtonen 2006: 9–12.

[19] HE 53/2002: 1 ja 28.

[20] Kirjanpitorikkomuksesta ks. Lehtonen 2006: 48–55.

kaiset rangaistavuuden edellytykset.[21] Tämän vuoksi jäljempänä käsitellään vain kirjanpitorikosta ja tuottamuksellista kirjanpitorikosta.

2. Kirjanpitorikos

Kirjanpitovelvollisen ja muun tekijän käyttäytyminen voi tulla rangaistavaksi kirjanpitorikoksena vain sillä edellytyksellä, että se täyttää kirjanpitorikoksen tunnusmerkistön kokonaisuudessaan. RL 30 luvun 9 §:ssä tarkoitetun kirjanpitorikoksen tunnusmerkistö voidaan jakaa neljään tunnusmerkistötekijöiden ryhmään: 1) tekijätunnusmerkit, 2) tekotapatunnusmerkit, 3) seuraustunnusmerkit ja 4) tahallisuusvaatimus.

2.1. Rikoksentekijät

Rikoslain 30 luvun 9 §:n tunnusmerkistössä lueteltiin alunperin kolme tekijäkategoriaa: 1) kirjanpitovelvollinen, 2) kirjanpitovelvollisen edustaja ja 3) se, jonka tehtäväksi kirjanpito on toimeksiannolla uskottu. Rikoslain eräiden talousrikossäännösten uudistuksen yhteydessä vuonna 2003 lisättiin kirjanpitorikoksen tunnusmerkistön tekijäpiiriin neljäs kategoria (31.1.2003/61): 4) kirjanpitovelvollisessa oikeushenkilössä tosiasiallista määräysvaltaa käyttävä.

Vuoden 1973 kirjanpitolain 38 §:ssä säädetyn kirjanpitorikoksen rikosoikeudellinen tekijävastuu oli aluksi sidottu kirjanpitolaissa tarkoitettuun kirjanpitovelvollisuuteen.[22] Näitä säännöksiä muutettiin olennaisella tavalla vuonna 1985. Lakiesityksen mukaan tarkoitus ei ollut muuttaa oikeustilaa rikosoikeudellisen vastuun kohdentamisen osalta. Ehdotetut rangaistussäännökset olisivat koskeneet vain kirjanpitovelvollisia.[23] Edellä

[21] Kirjanpitorikoksesta ja tuottamuksellisesta kirjanpitorikoksesta voidaan tuomita sakkoon tai vankeuteen enintään kahdeksi vuodeksi. Törkeän kirjanpitorikoksen maksimirangaistus on neljä vuotta vankeutta. Kirjanpitorikkomuksen rangaistukseksi on säädetty sakkoa.
[22] Ks. HE 120/1972: 14.
[23] Ks. HE 23/1985: 5. Rikoslakiprojektin ehdotuksessa oli esitetty, että tekijäpiiriin kuuluisi kirjanpitovelvollisen lisäksi "kirjanpitovelvollisen puolesta toimiva" henkilö. Rikoslain kokonaisuudistus 5/1984: 156–157.

luetellut kolmen ensimmäistä tekijäkategoriaa eivät perustu kuitenkaan hallituksen lakiesitykseen vaan lakivaliokunnan vuonna 1985 antamaan mietintöön. Valiokunnan mietinnössä laajennettiin kirjanpitorikoksen tekijäpiiriä siitä, mitä se oli hallituksen esityksessä.[24] Näitä tekijäkategorioita koskevat alkuperäiset lain esityöt löytyvät siten lakivaliokunnan mietinnöstä vuodelta 1985.

Yhteisölaeissa ja erityisiä toimialoja koskevissa laeissa on muun muassa omia kirjanpitovelvollisuutta koskevia säännöksiä, jotka syrjäyttävät vastaavat kirjanpitolain säännökset. Tämä on johtunut vuoden 1973 KPL 39 §:n ja nykyisen vuoden 1997 KPL 8 luvun 5 §:n toissijaisuussäännöksistä, joiden mukaan kirjanpitolain säännösten estämättä on sovellettava kirjanpitovelvollisuudesta ja kirjanpidosta, mitä siitä on erikseen säädetty muualla laissa.[25] Tästä syystä on ollut ymmärrettävää, että vuoden 1973 KPL 38 §:ssä tarkoitettu kirjanpitorikos koski vain kirjanpitolain säännösten rikkomista.[26]

Oikeustilaa muuttui, kun kirjanpitorikosta koskeva tunnusmerkistö siirrettiin RL 30 luvun 9 ja 10 §:ään rikoslain kokonaisuudistuksen ensimmäisen vaiheen yhteydessä, joka tuli voimaan 1.1.1991 lukien. Kirjanpitolain 8 luvun 5 §:n toissijaisuussäännöksellä ei ole merkitystä rikoslain säännösten kannalta, koska tämä toissijaisuussäännös koskee vain kirjanpitolain mutta ei rikoslain säännösten soveltamisalaa ja syrjäytymistä. RL 30 luvun 9 ja 10 §:n tunnusmerkistöissä ei ole esimerkiksi kirjanpitovelvollisen käsitettä rajattu tai käytetty siinä muodossa siten, että se koskisi vain kirjanpitolaissa tarkoitettua kirjanpitovelvollista. Lainvalmistelu- ja lainsäädäntöaineistossa nimenomaisesti omaksutun kannan mukaan RL 30 luvun 9 ja 10 §:n säännökset tulevat sovellettaviksi sellaisiin vakavimpiin tapauksiin, joissa on kysymys yhtiöoikeudellisissa laeissa, kuten osakeyhtiölaissa, säädettyjen tilinpäätöksen laatimista koskevien säännösten rikkomisesta. Yhteisölakien rikossäännökset voivat tulla sovellettaviksi, jos RL 30 luvun 9 ja 10 §:ssä tarkoitettu tunnusmerkistö ei täyty. Yhteisölakien rikossäännösten osalta pidettiin riittävänä sakkorangaistusta siitä syystä, että vakavimmat yhteisölakien kirjan-

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[24] Ks. LaVM 7/1985: 1–2.

[25] Yhteisölainsäädännössä ja erityisiä toimialoja koskevissa laeissa olevista kirjanpitovelvollisuutta koskevista säännöksistä ks. esim. Järvinen, Prepula, Riistama & Tuokko 2000: 26–35 ja 573–584 sekä HE 173/1997: 4–6.

[26] Ks. Lehtonen 2006: 5–7.

pitosäännösten rikkomiset tulivat rikoslain mukaan rangaistaviksi.[27] Rikoslain kirjanpitorikosten tunnusmerkistöt kattavat siten myös kirjanpitolain ulkopuolisissa laeissa säädetyn kirjanpitovelvollisuuden. Kirjanpitorikosten tunnusmerkistössä tarkoitettuna kirjanpitovelvollisena ei voida kuitenkaan pitää niitä verovelvollisia, jotka ovat vain verolakien perusteella muistiinpanovelvollisia, mutta jotka eivät ole kirjanpitovelvollisia.[28]

2.1.1. Kirjanpitovelvollisuudesta

Tekijätunnusmerkit on voimakkaasti sidottu kirjanpitovelvollisen käsitteeseen. Jäljempänä käsitellään rajoitetun palstatilan vuoksi kirjanpitolaissa säädettyä kirjanpitovelvollisuutta. Kirjanpitolain mukainen kirjanpitovelvollisuus voi johtua a) toiminnan laadusta tai b) oikeudellisesta yhteisömuodosta.

Toiminnan laatuun perustuvasta kirjanpitovelvollisuudesta säädettiin jo vuoden 1973 kirjanpitolain 1 §:n 1 momentissa. Nykyiset säännökset sisältyvät vuoden 1997 kirjanpitolain 1 luvun 1 §:n 1 momenttiin. Säännökset ovat saman sisältöiset. Näiden säännösten mukaan jokainen liike- ja ammattitoiminnan harjoittaja on tästä toiminnastaan kirjanpitovelvollinen. Ilmaisu "tästä toiminnastaan" sulkee kirjanpitovelvollisuuden ulkopuolelle ammatin- ja liikkeenharjoittajan henkilökohtaiset tulot ja hänen yksityistaloutensa. Kaikki siirrot (yksityisotot ja -sijoitukset) elinkeinotoiminnan ja yksityistalouden välillä on kuitenkin kirjattava asianmukaisesti.[29]

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[27] Ks. Rikoslain kokonaisuudistus 5/1984: 339–341 ja 390-392 sekä HE 66/1988: 79, 208–209 ja 212. Ks. samoin Airaksinen & Jauhiainen 1997: 595, Järvinen, Prepula, Riistama & Tuokko 2000: 569, Koski & af Schulten 1991: 436, Kyläkallio, Iirola & Kyläkallio 2002: 878, Lehtonen 1990a: 117, Lehtonen 2006: 7–9 ja af Schulten 2004: 720. Ks. lisäksi Lahti 1991: 1198, jossa lausutun mukaan kirjanpitorikossäännöksen rikoslakiin siirtämisen seurauksena se riidattomasti sanktioi muunkinlaisia kuin kirjanpitolain ja sen nojalla annettujen säännösten ja määräysten rikkomista.

[28] Vero-oikeudellista muistiinpanovelvollisuudesta säädetään Arvonlisäverolain 209.2 §:ssä, Ennakkoperintälain 36 §:ssä ja EPA 29 §:ssä sekä verotusmenettelylain 12 §:ssä. Arvonlisä- ja tuloverotusta koskevat tarkemmat säännökset muistiinpanovelvollisuudesta sisältyvät VeroHp ilmoittamisvelvollisuudesta ja muistiinpanoista (2.1.2006/5) Ks. HE 91/2005: 34, Lehtonen 2006: 12–14 ja Myrsky & Linnakangas 2004: 51–53.

[29] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 20 ja Leppiniemi & Leppiniemi 2001: 139–140.

Ammatti- ja liiketoiminnan käsitteitä ei ole määritelty kirjanpitolaissa eikä hallituksen lakiesityksessä. Asia on jätetty oikeuskäytännön ja -kirjallisuuden varaan. Liiketoiminnan käsitettä on pyritty luonnehtimaan liiketoiminnan tunnusmerkkien avulla.[30] Liiketoiminnasta voi olla kysymys, vaikka jokin tunnusmerkki ei täyttyisikään. Liiketoiminnan tunnusmerkkien täyttymistä arvioidaan käytännössä viime kädessä kokonaisuutena. Ammatti- ja liiketoiminnan välisessä rajanvedossa kysymys on aste-erosta. Jos kirjanpitovelvollisuudesta on epäselvyyttä, tapana on pyytää lausunto kirjanpitolautakunnalta, joka voi hakemuksesta antaa lausuntoja kirjanpitolain soveltamisesta.[31] Vapaa-ajan harrastustoiminta ei ole elinkeinotoimintaa.[32] Rajanvetoa koskevaa suoraa johtoa ei voitane aina saada EVL:n elinkeinotoiminnan käsitteestä ja arvonlisäverolain liiketoiminnan käsitteestä, koska verolakien tavoitteet ja soveltamiskäytännöt voivat olla omaperäisiä. Esimerkiksi arvonlisäverotuksen neutraalisuustavoitteesta johtuen liiketoiminnan käsitettä on tulkittu laventavasti ja sillä on arvonlisäverotuksessa laajempi merkityssisältö kuin EVL:ssa.[33] EVL:n mukaan verotettavana on pidetty muun muassa ns. "saastuneiden" osakkeiden tai kiinteistöjen myyntiä, vaikka myyjänä toimivaa luonnollista henkilöä ei ole pidetty kirjanpitovelvollisena.[34]

Oikeudelliseen yhteisömuotoon perustuvasta kirjanpitovelvollisuudesta säädettiin jo vuoden 1973 kirjanpitolain 1 §:n 3 momentissa, mitä vastaavat nykyiset säännökset ovat uuden KPL 1 luvun 1 §:n 1 momentissa. Näissä säännöksissä on lueteltu kirjanpitovelvolliset yhteisöt ja säätiöt. Kirjanpitovelvollisuus on asetettu 1) osakeyhtiölle, 2) osuuskunnalle, 3) kommandiittiyhtiölle ja 4) avoimelle yhtiölle, 5) yhdistykselle, asumisoikeusyhdistykselle ja muulle sellaiselle yhteisölle [35] sekä 6) säätiölle.[36] Tämän lisäksi on

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[30] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 17–20 ja Leppiniemi 2006: luku 5.

[31] Kirjanpitovelvollisuutta koskevista rajatapauksista ks. KILA 1974/7, jossa elokuvateatteritoimintaa harjoittavat puolisot katsottiin kirjanpitovelvollisiksi, KILA 1988/996 ja KILA 2001/1663, joissa oli kysymys ajoneuvojen myyntitoiminnasta, sekä KILA 2000/1630, jossa yksityishenkilöä ei pidetty kirjanpitovelvollisena arvopaperikaupoistaan.

[32] Ks. KILA 2003/1697, jossa yksityishenkilöä ei pidetty kirjanpitovelvollisena maalaamistaan ja myymistään tauluista.

[33] Ks. Linnakangas & Juanto 2004: 26-27 ja Äärilä & Nyrhinen 2005: 30–31.

[34] EVL:ssa tarkoitetusta ammatti- ja liiketoiminnasta ks. Andersson & Ikkala 2005: 15–43, Myrsky & Linnakangas 2006: 71–83 ja Tikka & Nykänen 2005: luku 6.

[35] Kirjanpitolautakunta on antamissaan lausunnoissaan katsonut, että kirjanpitovelvollisia ovat mm. rekisteröimätön yhdistys (KILA 1974/15 ja KILA 1999/1578) ja tiekunta (KILA 1974/16). Kalastuskunnan kirjanpitovelvollisuudesta ks. KILA 2000/1629. Lakiesityksessä mainittiin esi-

KPL 1:1.1:ssa kirjanpitovelvollisiksi säädetty 7) eläkesäätiö, 8) vakuutuskassa, 9) keskinäinen vakuutusyhtiö, 10) vakuutusyhdistys, 11) sijoitusrahastoyhtiön hallinnassa oleva sijoitusrahasto, 12) henkilöstörahasto, 13) luottolaitosten talletussuoja- ja vakuusrahasto sekä sijoituspalveluyrityksen sijoittajien korvausrahasto ynnä 14) arvopaperikeskuksen rahasto ja selvitysrahasto. Myöhemmin on luetteloon lisätty 15) rekisteröity uskonnollinen yhdyskunta ja sen rekisteröity paikallisyhteisö. Monet näistä yhteisöistä ovat kirjanpitovelvollisia niitä koskevien erityislakien perusteella, mutta niiden maininta kirjanpitolaissa on luonut niille yleisen kirjanpitovelvollisuuden. Sanotuissa kirjanpitolain säännöksissä luetellut yhteisöt ovat aina kirjanpitovelvollisia toiminnan laadusta riippumatta ja jopa silloin, kun ne eivät harjoita mitään taloudellista toimintaa.[37]

KPL 1 luvun 1 §:n 2 momentissa on erikseen säädetty, että maatilatalouden harjoittaja ei ole toiminnan laadun perusteella kirjanpitovelvollinen,[38] jos maatilataloutta ei harjoiteta edellä luetellun yksityisoikeudellisen yhteisön tai säätiön muodossa. Maataloutta harjoittava osakeyhtiö on siten kirjanpitovelvollinen. Maatalouden yhteydessä harjoitettu muu toiminta voidaan katsoa eri liikkeeksi muun muassa toiminnan laajuuden, erillisten investointien ja erillisen palkatun työvoiman perusteella. Tällaista erillistä liikettä käsitellään tuloverotuksessa elinkeinotoimintana[39] ja siihen liitetään myös kirjanpitovelvollisuus.[40] Käytännössä katsotaan, että esimerkiksi laajamittainen kalanviljely, turkistarhaus, kauppapuutarha, soranmyynti ja ulkopuolisiin kohdistuva sahaustoiminta ovat liiketoimintaa, jolloin kirjanpitovelvollisuus perustuu toiminnan laatuun, jos toimintaa harjoittaa luonnollinen henkilö.

merkkeinä "muusta sellaisesta yhteisöstä" kalastuskunta ja kauppakamari. Ks. HE 173/1997: 8. Ks. lisäksi Järvinen, Prepula, Riistama & Tuokko 2000: 29–32.

[36] Laivanisännistöyhtiön kirjanpitovelvollisuudesta säädetään merilain 5 luvun 8 §:ssä.

[37] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 22–25. Ks. lisäksi HE 44/2002: 174 ja Lehtonen 1991: 262.

[38] Maatilatalouden harjoittajan muistiinpanovelvollisuudesta ks. VML 12 § ja HE 91/2005: 34.

[39] Ks. Andersson & Ikkala 2005: 43 ja Myrsky & Linnakangas 2006: 73–74.

[40] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 39.

KPL 1 luvun 1 §:n 2 momentissa on lisäksi säädetty, että julkisyhteisö ei ole kirjanpitovelvollinen kirjanpitolain nojalla.[41] Julkisyhteisön kirjanpitovelvollisuus voi perustua muihin säännöksiin.[42] Kuntalain (365/1995) 67 §:ssä on säädetty, että kunnan kirjanpitovelvollisuudesta, kirjanpidosta ja tilinpäätöksestä on kuntalaissa säädetyn lisäksi voimassa soveltuvin osin, mitä kirjanpitolaissa säädetään. Tämä koskee kuntalain 86 §:n mukaan myös kuntayhtymää.[43] Valtion kirjanpitovelvollisuudesta on säädetty valtion talousarviosta annetun lain 14-21a §:ssä ja tämän lain nojalla annetun asetuksen 6 ja 8 luvussa.[44] Valtion liikelaitos ja liikelaitoskonserni ovat myös kirjanpitovelvollisia, mistä säädetään valtion liikelaitoksista annetun lain 13 §:ssä. Valtion liikelaitoksen kirjanpitoon ja tilinpäätökseen sovelletaan pääsääntöisesti kirjanpitolain säännöksiä.

2.1.2. Kirjanpitovelvollinen

"Kirjanpitovelvollisella" tarkoitetaan tunnusmerkistössä lähinnä sellaista luonnollista henkilöä, joka harjoittaa ammatti- tai liiketoimintaa. Oikeushenkilöä ei voida tuomita rangaistukseen kirjanpitorikoksesta, joten oikeushenkilö ei tule kyseeseen tunnusmerkistössä tarkoitettuna "kirjanpitovelvollisena". Kirjanpitovelvollisen edustajat kuuluvat toiseen tekijäkategoriaan. Kirjanpitovelvollisen käsitteellä on siten tämän ensimmäisen tekijäryhmän osalta tosiasiallisesti rajoitettu merkityssisältö, koska sen alaisuuteen jäävät käytännössä ne luonnolliset henkilöt, jotka ovat KPL 1 luvun 1 §:n 1 momentissa tarkoitetun toiminnan laadun perusteella kirjanpitovelvollisia.

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[41] Kirjanpitolautakunta on katsonut, ettei kunnallinen sopimusvaltuuskunta eli kunnallinen työmarkkinalaitos (KILA 1975/41) eikä kriminaalihuoltoyhdistys (KILA 1975/135) ole kirjanpitolain perusteella kirjanpitovelvollinen.

[42] Ks. HE 173/1997: 8.

[43] Kuntalain säätämisen myötä kunnissa ja kuntayhtymissä siirryttiin hallinnollisesta kirjanpitojärjestelmästä liikekirjanpidon mukaiseen järjestelmään, jonka sääntely on toteutettu pääosin kirjanpitolailla ja -asetuksella. Kuntalain 68 ja 69 §:ssä on lisäksi eräitä säännöksiä kunnan tilikaudesta, tilinpäätöksestä ja toimintakertomuksesta. Ks. tarkemmin Harjula & Prättälä 2004: 508-519, Heuru 2001: 402–416, Porokka-Maunuksela, Huuskonen, Koskinen & Säilä 2004: 25–32 ja HE 192/1994.

[44] Valtion kirjanpitoa ja tilinpäätöstä koskevat säännökset ovat melko pitkälti kirjanpitolain periaatteiden mukaisia, erityisesti liikekirjanpidon osalta, mikä uudistettiin vuoden 1998 alusta lukien. Ks. tarkemmin Järvinen, Prepula, Riistama & Tuokko 2000: 38, Myrsky 1999: 102-106 ja Pöllä & Etelälahti 2002: 134–243.

Kirjanpitorikos on ns. erikoisrikos (delicta propria).[45] "Kirjanpitovelvollisen" tekijäkategoriaan kuuluu tosiasiallisesti vain ammatti- ja liiketoimintaa harjoittava luonnollinen henkilö itse. Hänen kirjanpitorikoksensa tekemiseen osallistuva, epäitsenäisessä asemassa oleva työntekijä on lähinnä rikoslain 5 luvun 6 §:ssä tarkoitettuna avunantajana tai saman luvun 5 §:ssä mainittuna yllyttäjänä rangaistava osallinen.[46]

2.1.3. Kirjanpitovelvollisen edustaja

Kirjanpitorikoksen tunnusmerkistössä on epäselvyyksien välttämiseksi lueteltu itsenäisesti jokainen tekijäpiirin ryhmä. Tästä syystä siinä on erikseen mainittu kirjanpitovelvollisen edustaja. Alunperin katsottiin, että rikosoikeuden yleisten periaatteiden mukaan ratkaistaan, kuka tai ketkä ovat "kirjanpitovelvollisen edustajia".[47]

Termi “edustaja” on kovin avoin ilmaisu niin yleiskielellisessä kuin oikeudellisessa merkityksessä, joten se ei anna tarkkaa johtoa soveltamistoimintaa varten. Ilmaisulla “kirjanpitovelvollisen edustaja” voidaan tarkoittaa muun muassa kirjanpitovelvollisen lakimääräisiä edustajia, kuten vajaavaltaisen edunvalvojaa tai oikeushenkilön edustajaa, jonka asema voi perustua lakiin tai oikeushenkilön sääntöihin yms. Kirjanpitovelvollisen ’edustaja’ voi olla myös 1) kuolinpesän hoitaja tahi osakkaat tai pesänselvittäjä taikka 2) konkurssipesän pesänhoitaja.[48]

Ilmaisu “kirjanpitovelvollisen edustaja” ei ole yksiselitteinen, koska se voidaan sekoittaa “edustamiseen”, joka liitetään edustamiskelpoisuuteen eli kelpoisuuteen tehdä mm. sopimuksia sivullisen kanssa ja kirjoittaa kirjanpitovelvollisen toiminimi. Esimerkkinä voidaan käyttää osakeyhtiötä, jota koskeva edustamiskelpoisuus voi OYL 6 luvun 25-26 §:n nojalla olla yhtiön hallituksella, toimitusjohtajalla, hallituksen jäsenellä ja muulla

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[45] Ks. Frände 2005: 299, HE 44/2002: 169, Lehtonen 1990a: 123, Nuutila 1997: 361 ja Mäkelä 2001: 134.

[46] Ks. Lahti 1998: 1280 ja Lehtonen 1990a: 123.

[47] Ks. LaVM 7/1985: 1. RL 5 luvun 8 §:n säännöstä oikeushenkilön puolesta toimimisesta ei sovelleta kirjanpitorikoksiin, mikä johtuu tämän pykälän 3 momenttiin otetusta toissijaisuussäännöksestä. Ks. HE 44/2002: 172–176, Frände 2005: 300-301 ja Lahti 2002: 395.

[48] Ks. HE 44/2002: 175, HE 26/2003: 135 ja 151 sekä Lehtonen 1990a: 123. Ks. lisäksi KKO 1998: 39, jossa osakeyhtiön konkurssipesän uskottu mies, joka oli vastuussa konkurssivelallisen kirjanpitoaineiston säilyttämisestä, tuomittiin tuottamuksellisesta kirjanpitorikoksesta.

edustajalla (ent. toiminimenkirjoittajalla) ynnä prokuralaissa (2.2.1979/130) tarkoitetulla prokuristilla.[49] Tämä edustamisoikeus ei kuitenkaan yhdenny kirjanpitoa koskevien velvoitteiden kanssa, mistä osakeyhtiön osalta säädetään OYL 6 luvun 2 ja 17 §:ssä.

Kirjanpitorikosten tunnusmerkistössä 'edustajalla' tarkoitetaan käytännössä yleisimmin sellaista henkilöä, joka yhteisön tai säätiön toimielimenä tahi sen jäsenenä taikka palveluksessa olevana vastaa organisaation sisällä kirjanpidosta. Lain esitöissä pidettiin silmällä lähinnä niitä luonnollisia henkilöitä, jotka yhteisön tai säätiön organisaation sisällä vastaavat kirjanpidosta.[50] Vastuuasema ratkaistaan asianomaista yhteisöä koskevien säännösten ja määräysten (esim. yhtiöjärjestyksen) nojalla. Ensisijainen vastuuasema on niillä henkilöillä, joilla on yhteisön säännöksiin ja määräyksiin perustuva velvollisuus huolehtia kirjanpidosta. Esimerkiksi osakeyhtiössä kysymys on tällöin yhtiön hallituksesta ja toimitusjohtajasta.

Organisaation sisäisellä tehtävien jaolla on merkitystä edustajien rikosoikeudelliseen vastuuseen. Tehtävien jako voi perustua yhteisöoikeudellisiin säännöksiin tai määräyksiin taikka olla tosiasiallista.[51] Osakeyhtiössä ei voida edes yhtiöjärjestyksessä määrätä, että joillakin hallituksen jäsenillä ei olisi lainkaan velvollisuutta huolehtia kirjanpidon ja varainhoidon valvonnasta.[52] Organisaatioon kuuluvien henkilöiden välisin keskinäisin sopimuksin ei voida myöskään syrjäyttää lakiperusteista valvontavelvollisuutta.[53]

Selväpiirteisin yhteisöoikeudellisiin säännöksiin perustuva kirjanpitoa koskevien tehtävien jako on osakeyhtiölaissa. OYL 6 luvun 2 §:n 1 momentin mukaan osakeyhtiön hal-

[49] Osakeyhtiön edustamisesta ks. af Schulten 2003: 542–547. Prokuristilla ei ole oikeutta eikä velvollisuutta allekirjoittaa tilinpäätöstä. Ks. Kaisanlahti 1999: 457. Ks. lisäksi Lehtonen 1990b: 1058–1065.
[50] Ks. HE 23/1985: 5, HE 66/1988: 90 ja Rikoslain kokonaisuudistus 5/1984: 157–158.
[51] Ks. Lehtonen 1984: 84, Lehtonen 1990a: 123 ja Rikoslain kokonaisuudistus 5/1984: 158. Tehtävien jaon vaikutuksesta rikosoikeudelliseen vastuuseen yleisesti ks. Lahti 1981: 48–52, Lahti 1985: 161–162, Lahti 1988: 76–77 ja Nissinen 1997: 163–168. Ks. lisäksi Taxell 1983: 33–44.
[52] Ks. Kyläkallio, Iirola & Kyläkallio 2002: 611.
[53] Ks. KKO 2001:85: Osakeyhtiön kirjanpidon pitäminen oli laiminlyöty. Osakeyhtiön hallituksen puheenjohtajana toiminut A väitti sopineensa yhtiön toimitusjohtajana ja myös hallituksen jäsenenä toimineen B:n kanssa, että B huolehti kirjanpidosta. Kun sopimus ei vapauttanut A:ta osakeyhtiölain 8 luvun 6 §:n 2 momentista ilmenevästä hallitukselle kuuluvasta kirjanpidon valvontavelvollisuudesta, A tuomittiin rangaistukseen kirjanpitorikoksesta.

lituksen on huolehdittava siitä, että kirjanpidon ja varainhoidon valvonta on asianmukaisesti järjestetty. Yhtiön hallitus ei yleensä vastaa kirjanpidon (yksityiskohtien) oikeellisuudesta, jos tehtävää hoitamaan on valittu asiantunteva ja kyvykäs henkilö (valintavastuu) ja jos hänelle on annettu tarpeelliset tiedot tehtävän hoitamiseksi (informaatiovastuu) sekä jos tehtävien suorittamisen valvonta on asianmukaisesti järjestetty (valvontavastuu).[54] Näiden velvollisuuksien osittainenkin laiminlyönti voi aiheuttaa vastuun kanavoitumisen myös yhtiön hallitukselle. Yhtiön hallituksen tulee huolehtia yhtiön hallinnon ja toiminnan sekä kirjanpidon ja varainhoidon valvonnan asianmukaisesta järjestämisestä, mistä johtuen suuremmissa yrityksissä hallitus ei voi yleensä suorittaa muuta kuin ylempien toimihenkilöiden valinnan ja valvonnan sekä toimivan organisaation (mm. sisäisen tarkastusorganisaation) luomiseen ja seurantaan (valvontaan) kuuluvia tehtäviä, usein pelkästään selvitysten ja raporttien välityksellä. Näistä järjestelyistä huolimatta rikosoikeudellinen vastuu kohdentuu yhtiön hallituksen jäseniin, mikäli he ovat päättäneet virheellisen kirjanpidon laatimisesta tai mikäli he eivät ole ryhtyneet toimenpiteisiin heidän tietoonsa tulleiden virheiden korjaamiseksi tahi puutteiden poistamiseksi.[55]

OYL 6 luvun 17 §:n 1 momentin säännösten mukaan osakeyhtiön toimitusjohtajan on huolehdittava juoksevan hallinnon lisäksi siitä, että yhtiön kirjanpito on lainmukainen ja varainhoito järjestetty luotettavalla tavalla. Kirjanpidon lainmukaisuuden järjestäminen ja valvonta ovat tarvittaessa yksityiskohtia myöden sellaisia juoksevaan hallintoon kuuluvia tehtäviä, jotka kuuluvat toimitusjohtajan vastuualueeseen. Pienemmissä yrityksissä (esim. asuntoyhtiössä tai perheyhtiössä) toimitusjohtaja voi joutua suorittamaan itse kirjanpidon lainmukaisuuden valvontaa tai jopa henkilökohtaisesti laatimaan kirjanpitoa. Suurissa yrityksissä toimitusjohtajan vastuuasema lähenee edellä kuvattua hallituksen vastuuta.[56]

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[54] Tekstissä mainituista vastuuperusteista rikosoikeudellisen vastuun kohdentamisessa ks. KM 1973/70: 65, Lahti 1981: 50, Lahti 1985: 162, Lahti 1988: 76, Lahti 2002: 395–397, Lehtonen 1977: 276, Lehtonen 1984: 87, Lehtonen 1990a: 123–124, Nissinen 1997: 173 ja Nuutila 1997: 137–138. Ks. lisäksi af Schulten 2003: 504.

[55] Ks. Kyläkallio, Iirola & Kyläkallio 2002: 617-618, Lehtonen 1991: 124 ja af Schulten 2003: 488–489, 493–494 ja 503-504. Ks. lisäksi Vahtera 1986: 16–18.

[56] Ks. Kyläkallio, Iirola & Kyläkallio 2002: 651, Lehtonen 1991: 124, af Schulten 2003: 496-500 ja 503–504 sekä Toiviainen 1992: 318–323.

'Edustajana' voidaan pitää yleensä henkilöä, jolla on siten itsenäinen asema yhteisössä, että hän voi omaehtoisesti päättää kirjanpitoon liittyvistä asioista (esim. tulosvastuullisen yksikön johtaja, toimialajohtaja taikka johtoryhmän jäsenet, jos heidän vastuualueeseensa kuuluu kirjanpidosta huolehtiminen).[57]

Kirjanpitovelvollisen 'edustajaksi' ei voida katsoa epäitsenäisessä asemassa olevaa työsuhteista kirjanpitäjää, joka oman kavalluksensa peittääkseen tekee tosiasioita vastaamattomia merkintöjä kirjanpitoon.[58] Sama koskee työntekijää, joka hävittää yhtiön kirjanpidon kostoksi esimerkiksi irtisanomisesta, jonka hän kokee perusteettomaksi. Tällaiset työntekijät eivät toimi kirjanpitovelvollisen "puolesta", vaan heidän rikoksensa kohdistuu kirjanpitovelvolliseen. Työntekijää ei rangaista kirjanpitorikoksesta, vaan hänen tekoaan vastaavasta muusta rikoksesta.[59] Kirjanpitoon kuuluvia pelkästään teknisiä töitä tekevät työntekijät, jotka ovat epäitsenäisessä asemassa, voivat syyllistyä kirjanpitorikokseen yleensä vain avunantajina tai yllyttäjinä.[60]

2.1.4. Se, jonka tehtäväksi kirjanpito on toimeksiannon nojalla uskottu

Ilmaisulla "se, jonka tehtäväksi kirjanpito on toimeksiannon nojalla uskottu" tarkoitetaan kirjanpitovelvollisen ulkopuolella olevia henkilöitä, jotka yksityisoikeudellisen toimeksiannon perusteella ovat saaneet tehtäväksi kirjanpidon laatimisen (esim. itsenäiset kirjanpitäjät). Kysymykseen tulevat myös kirjanpitotehtäviä hoitavan yrityksen toiminnasta vastaavat henkilöt, kuten tilitoimistotoimintaa harjoittavan liikkeen omistaja, henkilöyhtiön vastuunalainen yhtiömies sekä osakeyhtiön, osuuskunnan ja yhdistyksen hallintovaltaa käyttävät henkilöt. Tekijäominaisuus edellyttää selvää itsenäistä asemaa toimia kirjanpitovelvollisen puolesta tätä koskevin vaikutuksin.[61]

Kirjanpitovelvollisen ulkopuolisen henkilön kirjanpitotehtävän suorittamisen pitää perustua toimeksiantoon. Tekijävastuun ulkopuolelle jäävät siten 1) avio- ja avopuolisot,

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[57] Ks. Lehtonen 1990a: 124.
[58] Ks. Lehtonen 1990a: 124.
[59] Ks. HE 44/2002: 175.
[60] Ks. Lahti 1998: 1282, Lahti 2002: 397, Lehtonen 1990a: 124 ja Mäkelä 2001: 135.
[61] Ks. LaVM 7/1985: 2.

2) sukulaiset sekä 3) ystävät ja tuttavat, jotka ovat palkkiotta laatineet kirjanpitoa. Viimeksi luetellut henkilöt jäävät avunantajan asemaan, jos he ovat toimillaan vain edistäneet kirjanpitovelvollisen tai tämän edustajan kirjanpitorikoksen tekemistä.

2.1.5. Oikeushenkilössä tosiasiallista päätösvaltaa käyttävä henkilö

Ilmaisua "kirjanpitovelvollisen edustaja" on aikaisemmin käytetty myös laajemmassa merkityksessä, jolloin "edustajalta" ei ole edellytetty muodollista asemaa organisaatiossa vaan esim. tosiasiallista valtaa itsenäisesti päättää kirjanpitoon liittyvistä seikoista. Vastuuasema on voinut perustua myös henkilön tosiasialliseen asemaan eli yhtiön sisäisen hallintovallan itsenäiseen käyttämiseen. Esimerkiksi osakeyhtiön pääosakas saattaa käytännössä osakkuusasemansa perusteella päättää kaikista merkittävistä juoksevaan hallintoon kuuluvista asioista, vaikka hän ei kuulu yhtiön hallitukseen eikä toimi toimitusjohtajana.[62] Tämän lisäksi osakeyhtiön todellinen pääosakas saattaa päättää ilman muodollista asemaa yhtiön juoksevasta hallinnosta ns. välikäsi- eli bulvaanisuhteen avulla, jossa muodollinen hallitus toimii todellisen osakkaan määräysten ja tahdon mukaisesti. Tosiasiallista hallintovaltaa käyttävä osakeyhtiön todellinen osakas ('omistaja') voi joutua rikosoikeudelliseen vastuuseen, vaikka hänellä ei ole muodollista asemaa yhtiössä. Ratkaisussa KKO 2001:86 (ään. 3–2) korkeimman oikeuden enemmistö katsoi, että osakeyhtiössä tosiasiallista määräysvaltaa käyttänyttä henkilöä voitiin pitää RL 30 luvun 9 §:ssä tarkoitettuna kirjanpitovelvollisen edustajana, minkä vuoksi hänet tuomittiin tekijänä rangaistukseen kirjanpitorikoksesta, vaikka hänellä ei ollut muodollista asemaa yhtiön hallinnossa ja vaikka hän ei omistanut yhtiön osakkeita.

Kirjanpitorikoksen tekijäpiiriä on laajennettu vuonna 2003 lisäämällä tekijöiden luetteloon oikeushenkilössä tosiasiallista päätösvaltaa käyttävät henkilöt. Tämä lisäys tehtiin rikoslain eräiden talousrikossäännösten uudistuksen yhteydessä (31.1.2003/61). Tekijäpiirin laajennusta on perusteltu sillä, että tällaiset henkilöt on myös oikeushenkilön rangaistusvastuuta koskevassa RL 9 luvun 2 §:n säännöksessä rinnastettu oikeushenkilössä muodollisessa asemassa toimivaan henkilöön ja sillä, että oikeuskäytännössä oli tosiasiallista päätösvaltaa käyttävä henkilö jo aikaisemmin katsottu voitavan rinnastaa muo-

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[62] Ks. Lehtonen 1990a: 123.

dollisen päätösvallan haltijoihin. Tekijäpiirin lisäyksellä on haluttu vahvistaa korkeimman oikeuden omaksumaa tulkintalinjaa.[63] Vallitseva oikeustila on kirjattu lakiin erillisenä kohtana.

Käytännössä on toisinaan koettu myös kirjanpitorikosten osalta erittäin ongelmalliseksi ns. saattohoitotilanteet, jotka liittyvät yrityksen ajamiseen konkurssiin. Saattohoitotilanteessa yrityksen varsinainen omistaja ja vastuuasemassa oleva henkilö myy konkurssiin ajautumassa olevan yrityksensä henkilölle, jonka tehtävänä on toimia muodollisessa vastuuasemassa (esim. toimitusjohtajana ja hallituksena) silloin, kun yritys asetetaan konkurssiin. Näissä tapauksissa rikoksesta vastuuseen joutuva taho voi olla yrityksen muodollisesti ostanut ammattimainen saattohoitaja, vaikka kirjanpito olisi hävitetty tai laiminlyöty ennen kuin yritys on siirtynyt saattohoitajalle. Tällöin varsinainen kirjanpitovelvollinen saattaisi jäädä rikosoikeudellisen vastuun ulottumattomiin, jos saattohoitaja antaa yrityskaupan yhteydessä virheellisen todistuksen siitä, että hän on vastaanottanut kirjanpidon, vaikka kirjanpitoa kaupantekohetkellä ei ole ollut olemassa tai se oli jo silloin puutteellinen.[64] Saattohoitaja saattaa olla vain varsinaisen yritystoiminnan harjoittajan bulvaani eli välikäsi, joka toimii todellisen omistajan määräysten mukaan ja lukuun (hyväksi) mutta omissa nimissään.[65] Näissä tilanteissa tekijäksi voidaan katsoa todellinen omistaja, joka on oikeushenkilössä tosiasiallista päätösvaltaa käyttävä henkilö.

Saattohoitaja joutuu myös rikosoikeudelliseen vastuuseen osallisuutensa mukaisesti, joka voi olla mm. rikoskumppanuutta, jos saattohoitajan ja todellisen omistajan välillä vallitsee yhteisymmärrys kirjanpitorikoksen tekemisestä. Saattohoitaja on rikoskumppani esim. silloin, kun hän on palkkiota vastaan ja etukäteiseen suunnitelmaan perustuvan työnjaon mukaisesti tehnyt oman osuutensa esim. väärien merkintöjen tekemisessä kirjanpitoon, kirjanpidon hävittämisessä tai kirjanpidon pitämisen ja tilinpäätöksen laatimisen laiminlyönnissä. Saattohoitajan osuus rikoksen toteuttamisessa on yleensä olennainen ja kokonaisuuden kannalta merkityksellinen. Koko menettelyyn ei useinkaan

[63] Ks. HE 53/2002: 33.
[64] Ks. HE 53/2002: 18 ja Mäkelä 2001: 150-151.
[65] Ks. Kuortti 1997: 165.

ryhdyttäisi, jos ei löytyisi bulvaaniksi halukasta saattohoitajaa, joka asettuu esim. palkkiota vastaan muodolliseen vastuuasemaan. Saattohoitaja on tavallaan välttämättömyys rikokseen ryhtymiseksi. Tästä näkökulmasta saattohoitajan menettely on rangaistusarvoltaan rinnasteinen 'päämiehensä' moitittavaan käyttäytymiseen. Saattohoitaja saattaa ottaa nimenomaisesti huolehtiakseen esim. kirjanpidon hävittämisestä. Toisinaan saattohoitajat ovat vähätelleet omaa osuuttaan pitäen sitä vain RL 15 luvun 11 §:ssä tarkoitettuna rikoksentekijän suojelemisena tai pelkästään laillisena yrityskauppana. Tähän uskominen on osaltaan johtanut tilanteisiin, joissa sama henkilö on toiminut peräkkäin tai jopa samanaikaisesti saattohoitajana useissa konkurssiin joutuneissa yrityksissä eri puolilla Suomea.

2.2. Kirjanpitorikoksen tekotavat

Rikoslain 30 luvun 9 §:ssä tarkoitetun kirjanpitorikoksen tunnusmerkistössä on mainittu kolme rangaistavaksi säädettyä tekotapaa: 1) liiketapahtumien kirjaamisen tai tilinpäätöksen laatimisen laiminlyönti vastoin kirjanpitolainsäädännön mukaisia velvollisuuksia, 2) väärien tai harhaanjohtavien tietojen merkitseminen kirjanpitoon ja 3) kirjanpitoaineiston hävittäminen, kätkeminen tai vahingoittaminen.

2.2.1. Liiketapahtumien kirjaamisen tai tilinpäätöksen laatimisen laiminlyönti

RL 30 luvun 9 §:n 1) kohdassa oli alunperin ilmaistu kirjanpitorikoksen rangaistava tekotapa seuraavasti: "laiminlyö kokonaan tai osaksi liiketapahtumien kirjaamisen tai tilinpäätöksen laatimisen". Vuoden 2003 uudistuksen yhteydessä on tämän kohdan tekotapatunnusmerkit muutettu seuraavan sisältöiseksi: "laiminlyö liiketapahtumien kirjaamista tai tilinpäätöksen laatimista vastoin kirjanpitolainsäädännön mukaisia velvollisuuksia". Ilmaisun "kokonaan tai osittain" poistamisella ja kirjanpitolainsäädäntöä koskevalla lisäyksellä eli näillä sanamuotojen muutoksilla ei ole lain esitöiden mukaan ollut tarkoitus muuttaa säännöksen vakiintunutta tulkintaa. Kirjanpitolainsäädännön mukaisia velvoitteita koskevalla lisäyksellä on vain haluttu kielellisesti selventää se, että tilinpäätöksen laatimisvelvollisuuden laiminlyöntiä voi olla myös liitetietojen ilmoittamatta jättäminen.[66] Tekotapatunnusmerkkien keskeisen sisällön muodostaa liiketapahtumien kirjaamisen tai tilinpäätöksen laatimisen laiminlyönti, jos se on vastoin kirjanpitolainsäädännön mukaisia velvollisuuksia.[67]

Liiketapahtumien kirjaamista koskevat yleissäännökset sisältyvät kirjanpitolain 2 lukuun, joka koskee tilikauden aikaista kirjanpitoa. Näitä säännöksiä on pidetty esikuvana, kun on laadittu tunnusmerkkejä "laiminlyö liiketapahtumien kirjaamisen".[68] Liiketapahtuman käsitteen merkityssisällön tuntemus on keskeistä, koska rangaistavaksi on säädetty niiden kirjaamisen laiminlyönti. KPL 2 luvun 1 §:ssä on säädetty, että kirjanpitovelvollisen on merkittävä kirjanpitoonsa liiketapahtumina menot, tulot, rahoitustapahtumat sekä niiden oikaisu- ja siirtoerät. Tämä säännös vastaa sisällöltään vuoden 1973 kirjanpitolain 4 §:ää. Lakien esitöissä on määritelty, että meno on tuotannontekijän rahana ilmaistu vastike ja että tulo on suoritteen rahana ilmaistu vastike.[69] Meno liittyy toiselta talousyksiköltä hankitun ja vastaanotetun hyödykkeen vastikkeen määrään, kun taas tulo tarkoittaa luovutetusta suoritteesta saatavaa vastiketta.[70] Rahoitustapahtumia ovat pääomasijoitukset ja niiden palautukset sekä voitonjako ynnä niistä sekä tuloista ja menoista johtuneet kassaan- ja kassastamaksut. Kassaan- ja kassastamaksuja kutsutaan maksutapahtumiksi, joilla tarkoitetaan yrityksen rahatileille (kassaan ja pankkitileille) saatua suoritusta ja niiltä tapahtunutta suoritusta.[71] Oikaisueriä ovat tulon ja menon sekä rahoitustapahtumien vähennys- tai lisäyserät, joilla ne korjataan lopulliseen määräänsä. Kysymys voi olla esimerkiksi alennusten, hyvityslaskujen ja valuuttojen kurssivaihteluiden aiheuttamista muutoksista. Siirtoeriä voi aiheutua siitä, että tulo tai meno siirretään toiselle talousyksikölle taikka menon tarkoitus muuttuu. Menonsiirtokirjauksen tarve

[66] Ks. 53/2002: 28 ja 33.
[67] Oikeuskirjallisuudessa on esitetty myös sellainen tunnusmerkistöä supistava tulkinta, jonka mukaan "kirjanpitolainsäädännön mukaisilla velvollisuuksilla" ei tarkoitettaisi muualla lainsäädännössä kuin kirjanpitolaissa ja -asetuksessa säädettyjä velvollisuuksia. Koponen ja Sahavirta puhuvat asiasta potentiaalissa, mutta Tapani esittää sen normiväitteenä. He palauttavat tilanteen kuitenkin "normaalitilaan" katsomalla, että kirjanpitovelvollisuuden tarkemman sisällön määrittämisessä voidaan käyttää apuna hyvää kirjanpitotapaa ja erityislakien, kuten OYL:n säännöksiä. Ks. Koponen & Sahavirta 2004: 63-64 ja Tapani 2006: 551. Vrt. toisin esim. Mäkelä 2001: 120-122.
[68] Ks. HE 23/1985: 5 ja HE 66/1988: 90.
[69] Ks. HE 120/1972: 5 ja HE 173/1997: 10.
[70] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 85-87.
[71] Ks. HE 120/1972: 5, HE 173/1997: 10 ja Leppiniemi 2006: 6:4.

voi johtua esimerkiksi siitä, että vaihto-omaisuushyödyke muuttuu käyttöomaisuudeksi tai liikeomaisuutta otetaan yksityiskäyttöön.[72]

Liiketapahtumat on merkittävä asian mukaan eri kirjanpitotileille, jotka sisältyvät KPL 2 luvun 2 §:n 2 momentissa tarkoitettuun tililuetteloon. Kirjaukset on tehtävä suorite- tai maksuperusteisesti siten kuin KPL 2:3:ssa säädetään. Liiketapahtumien kirjaaminen on KPL 2 luvun 4 §:n mukaan suoritettava sekä aikajärjestyksessä (peruskirjanpito) että asiajärjestyksessä (pääkirjanpito). Käteisellä rahalla suoritetun maksun kirjaaminen on tehtävä aikajärjestyksessä viipymättä päiväkohtaisesti, mikä voidaan toteuttaa kassakladiin päivittäin tehtävillä merkinnöillä.[73] Muut kirjaukset saadaan tehdä kuukausikohtaisesti tai muulla vastaavalla jaksotuksella neljän kuukauden kuluessa kalenterikuukauden tai jakson päättymisestä.[74] Samanlajisten liiketapahtumien kirjaukset voidaan suorittaa myös yhdistelmänä. Käteisenä rahana tapahtuneiden samanlajisten maksusuoritusten kirjaus on sallittua tehdä päiväkohtaisena yhdistelmänä.[75] Kirjausten on perustuttava päivättyihin ja numeroituihin tositteisiin, jotka todentavat liiketapahtuman KPL 2 luvun 5 §:ssä säädetyllä tavalla.

Liiketapahtumien kirjaamisen laiminlyönti voi ilmetä muun muassa siten, että 1) tilikauden aikainen kirjanpito jätetään pitämättä kokonaisuudessaan joltakin ajanjaksolta, esimerkiksi muun rikollisen toiminnan salaamiseksi, 2) tietyille tileille kuuluvia liiketapahtumia jätetään kirjaamatta, kuten a) käteismyynti jätetään kirjanpidon ulkopuolelle (ns. ohimyynti)[76] tai b) palkkamenot sekä siihen liittyvät työnantajasuoritukset ja sosiaalikulut jätetään kirjaamatta ns. pimeän palkanmaksun yhteydessä, tai 3) useita merkittäviä liiketapahtumia jätetään merkitsemättä kirjanpitoon, esimerkiksi myyntivoittojen salaamiseksi, vakuutuskorvausten pimittämiseksi tai sen salaamiseksi, että hyödykkeitä on siirretty toisen talousyksikön (kuten tytäryhtiön tai intressiyhteydessä olevan yrityksen) pysyvään käyttöön.

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[72] Ks. HE 120/1972: 5 ja HE 173/1997: 10-11.
[73] KPL 2 luvun 4 §:n 2 momentin sanamuotoa on muutettu (30.12.2004/1304). Aikaisemmin käytettiin ilmaisua "viivytyksettä" ja nykyisin "viipymättä".
[74] "Muulla vastaavalla jaksolla" on tarkoitettua 4 tai 5 viikkoa. Ks. tarkemmin perusteista HE 189/2000: 8-9 ja HE 126/2004: 16.
[75] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 130, 646 ja 654.
[76] Ks. Mäkelä 2001: 148.

Muutaman vähämerkityksellisen liiketapahtuman kirjauksen laiminlyönti ei tule kuitenkaan rangaistavaksi kirjanpitorikoksena, jos seuraustunnusmerkit eivät täyty. Seuraustunnusmerkki muodostaa soveltamiskynnyksen.[77] Laiminlyöntien tulee olla sellaisia, että ne vaikeuttavat oikean ja riittävän kuvan saamista kirjanpitovelvollisen toiminnan tuloksesta tai taloudellisesta asemasta kokonaisuudessaan. Yksittäiset ja vähäiset puutteet ja virheet eivät yleensä täytä seuraustunnusmerkkiä.[78]

Tilinpäätöksen sisältöä koskevat säännökset ovat olleet jatkuvassa muutostilassa. Vuoden 1973 kirjanpitolain 9 §:n 1 momentin alkuperäisten säännösten mukaan tilinpäätös käsitti tuloslaskelman ja taseen. Osakeyhtiön tilinpäätökseen kuului vuoden 1978 OYL 11 luvun 1 §:n mukaan tuloslaskelman ja taseen lisäksi toimintakertomus. Vuonna 1992 muutettiin näitä säännöksiä. KPL 9 §:n 1 momentin (1572/1992) mukaan tilinpäätös käsitti 1) tuloslaskelman, 2) taseen ja 3) niiden liitteenä ilmoitettavat tiedot. OYL 11 luvun 1 §:n 1 momentin (1573/1992) mukaan osakeyhtiön tilinpäätökseen kuuluivat a) kirjanpitolain mukainen tilinpäätös ja b) toimintakertomus.[79] Nykyisen KPL 3 luvun 1 §:n alkuperäisen säännöksen (1336/1997) mukaan tilikaudelta laadittava tilinpäätös sisälsi 1) tuloslaskelman, 2) taseen, 3) liitetiedot ja 4) toimintakertomuksen.[80] Vuonna 2001 lisättiin KPL 3 luvun 1 §:ään uusi 4 ja 5 momentti (1495/2001), joissa mainituilla edellytyksillä pienyritys voi jättää laatimatta toimintakertomuksen.[81] Tilinpäätöksen sisältöä koskevia KPL 3 luvun 1 §:n säännöksiä on muutettu sittemmin vuonna 2004 (1304/2004). Tässä yhteydessä tilinpäätöksestä erotettiin toimintakertomus, mutta siihen lisättiin rahoituslaskelma. Kirjanpitolain mukaan tilinpäätökseen kuuluvat nykyisin siten 1) tase, joka kuvaa tilinpäätöspäivän taloudellista asemaa, 2) tuloslaskelma, joka kuvaa tuloksen muodostumista, 3) rahoituslaskelma, jossa on annettava selvitys varojen hankinnasta ja niiden käytöstä tilikauden aikana, ja 4) taseen, tuloslaskelman ja rahoituslaskelman liitteenä olevat tiedot (liitetiedot). Rahoituslaskelman ovat tilinpäätökseensä velvollisia sisällyttämään vain KPL 3 luvun 1 §:n 3 momentissa tarkoitetut kirjanpitovelvolliset. Toimintakertomus on nykyisin erillinen asiakirja, joka liitetään tilin-

[77] Ks. HE 23/1985: 5, HE 66/1988: 90, Mäkelä 2001: 122 ja Rautio 2002: 1056.
[78] Ks. HE 53/2002: 34.
[79] Ks. tarkemmin HE 111/1992: 5-7, 14 ja 37. Tekstissä mainittu OYL:n säännös on sittemmin kumottu (1337/1997). Ks. HE 173/1997: 47.
[80] Ks. HE 173/1997: 15.
[81] Ks. perusteista HE 189/2000: 9-10.

päätökseen. Kaikkien kirjanpitovelvollisten ei tarvitse laatia toimintakertomusta. Yhteisölaeissa on erityissäännöksiä tilinpäätöksestä ja toimintakertomuksesta.[82]

Tunnusmerkkejä "laiminlyö tilinpäätöksen laatimista" säädettäessä ovat esikuvana olleet vuoden 1973 kirjanpitolain 3 luvun säännökset tilinpäätöksen laatimisesta.[83] Niitä vastaavia yleisiä säännöksiä tilinpäätöksen laatimisesta on nykyisin kirjanpitolain 3, 4 ja 5 luvussa. KPL 3 luvussa säädetään muun muassa tilinpäätöksen sisällöstä, yleisistä tilinpäätösperiaatteista sekä oikeiden ja riittävien tietojen vaatimuksesta. Tilinpäätöseriä koskevat määritelmät on sijoitettu KPL 4 lukuun. Arvostus- ja jaksotussäännökset ovat KPL 5 luvussa. Tilinpäätös on KPL 3 luvun 6 §:n mukaan laadittava neljän (4) kuukauden kuluessa tilikauden päättymisestä.

Kirjanpitorikoksen tunnusmerkistön tarkoittamana tilinpäätöksenä voitaneen pitää myös KPL 6 luvussa tarkoitettua konsernitilinpäätöstä[84] sekä kansainvälisten tilinpäätösstandardien mukaista tilinpäätöstä ja konsernitilinpäätöstä, joista säädetään kirjanpitolain 7a luvussa.[85]

Tunnusmerkistön edellyttämä tyyppitilanne koskee tilikauden aikaisen kirjanpidon ja tilinpäätöksen laatimisen laiminlyöntiä kokonaisuudessaan. Tilinpäätöksen laatimisen osittainen laiminlyönti voidaan lain esitöiden mukaan toteuttaa esimerkiksi jättämällä kirjanpitolainsäädännön vastaisesti tuottoja tai kuluja tuloslaskelmasta taikka saamisia tai velkoja taseesta.[86] Laiminlyönti voi ilmetä esim. siten, että tuloslaskelmasta tai taseesta puuttuu kirjanpitoasetuksessa tarkoitettujen kaavojen mukaisia ryhmiä tai eriä, vaikka yrityksellä on riidattomasti ollut niiden mukaisia merkittäviä liiketapahtumia. Joskus voi tosin olla tulkinnanvaraista, mihin erään jokin liiketapahtuma kuuluu varsin-

[82] Ks. tarkemmin HE 126/2004:17-18 ja 41.
[83] Ks. HE 23/1985: 5 ja HE 66/1988: 90.
[84] Ks. Koponen & Sahavirta 2004: 65 ja Tapani 2006: 551-552. Ks. lisäksi Rikoslain kokonaisuudistus 5/1984: 159.
[85] IFRS-standardien mukaisesta tilinpäätöksestä ja konsernitilinpäätöksestä ks. esim. HE 126/2004: 7-8 ja 26-27 sekä Halonen ym. 2006.
[86] Ks. HE 23/1985: 5 ja Prepula 1985: 6.

kin, kun kirjanpitolaissa ja -asetuksessa ei ole määritelty kaikkien erien sisältöä. Tunnusmerkistön voi täyttää myös liitetietojen ilmoittamatta jättäminen.[87]

Kirjanpitolain 3 luvun 1 §:ssä säädetään tilinpäätöksen sisällöstä. Tämän säännöksen mukaan tilinpäätökseen eivät kuulu tase-erittelyt,[88] kuten edellä on selvitetty. KPL 3 luvun 13 §:n mukaan tilinpäätöstä varmentamaan on laadittava tase-erittelyt, mutta niitä ei ilmoiteta rekisteröitäväksi kirjanpitolain nojalla. KPL 3 luvun 8 §:n säännökset eivät edellytä, että tase-erittelyt otettaisiin edes tasekirjaan.[89] Käytännössä tase-erittelyt laaditaan omaksi asiakirjavihoksi, mutta ne voidaan laatia pelkästään koneelliselle tietovälineelle KPA 5 luvun 3 §:n mukaisesti. Tase-erittelyt on päivättävä ja niiden laatijoiden allekirjoitettava tai varmennettava koneelliselle tietovälineelle KPA 5 luvun 4 §:ssä säädetyllä tavalla. Tase-erittelyiden laatijana ja allekirjoittajana toimii yleensä joku yrityksen kirjanpidosta huolehtiva toimihenkilö, joka ei kuulu yrityksen ylimpään johtoon. Tilinpäätöksen ja toimintakertomuksen allekirjoittamisesta säädetään KPL 3 luvun 7 §:ssä. Tilinpäätöksen ja toimintakertomuksen ovat velvollisia allekirjoittamaan muun muassa yhteisön hallitus ja toimitusjohtaja, jotka voivat esittää KPL 3 luvun 7 §:n 2 momentissa tarkoitetun eriävän mielipiteen, joka sisällytetään tilinpäätökseen.[90] Tase-erittelyitä ei liitetä nykyisin tilinpäätökseen, vaan ne jäävät yrityksen sisäisiksi asiakirjoiksi. Tase-erittelyiden laatimatta jättäminen ei ole kirjanpitorikoksen tunnusmerkistössä tarkoitettua tilinpäätöksen laatimisen laiminlyöntiä. Muu tulkinta merkitsisi "tilinpäätös" käsitteen laventamista kirjanpitolain 3 luvun 1 §:ssä säädetyn merkityksen ulkopuolelle.[91] Tase-erittelyiden laatimisen laiminlyönti saattoi tulla rangaistavaksi vuoden 1973 kirjanpitolain 38a §:ssä tarkoitettuna kirjanpitorikkomuksena, mutta nykyisen KPL 8 luvun 4 §:ssä tase-erittelyiden laatimisen laiminlyöntiä ei ole enää säädetty rangaistavaksi. Rikossäännösten tunnusmerkistöissä on selvä puute. Tase-erittelyiden laatimatta jättäminen ei vääristä tilinpäätöstä, mutta se heikentää informaatioarvoa yrityksen sisäisessä käytössä ja tilintarkastuksessa. Tase-erittelyt ovat myöhemmin laadittavissa

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[87] Ks. HE 53/2002: 33, jossa on mainittu puuttuvista liitetiedoista esimerkkeinä merkittävä poikkeaminen suunnitelman mukaisista poistoista tai liiketoiminnan laajuuteen nähden merkittävä omaisuuden panttaaminen.
[88] Ks. HE 126/2004: 17-19.
[89] Ks. Kaisanlahti 1999: 459.
[90] Ks. Kyläkallio, Irola & Kyläkallio 2002: 846.
[91] Ks. tase-erittelyistä Järvinen, Prepula, Riistama & Tuokko 2000: 361-367.

luotettavalla tavalla tai suoraan tulostettavissa kirjanpito-ohjelman asianomaisella toiminnolla, jos kirjanpitoaineisto on muutoin kunnossa.

Kirjausten suorittaminen ja tilinpäätöksen laatiminen KPL 2 luvun 4 §:n tai 3 luvun 6 §:n säännösten vastaisesti jossain määrin myöhässä ei useinkaan toteuta kirjanpitorikoksen tunnusmerkistöä, koska seuraustunnusmerkit eivät tällöin yleensä täyty. Sanotut määräajat ilmaisevat laiminlyöntirikoksen täyttymisajankohdan,[92] josta voi alkaa kulua RL 8 luvun 2 §:n 1 momentin mukaisesti syyteoikeuden vanhentumisaika. Liiketapahtumien kirjausten tekeminen KPL 2 luvun 4 §:n 2 momentissa säädettyjen määräaikojen jälkeen myöhästyneenä on säädetty rangaistavaksi KPL 8 luvun 4 §:ssä tarkoitettuna kirjanpitorikkomuksena, jos rikkomus ei ole vähäinen. Kirjanpitorikoksen ja -rikkomuksen systematiikkaan kuuluu, että vähäiset laiminlyönnit jäävät rankaisematta. Vähäistä suuremmat laiminlyönnit rangaistaan kirjanpitorikkomuksena. Kirjanpitorikoksessa täytyy olla kysymys niin merkittävästä laiminlyönnistä, että seuraustunnusmerkki täyttyy. Määräaikainen kirjaaminen on erityisen tärkeää silloin, kun yrityksen myyntituloista huomattava määrä muodostuu käteismyynnistä ja kun menoja maksetaan merkittävässä määrin käteisellä. Tällöin voidaan painottaa sitä, että käteisellä rahalla suoritetut maksut kirjataan viipymättä ja päiväkohtaisesti. Asiantila on kirjanpidon luotettavuuden kannalta todella ongelmallinen, mikäli kassakladi laaditaan näissä olosuhteissa pahoin myöhässä vasta jälkikäteen.[93] Puutteellinen dokumentaatio voi aiheuttaa virheellisiä kirjauksia, jos muistikuvat eivät ole korrekteja. Tilanne on toisenlainen, jos kaikki tai lähes kaikki maksutapahtumat suoritetaan pankin välityksellä ja jos käteiskassa on vähäinen ja käteisellä rahalla suoritetaan harvoin vähäisiä maksuja.[94] Rangaistusarvoltaan olisi pidettävä erillään sellainen tapaus, jossa kirjaukset joltakin kaudelta tapahtuvat jossain määrin myöhässä, ja se tilanne, jossa kirjauksia ei tehdä lainkaan eli niiden tekeminen laiminlyödään totaalisesti.

[92] Ks. Rikoslain kokonaisuudistus 5/1984: 161.
[93] Ks. HE 189/2000: 8-9 ja Mäkelä 2001: 148-149.
[94] Ks. Heikkonen 1974: 133.

2.2.2. Väärät ja harhaanjohtavat tiedot

Toisena tekotapana on mainittu väärien tai harhaanjohtavien tietojen merkitseminen kirjanpitoon. Vääriä tai harhaanjohtavia tietoja voidaan merkitä yhtäläisesti tilikauden aikaisen kirjanpidon kuin tilinpäätöksen laatimisen yhteydessä.[95]

Väärällä tiedolla on tarkoitettu tosiasioiden vastaista tietoa.[96] Tiedon virheellisyyttä arvioidaan informaation hyväksikäyttäjän, kuten kirjanpitovelvollisen sidosryhmien, näkökulmasta.[97] Tätä perspektiiviä ilmentää erityisesti seuraustunnusmerkki, jonka mukaan ratkaisevaa on oikean ja riittävän kuvan saaminen kirjanpitovelvollisen toiminnan tuloksesta tai taloudellisesta asemasta. Tuloslaskelman ja taseen tietojen oikeellisuuden arvioinnissa on otettava huomioon myös liitetiedot, koska ne muodostavat kokonaisuuden. Oikean ja riittävän kuvan saamiseksi tarpeelliset lisätiedot ilmoitetaan liitetiedoissa.[98] Kysymys on siitä, että väärä tieto antaa informaation vastaanottajalle totuudesta poikkeavan kuvan todellisuuden asiantilasta tai tapahtumasta.[99]

Tyypillistä väärien tietojen merkitsemistä kirjanpitoon on tekaistuihin, väärennettyihin tai muutoin tosiasioita vastaamattomiin tositteisiin perustuvat kirjaukset.[100] Käytännössä esiintyvinä tapauksina voidaan mainita muun muassa seuraavat menettelyt: 1) tekaistun kassatositteen laatiminen, esim. osakepääoman maksun osoittamiseksi, 2) tekaistujen selvitysten nojalla tehty perusteeton käyttöomaisuuden arvonkorotus selvitystilan välttämiseksi taikka yritysostajan tai rahoittajan erehdyttämiseksi, 3) vaihto-omaisuuden kirjaaminen väärennettyjen tai tekaistujen inventaariluetteloiden perusteella ja 4) kuluvaraston saamiseksi kriittisen tilinpäätöksen välttämistä varten laaditaan väärennetty tai tekaistu ostolasku, mikä hyvitetään seuraavalla tilikaudella.

[95] Ks. HE 23/1985: 6, HE 55/1988: 90 ja Prepula 1985: 6.
[96] Ks. HE 23/1985: 6, Rikoslain kokonaisuudistus 5/1984: 159 ja Mäkelä 2001: 124.
[97] Ks. Mäkelä 2001: 124.
[98] Liiketapahtumien kirjausten arvioinnissa on otettava huomioon muun muassa korjausmerkinnät, muistiotositteet ja muu tositeaineisto.
[99] Ks. Lehtonen 1986: 142-144.
[100] Ks. HE 23/1985: 6, HE 66/1988: 90 ja Rikoslain kokonaisuudistus 5/1984: 159.

Väärien tietojen merkitsemistä on myös saman liiketapahtuman kaksin- tai useampikertainen kirjaaminen,[101] esimerkiksi ensinnä lähetteellä ja sen jälkeen laskulla sekä lopuksi maksutositteella tai niiden jäljenteellä. Tavanomaista väärien tietojen merkitsemistä on liiketapahtuman (menon, tulon, rahoitustapahtuman taikka niiden oikaisu- ja siirtoerän) kirjaaminen virheellisen suuruisena.[102] Oman ryhmänsä muodostaa ns. kuittikauppa, jossa ostetaan mm. pimeän palkanmaksun, yksityisottojen tai laittoman voitonjaon peittämiseksi totuudenvastaisia laskuja tai maksutositteita toiselta yritykseltä, joka ei välttämättä harjoita mitään toimintaa tai jota ei ole edes olemassa.

Käytännössä esiintyviä yleisiä väärien tietojen merkitsemistä ovat lisäksi seuraavat menettelytavat: 1) meno kirjataan toiselle talousyksikölle kuuluvan tositteen perusteella (kohdistamisongelma)[103], 2) tuloja kirjataan menoiksi, 3) suoritetaan tarkoituksellisia lasku- ja siirtovirheitä, 4) käytetään virheellisiä sisäisiä tositteita, esim. valuuttakurssimuutoksen tekemiseksi, 5) liiketapahtumien kirjaaminen täysin virheellisillä nimikkeillä väärille tileille, esim. tuloksen parantamiseksi realisoituneita menoja ei kirjata tulosvaikutteisesti, vaan ne merkitään saatuina lainoina vieraaseen pääomaan, ja 6) riidattomia vuosikuluja, jotka ovat rahamääriltään suuria, aktivoidaan pitkävaikutteisiksi menoiksi tappiollisen tuloksen muuttamiseksi voitolliseksi.[104]

Harhaanjohtavalla tiedolla on ymmärretty sinänsä totuudenmukaista tietoa, joka asiayhteytensä vuoksi tai muusta syystä antaa tapahtumista todellisuutta vastaamattoman kuvan.[105] Tällainen "harhaanjohtavien tietojen" määrittely tarkoittaa tosiasiallisesti samaa kuin "väärä tieto". Kummassakin on kysymys siitä, että asianomainen tieto antaa informaation käyttäjille erehdyttävän kuvan jostakin asiantilasta tai tapahtumasta.[106]

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[101] Ks. HE 23/1985: 6 ja HE 66/1988: 90.

[102] Ks. Heikkonen 1974: 128 ja Rikoslain kokonaisuudistus 5/1984: 159.

[103] Ks. KKO 2004:33, jossa oli kysymys siitä, että kommandiittiyhtiön vastuunalainen yhtiömies oli kahden tilikauden aikana merkinnyt määräysvallassaan olleen osakeyhtiön henkilöstön palkkamenot kommandiittiyhtiön kuluiksi.

[104] Erilaisista virheellisistä menettelytavoista ks. lisäksi Heikkonen 1974: 128-129, Mäkelä 2001: 143-148 ja Salminen 1998: 133-152.

[105] Ks. HE 23/1985: 6 ja HE 66/1988: 90.

[106] Koposen ja Sahavirran esittämän laajentavan tulkinnan mukaan tunnusmerkit “merkitsee kirjanpitoon harhaanjohtavia tietoja” tarkoittaisivat myös puutteellisiin tositteisiin perustuvia kirjauksia. Heidän mukaansa kirjaus “harhauttaa” luottamaan siihen, että kirjaus perustuisi asianmukaisiin tositteisiin. Ks. Koponen & Sahavirta 2004: 68. Ks. lisäksi Tapani 2006: 552.

Lain esitöiden mukaan mm. virheelliseen jaksottamiseen tai arvostamiseen saattaa liittyä harhaanjohtavien tietojen antamista.[107] Harhaanjohtavia tietoja voitaisiin käyttää esim. tase-erittelyissä kuvattaessa vaihto- tai käyttöomaisuuden laatua.[108] Jossakin tapauksessa kysymys voi olla aidosta arviointi- tai arvostuserimielisyydestä, mitä epäselvässä tai tulkinnanvaraisessa tilanteessa ei voitane pitää harhaanjohtavan tai väärän tiedon antamisena, jos kirjanpitovelvollinen on tehnyt ratkaisunsa hyväksyttävinä pidettävien seikkojen nojalla. Esimerkiksi jaksottamissäännösten soveltaminen voi olla hyvin tulkinnanvaraista. Tällaisissa olosuhteissa olisi syytä suhtautua pidättyväisesti jaksottamis- ja arvostamisvirheiden luokittelemiseksi "harhaanjohtavaksi" tai "vääräksi" tiedoksi.[109] Virheiden pitäisi olla todella merkittäviä, jotta ne voitaisiin luokitella harhaanjohtaviksi tai vääriksi. Säännönmukaisesti tällöin on kysymys selvästi tosiasioiden vastaisiin tai tekaistuihin seikkoihin perustuvista ilmaisuista tai merkinnöistä, joiden suhteen ei ole noudatettu hyvää kirjanpitotapaa. Oikean ja riittävän kuvan antamiseksi on suositeltavaa ilmoittaa tarpeelliset lisätiedot liitetiedoissa, kuten KPL 3 luvun 2 §:ssä edellytetään.

2.2.3. Kirjanpitoaineiston hävittäminen, kätkeminen tai vahingoittaminen

Rangaistavaksi on säädetty lisäksi kirjanpitoaineiston hävittäminen, kätkeminen tai vahingoittaminen. Kirjanpitoaineistolla on tarkoitettu muun muassa kirjanpitokirjoja, tositteita ja liiketapahtumia koskevaa kirjeenvaihtoa.[110]

Hävittämiseksi voitaneen katsoa kirjanpitoaineiston kokonaan tuhoaminen, mikä voidaan suorittaa polttamalla paperipohjainen kirjanpitoaineisto tai heittämällä aineisto mereen.[111] Kirjanpitoaineiston kätkemisenä voidaan pitää aineiston piilottamista tai sen säi-

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Luontevampaa saattaisi olla katsoa tositteettomat kirjaukset tunnusmerkistön 1) kohdan mukaiseksi laiminlyönniksi, jos liiketapahtumat ovat todellisia.

[107] Ks. HE 23/1985: 6, HE 66/1988: 90 ja Rikoslain kokonaisuudistus 5/1984: 159.

[108] Ks. HE 23/1985: 6 ja Rikoslain kokonaisuudistus 5/1984: 159. Ks. samoin Mäkelä 2001: 124 ja Prepula 1985: 6.

[109] Ks. Heikkonen 1974: 128, Jareborg 1978: 183 ja Löfmarck 1986: 322-324.

[110] Ks. HE 23/1985: 6 ja HE 66/1988: 90.

[111] Ks. HE 66/1988: 124 ja Mäkelä 2001: 125. Raution mukaan hävittäminen viittaa aineiston fyysiseen tuhoamiseen. Ks. Rautio 2002: 1056.

lytyspaikan salaamista.[112] Kätkemiseksi on katsottu myös kirjanpitoaineiston toimittaminen sellaisen asiamiehen haltuun, jota on kielletty luovuttamasta kirjanpitoa asianomaiselle viranomaiselle.[113] Vahingoittamista voi olla kirjanpitomerkintöjen tekeminen epäselviksi lisämerkinnöin tai virheellisin korjauksin ja kirjanpitoaineiston saattaminen siten mahdottomaksi lukea.[114] Vahingoittamiseksi katsotaan myös kirjanpitoaineiston vieminen paikkaan, jossa se on alttiina turmeltumiselle.[115] Kirjanpitoaineisto voidaan hävittää, kätkeä tai vahingoittaa vain osittain. Tunnusmerkistö täyttyy silloin, kun jäljelle jääneestä aineistosta ei saada vaikeuksitta oikeaa ja riittävää kuvaa kirjanpitovelvollisen toiminnan tuloksesta tai taloudellisesta asemasta.[116]

Kirjanpidon laatiminen ja kirjanpitoaineiston säilyttäminen on vanhastaan ollut mahdollista tietotekniikkaa (koneellisia tietovälineitä) hyväksi käyttämällä.[117] Aluksi tämä oli mahdollista kirjanpitolautakunnan poikkeusluvalla.[118] Nykyisen kirjanpitolain säätämisen yhteydessä poistettiin poikkeuslupamenettely ja sallittiin koko kirjanpitoaineiston säilyttäminen digitaalisessa muodossa tai muulla tietovälineellä kuin paperilla. Ainoan poikkeuksen muodostaa tasekirja, joka on säilytettävä fyysisenä asiakirjana.[119] Kirjanpitoaineisto voidaan nykyisin säilyttää sähköisessä muodossa myös toisessa EU:n jäsenvaltiossa, jos aineistoon on jatkuva tietoliikenneyhteys (on line -yhteys).[120] Kirjanpitorikoksen tunnusmerkistössä käytetty “kirjanpitoaineiston” käsite on avoin (abstrakti) ilmaisu, jonka merkityssisältö määräytyy kirjanpitolainsäädännön nojalla.[121] Kirjanpitoaineistolla tarkoitetaan siten yhtä hyvin paperialustalla kuin digitaalisessa muodossa olevia tositteita, kirjanpitomerkintöjä ja muuta aineistoa. Näistä lähtökohdista käsin ei olisi perusteltua sellainen supistava tulkinta, jonka mukaan kirjanpitoaineiston vahin-

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[112] Ks. HE 23/1985: 6, HE 66/1988: 90 ja Prepula 1985: 6.
[113] Ks. Rikoslain kokonaisuudistus 5/1984: 160.
[114] Ks. HE 23/1985: 6, HE 66/1988: 90, Mäkelä 2001: 125 ja Rautio 2002: 1056.
[115] Ks. HE 23/1985: 6, Lehtonen 1990a: 126 ja Mäkelä 2001: 125.
[116] Ks. HE 53/2002: 35.
[117] Ks. HE 190/1989: 1-3.
[118] Ks. vuoden 19973 KPL 8, 24 ja 35 §, jotka oli muutettu 17.8.1978 annetulla lailla.
[119] Ks. HE 173/1997: 13-14.
[120] Ks. HE 126/2004: 17.
[121] Ks. Lehtonen 1986: 179-180.

goittaminen olisi mahdollista vain “esinevahingon” muodossa.[122] Tällaiseen rajaukseen ei viitata lain esitöissä.[123]

2.3. Seuraustunnusmerkki

Seuraustunnusmerkit lisättiin vuoden 1973 kirjanpitolain 38 §:n 2 momentissa tarkoitetun kirjanpitorikoksen tunnusmerkistöön vuoden 1985 uudistuksen yhteydessä. Kysymys on kirjanpitorikoksen rangaistavuuden edellytyksestä, jonka tulee toteutua, jotta rikoksen tunnusmerkistö täyttyisi. Rikoksentekijän käyttäytymisen, joka toteutti jonkun tekotapatunnusmerkin mukaisen menettelyn, tuli lisäksi olennaisesti vaikeuttaa oikean ja riittävän kuvan saamista kirjanpitovelvollisen toiminnan taloudellisesta tuloksesta tai taloudellisesta asemasta.[124]

Samat seuraustunnusmerkit otettiin RL 30 luvun 9 §:ssä tarkoitetun kirjanpitorikoksen tunnusmerkistöön rikoslain kokonaisuudistuksen ensimmäisessä vaiheessa. Tekotapatunnusmerkin täyttävä käyttäytyminen oli rangaistavaa RL 30 luvun 9 §:n alkuperäisen tunnusmerkistön mukaan vain sillä edellytyksellä, että niiden avulla olennaisesti vaikeutettiin oikean ja riittävän kuvan saamista kirjanpitovelvollisen toiminnan taloudellisesta tuloksesta tai taloudellisesta asemasta. Kirjanpitorikos tuli kysymykseen vain siinä tapauksessa, että tekijän tunnusmerkistön mukainen tekotapa toteutti myös seuraustunnusmerkit.[125]

Vuoden 2003 uudistuksen yhteydessä on RL 30 luvun 9 §:n seuraustunnusmerkkien joukosta poistettu olennaisuusvaatimusta koskenut termi “olennaisesti”. Tämä muutos liittyi uusien törkeää kirjanpitorikosta koskevien kvalifiointiperusteiden säätämiseen. Kirjanpidon laiminlyöntien tai virheellisyyksien on edelleen oltava sellaisia, että ne

[122] Menneeseen aikaan kuulu ratkaisu KKO 1985 II 60, jossa katsottiin, että tietokoneen muistiin sähköisesti, magneettisesti tai muulla tavoin näkymättömään muotoon taltioidut tiedostot eivät olleet RL 36 luvun 5 §:ssä tarkoitettuja asiakirjoja.
[123] Kirjanpitolainsäädäntöön perustuvan “kirjanpitoaineiston” käsitteen alaan kuuluvat myös RL 35 luvun 1 §:n 2 momentissa tarkoitettu tietovälineelle tallennettu tieto ja muu tallennus.
[124] Ks. HE 23/1985: 6 ja LaVM 7/1985: 2.
[125] Ks. HE 66/1988: 91.

vaikeuttavat oikean ja riittävän kuvan saamista kirjanpitovelvollisen a) toiminnan tuloksesta[126] tai b) taloudellisesta asemasta. Nämä seuraustunnusmerkit muodostavat jatkossakin soveltamiskynnyksen, jonka täyttyminen on kirjanpitorikoksen rangaistavuuden edellytys.[127]

Lain esitöissä on katsottu, että kirjanpidon antaman kuvan oikeellisuus ja riittävyys arvioidaan kirjanpitolain ja -asetuksen sekä hyvän kirjanpitotavan pohjalta.[128] Hyvä kirjanpitotapa saa sisältönsä kirjanpitokäytännön ja -teorian muovaamista konventioista, jotka kehittyvät jatkuvasti. Nämä tapanormit voivat koskea kirjanpidon muotoa ja aineellista sisältöä.[129] Kirjanpitolautakunnan antamilla yleisohjeilla ja lausunnoilla on keskeinen asema käytännön ohjaamisessa.[130] Seuraustunnusmerkkien arvioinnissa on kysymys siitä, antaako kirjanpito hyvän kirjanpitotavan tuntijalle riittävän ja oikean kuvan kirjanpitovelvollisen tuloksesta ja taloudellisesta asemasta.[131] Toiminnan tuloksella tarkoitetaan informaatiota, joka esitetään pääasiassa tuloslaskelmassa, kun taas taloudellista asemaa koskeva informaatio esitetään pääasiassa taseessa,[132] kuten nykyisin säädetään tilinpäätöksen sisältöä koskevassa KPL 3 luvun 1 §:n 1 momentissa. KPL 1 luvun 3 §:ssä tarkoitettu hyvä kirjanpitotapa koskee sekä tilikauden aikaista juoksevaa kirjanpitoa että tilinpäätöstä.[133]

Kirjanpitorikoksen seuraustunnusmerkkien on katsottu vastaavan vuoden 1973 kirjanpitolain 9 §:n 2 momenttiin lisättyä säännöstä, jonka mukaan tilinpäätöksen tuli antaa oi-

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[126] Seuraustunnusmerkeissä puhutaan nykyisin vain pelkästä "toiminnan tuloksesta" aikaisemman ilmaisun "toiminnan taloudellisen tuloksen" sijasta. Kysymys on kielellisestä täsmennyksestä, jolla tunnusmerkistö on saatettu vastaamaan KPL 3 luvun 2 §:ssä käytettyä ilmaisua. Ks. HE 53/2002: 34.

[127] Ks. HE 53/2002: 34.

[128] Ks. HE 23/1985: 6 ja HE 66/1988: 91. Ks. samoin Leppiniemi 2000: 31 ja 100, Rautio 2002: 1057, Tuokko 1996: 171–172 ja Yli-Fossi 2004: 31.

[129] Ks. HE 120/1972: 4, HE 111/1992: 14–15, HE 173/1997: 8 ja Rikoslain kokonaisuudistus 5/1984: 158. Ks. myös Järvinen, Prepula, Riistama & Tuokko 2000: 52 ja Leppiniemi 2000: 17–18.

[130] Ks. HE 173/1997: 8 ja Leppiniemi 2000: 100.

[131] Ks. HE 23/1985: 6, Järvinen, Prepula, Riistama & Tuokko 2000: 572 ja Rikoslain kokonaisuudistus 5/1984: 160.

[132] Ks. Jänkälä & Kaisanlahti 2005: 234, Mäkelä 2001: 127 ja Rikoslain kokonaisuudistus 5/1984: 160.

[133] Ks. HE 173/1997: 8 ja Leppiniemi 2000: 15.

keat ja riittävät tiedot kirjanpitovelvollisen toiminnan tuloksesta ja taloudellisesta asemasta.[134] Tämä lisäys sisälsi hyvää kirjanpitotapaa koskevaa yleisluonteista säännöstä täsmentävän vaatimuksen. Vuoden 1973 KPL 9 §:n 2 momenttia vastaava säännös sisältyy nykyisen KPL 3 luvun 2 §:ään. Tämä säännös oikeasta ja riittävästä kuvasta koskee tilinpäätöstä ja toimintakertomusta. Näissä säännöksissä on lisäksi säädetty EY:n tilinpäätösdirektiivin 2(4) artiklan mukaisesti, että oikean ja riittävän kuvan saamiseksi tarpeelliset lisätiedot on ilmoitettava liitetiedoissa. Tuloslaskelman ja taseen toiminnan tuloksesta tai taloudellisesta asemasta antaman kuvan puutteita voidaan kompensoida liitetiedoissa esitettävillä lisätiedoilla.[135]

Seuraustunnusmerkeillä rajataan säännöksen soveltamisalan ulkopuolelle kirjanpidon antaman kokonaiskuvan kannalta vähäiset teot ja laiminlyönnit.[136] Yksittäiset ja vähäiset puutteet ja virheet eivät yleensä voi vaikeuttaa oikean ja riittävän kuvan saamista kirjanpitovelvollisen toiminnan tuloksesta tai taloudellisesta asemasta kokonaisuudessaan.[137]

2.4. Tahallisuusvaatimus

Tekijän käyttäytymisen tulee olla tahallista. Tahallisuusvaatimus oli nimenomaisesti sanottu RL 30 luvun 9 §:n alkuperäisessä tunnusmerkistössä. Vuoden 2003 uudistuksen yhteydessä tunnusmerkistöstä poistettiin ilmaisu "tahallaan" (31.1.2003/61). Tällä poistamisella ei ole ollut tarkoitus muuttaa vallitsevaa oikeustilaa. Perusteluissa katsottiin vallitsevan käsityksen mukaisesti, että rikoslain säännösten rikkominen on rangaistavaa vain tahallisena, jollei laissa nimenomaisesti mainita tuottamusta.[138] Rikosoikeuden yleisiä oppeja koskevan lainsäädännön uudistamisen jälkeen on yksiselitteistä, että kir-

[134] Ks. HE 111/1992: 14–15 ja HE 173/1997: 15. Ks. samoin HE 53/2002: 34 ja Leppiniemi 2000: 19. Tekstissä sanotun lisäyksen esikuvana on ollut Euroopan yhteisön neljäs yhtiöoikeudellinen direktiivi (78/660/ETY), jonka 2 artiklan 3 kohdan mukaan tilinpäätösinformaation ensisijainen tavoite on antaa oikea ja riittävä kuva (true and fair view) yhtiön varoista, veloista, taloudellisesta asemasta ja tuloksesta. Ks. HE 111/1992: 7, 9-10 ja 14 sekä HE 173/1997: 15.
[135] Ks. HE 173/1997: 16.
[136] Ks. HE 23/1985: 6, HE 66/1988: 91 ja Rautio 2002: 1057.
[137] Ks. HE 53/2002: 34.
[138] Ks. HE 53/2002: 33.

janpitorikoksen rangaistavuus edellyttää tahallisuutta. Tällöin lisättiin RL 3 luvun 5 §:n 2 momenttiin säännös siitä, että rikoslaissa tarkoitettu teko on vain tahallisena rangaistava, jollei toisin säädetä.[139] Kirjanpitorikoksen rangaistavuus edellyttää siten edelleenkin tahallisuutta.[140] Tekijän tahallisuuteen tulee ulottua myös seuraustunnusmerkkeihin.[141]

3. Tuottamuksellinen kirjanpitorikos

RL 30 luvun 10 §:ssä tarkoitettu tuottamuksellinen kirjanpitorikos eroaa kirjanpitorikoksesta (RL 30:9) ensinnäkin syyksiluettavuuden asteen suhteen. Tämän lisäksi näiden tunnusmerkistöjen välillä on eräitä muitakin eroja, mutta monissa suhteissa ne ovat saman sisältöiset. Molempien rikosten tekijäpiiri on sama.

3.1. Tekotavat

Tuottamuksellisille kirjanpitorikokselle on säädetty kaksi tekotapaa: 1) liiketapahtumien kirjaamisen tai tilinpäätöksen laatimisen laiminlyönti kokonaan tai osaksi ja 2) kirjanpitoaineiston hävittäminen, hukkaaminen tai vahingoittaminen.

Tuottamuksellisen kirjanpitorikoksen (RL 30:10) ja kirjanpitorikoksen (RL 30:9) tekotapatunnusmerkkien merkittävin ero on siinä, että tuottamuksellisen kirjanpitorikoksen tunnusmerkistössä ei ole mainittu RL 30 luvun 9 §:n 2) kohdassa tarkoitettua väärän tai harhaanjohtavan tiedon merkitsemistä kirjanpitoon.[142]

Törkeästä tuottamuksesta tapahtunut väärien tai harhaanjohtavien tietojen merkitseminen kirjanpitoon oli rangaistavaa vuoden 1973 kirjanpitolain 38a §:ssä tarkoitettuna kir-

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[139] Ks. Frände 2005: 63 ja HE 44/2002: 73–75.
[140] Seuraustahallisuudesta säädetään nykyisin RL 3 luvun 6 §:ssä. Ks. esim. LaVM 28/2002: 9–10.
[141] Ks. LaVM 7/1985: 2, Koponen & Sahavirta 2004: 76 ja Mäkelä 2001: 141.
[142] Ks. HE 66/1988:91 ja Rautio 2002: 1058.

janpitorikkomuksena.[143] Sittemmin se saattoi tulla rangaistavaksi nykyisen KPL 8 luvun 4 §:n 3) kohdan alkuperäisessä säännöksessä tarkoitettuna käyttäytymisenä. Kysymys oli tilinpäätöksen tai konsernitilinpäätöksen laatimisesta vastoin KPL 3 luvun 2 §:ää, mikä tunnusmerkistö voitiin toteuttaa merkitsemällä vääriä tai harhaanjohtavia tietoja tilinpäätökseen.[144] Vuoden 2003 uudistuksen yhteydessä on poistettu KPL 8 luvun 4 §:n aikaisempi 3) kohta kirjanpitorikkomuksen tunnusmerkistöstä (31.1.2003/62). Tarkoituksena oli kirjanpitorikoksen (RL 30:9) ja kirjanpitorikkomuksen tunnusmerkistöjen päällekkäisyyden poistaminen.[145] Tämän seurauksena törkeästä huolimattomuudesta tapahtunut väärän tai harhaanjohtavan tiedon merkitseminen kirjanpitoon jää kokonaan rankaisematta.

Toinen ero kirjanpitorikoksen ja tuottamuksellisen kirjanpitorikoksen tekotapatunnusmerkkien välillä on lähinnä kielellinen. RL 30 luvun 9 §:n 3) kohdassa puhutaan kirjanpitoaineiston "kätkemisestä", kun taas saman luvun 10 §:n 2) kohdassa käytetään ilmaisua "hukkaaminen".[146] Hukkaaminen kuvaa paremmin huolimattomuudesta tapahtunutta tekoa kuin termi kätkeminen.[147]

3.2. Syyksiluettavuus

RL 30 luvun 10 §:ssä tarkoitetun tuottamuksellisen kirjanpitorikoksen osalta riittää teon rangaistavuuteen, että tekijä osoittaa törkeää huolimattomuutta. Rajanveto tahallisen ja tuottamuksellisen kirjanpitorikoksen välillä määräytyy syyksiluettavuuden yleisten periaatteiden mukaan.[148] Törkeän huolimattomuuden arvioinnista säädetään nykyisin rikoslain 3 luvun 7 §:ssä.[149]

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[143] Ks. HE 66/1988: 91.
[144] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 568.
[145] Ks. LaVM 18/2002:5.
[146] Ks. HE 66/1988: 91.
[147] Ks. Rautio 2002: 1058. KKO 1998:39: Kirjanpitoaineistoa säilytettiin konkurssiin menneen yhtiön tiloissa. Siellä toimitetun huutokaupan yhteydessä kirjanpitoaineisto hävisi. Konkurssipesän uskottu mies, joka oli vastuussa konkurssivelallisen kirjanpitoaineiston säilyttämisestä, tuomittiin rangaistukseen tuottamuksellisesta kirjanpitorikoksesta.
[148] Ks. HE 66/1988: 91, Rautio 2002: 1058 ja Rikoslain kokonaisuudistus 5/1984: 162.
[149] Ks. tarkemmin HE 44/2002: 93-105.

Tekotapatunnusmerkkien 1) kohdassa tarkoitettuja liiketapahtumien kirjaamisen tai tilinpäätöksen laatimisen laiminlyöntejä tapahtuu käytännössä törkeästä huolimattomuudesta lähinnä silloin, kun kirjanpito on uskottu jollekulle kirjanpitovelvollisen puolesta toimivalle. Esimerkiksi kirjanpitovelvollinen on valinnut kirjanpitoa tekemään henkilön, jolla ei ole tähän minkäänlaisia edellytyksiä.[150] Kirjanpitovelvollisen tai hänen edustajansa vastuu perustuu tällöin valintavastuuseen.

Kirjanpitoaineiston törkeästä huolimattomuudesta tapahtuneella vahingoittamisella tarkoitetaan esim. sellaisia tapauksia, joissa kirjanpitoaineistoa ei suojata riittävän hyvin sen säilytyspaikassa. Tällöin kysymys voi kirjanpitoaineisto jättämisestä paikkaan, jossa se on alttiina esim. vesivahingolle huonokuntoisessa ulkorakennuksessa tai ullakolla. Hävittäminen voi tapahtua törkeästä huolimattomuudesta myös silloin, kun kirjanpitoa siirretään paikasta toiseen seurauksin, että se unohtuu tai hukkaantuu johonkin.[151] Kirjanpito voidaan hukata törkeästä huolimattomuudesta lisäksi silloin, kun kirjanpitoa ei ole hävitetty, mutta kirjanpitovelvollinen ei kuitenkaan tiedä kirjanpidon säilytyspaikkaa.[152]

3.3. Seuraustunnusmerkit

Vuoden 2003 uudistuksen (31.1.2003/61) yhteydessä on RL 30 luvun 9 §:n tunnusmerkistöstä poistettu olennaisuusvaatimusta koskeva seuraustunnusmerkki. Olennaisuuden kriteeri siirtyi osittain RL 30 luvun 9 §:ssä tarkoitetun kirjanpitorikoksen perustekomuodon ja uuden RL 30 luvun 9a §:ssä tarkoitetun törkeän kirjanpitorikoksen väliseen rajanvetoon. Tämän uudistuksen yhteydestä ei poistettu tuottamuksellisen kirjanpitorikoksen seuraustunnusmerkkien joukosta olennaisuuden vaatimusta, joten se säilyi ennallaan. Tuottamuksellisen kirjanpitorikoksen rangaistavuuden edellytyksenä on siten edelleen, että tekotapatunnusmerkkien mukaisella käyttäytymisellä olennaisesti vaikeutetaan oi-

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[150] Ks. HE 23/1985: 5–6 ja HE 66/1988: 91–92.
[151] Ks. HE 23/1985: 6 ja HE 66/1988: 91–92.
[152] Ks. Rikoslain kokonaisuudistus 5/1984: 163.

kean ja riittävän kuvan saamista kirjanpitovelvollisen a) toiminnan taloudellisesta tuloksesta tai b) taloudellisesta asemasta.

Olennaisuusvaatimus täyttyy aina silloin, kun kirjanpitoaineisto on kokonaisuudessaan hävitetty, hukattu tai vahingoitettu. Sama koskee tilannetta, jossa jäljelle tai lukukelpoiseksi jääneen kirjanpitoaineiston perusteella ei pystytä saamaan oikeaa ja riittävää kuvaa toiminnan taloudellisesta tuloksesta tai taloudellisesta asemasta.[153] Olennaisuusvaatimuksen täyttymisen suhteen ovat ongelmattomia myös ne tapaukset, joissa kirjanpitovelvollinen on laiminlyönyt liiketapahtumien kirjaamisen ja tilinpäätöksen laatimisen kokonaan. Tulkinnanvaraista on sen sijaan, koska seuraustunnusmerkit täyttyvät, jos nämä velvoitteet on laiminlyöty vain osaksi. Lain esitöistä ilmenee yleisluonteisesti, että olennaisuusvaatimuksella pyritään rajaamaan rikossäännöksen soveltamisalan ulkopuolelle kirjanpidon antaman kokonaiskuvan kannalta vähäiset teot ja laiminlyönnit.[154]

Termi "olennaisesti" on melko avoin, viime kädessä arvostuksenvarainen ilmaisu. Lain esitöissä on katsottu, että kirjanpidon antaman kuvan oikeellisuus ja riittävyys arvioidaan kirjanpitolain ja -asetuksen sekä hyvän kirjanpitotavan pohjalta.[155] Hyvä kirjanpitotapa saa sisältönsä kirjanpitokäytännön ja teorian muovaamista konventioista.[156] Käytännön ohjaamisessa on keskeinen asema kirjanpitolautakunnan antamilla yleisohjeilla ja lausunnoilla.[157] Seuraustunnusmerkkien arvioinnissa on kysymys siitä, antaako kirjanpito hyvän kirjanpitotavan tuntijalle (kuten ammattitilintarkastajalle) riittävän ja oikean kuvan kirjanpitovelvollisen tuloksesta ja taloudellisesta asemasta.[158] Toiminnan tuloksella tarkoitetaan informaatiota, joka esitetään pääasiassa tuloslaskelmassa, kun taas taloudellista asemaa koskeva informaatio esitetään pääasiassa taseessa.[159] Olennaisuus-

[153] Ks. HE 53/2002: 35.
[154] Ks. HE 23/1985: 6, HE 66/1988: 91 ja Rautio 2002: 1057.
[155] Ks. HE 23/1985: 6 ja HE 66/1988: 91. Ks. samoin Leppiniemi 2000: 31 ja 100, Rautio 2002: 1057, Tuokko 1996: 171-172 ja Yli-Fossi 2004: 31.
[156] Ks. HE 120/1972: 4, HE 111/1992: 14–15, HE 173/1997: 8 ja Rikoslain kokonaisuudistus 5/1984: 158.
[157] Ks. HE 173/1997: 8 ja Leppiniemi 2000: 100.
[158] Ks. HE 23/1985: 6, Rikoslain kokonaisuudistus 5/1984: 160 ja Järvinen, Prepula, Riistama & Tuokko 2000: 572.
[159] Ks. Jänkälä & Kaisanlahti 2005: 234, Mäkelä 2001: 127 ja Rikoslain kokonaisuudistus 5/1984: 160.

vaatimukselle voidaan hakea johtoa kirjanpitolain lisäksi muun muassa hyvään kirjanpitotapaan kuuluvista kirjanpidon periaatteista ja konventioista sekä kirjanpitolautakunnan kannanotoista, koska niiden yhteydessä on otettu kantaa "olennaisuuden" kriteerin arviointiin.[160]

1) Olennaisuuden periaate.[161] Olennaisuuden (materiaalisuuden) periaate on yksi hyvään kirjanpitotapaan kuuluvista kirjanpidon yleisistä periaatteista. Periaatteella on tarkoitettu sitä, että informaation kannalta epäolennaisia eriä ei tarvitse käsitellä teoreettisesti täsmällisellä tavalla (ehdottoman tarkasti). Jonkin erän olennaisuus tai epäolennaisuus riippuu kyseessä olevasta yrityksestä ja usein myös päätöksentekotilanteesta. Se mikä on epäolennaista suuryrityksen kirjanpidon informaatiolle, saattaa olla olennaista pienyrityksen kirjanpidon informaatiolle. Ratkaisevana kriteerinä on pidetty sitä, vaikuttaako asianomaisen erän täsmällisen käsittelyn laiminlyönti informaation hyväksikäyttäjän päätöksiin. Huomioon voidaan ottaa myös informaation tuottamisesta aiheutuvat kustannukset, jotka eivät saisi muodostua suuremmiksi kuin informaatiosta saatava hyöty.[162] Olennaisuuden periaate tukee sitä käsitystä, että olennaisuusvaatimuksen arvioinnissa otetaan huomioon informaation käyttäjien näkökulma ja että kyseessä olevan yrityksen tilinpäätösinformaation kannalta epäolennaisia eriä ei tarvitse käsitellä teoreettisesti täsmällisellä tavalla. Leppiniemi on katsonut kirjanpitolautakunnan olennaisuuden periaatetta koskevien ratkaisujen nojalla, että erän olennaisuutta ei voida tulkita yksinomaan sen perusteella, kuinka suuri se on suhteessa kokonaislukuihin, kuten liikevaihtoon tai taseen loppusummaan. Huomiota on kiinnitetty myös siihen, muuttaisiko erän tarkka käsittely olennaisesti tilinpäätöksen rakennetta. Leppiniemen mukaan voidaan yleisesti todeta, että 10 %:n muutos erän suuruudessa toteuttaisi olennaisuuden kriteerin ja että tapauskohtaisesti merkittävästi alle 10 %:n määrät voivat olla olennaisia joko asian luonteen tai erän rahamääräisen suuruuden takia.[163]

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[160] Ks. Mäkelä 2001: 128.
[161] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 572, jossa on katsottu, että olennaisuuden periaatteella on vaikutusta arvioinnissa.
[162] Ks. Jänkälä & Kaisanlahti 2005: 235, Järvinen, Prepula, Riistama & Tuokko 2000: 60–61, Leppiniemi 2000: 74–75, Leppiniemi 2005: 5:14, Räty & Virkkunen 2004: 78 ja Vahtera 1986: 88.
[163] Ks. Leppiniemi 2000: 75-76.

2) KPL 5 luvun 17 §:ssä säädetään pysyviin vastaaviin (käyttöomaisuuteen) kuuluvien eräiden hyödykkeiden arvonkorotusten edellytyksistä. Arvonkorotuksen tekeminen on mahdollista, jos hyödykkeen todennäköinen luovutushinta tilinpäätöspäivänä on pysyvästi alkuperäistä hankintamenoa olennaisesti suurempi. Arvonkorotukselle on siten asetettu olennaisuuden vaatimus. Tässä yhteydessä käytetyn olennaisuuden käsitteen merkityssisältöä ei ole määritelty laissa eikä lain esitöissä. Oikeuskirjallisuudessa on katsottu, että arvonnousun tulee olla yli 10 %:ia, jotta sitä voitaisiin pitää olennaisena.[164]

3) Pysyviin vastaaviin kuuluvien hyödykkeiden ja sijoitusten arvonalennuksista säädetään KPL 5 luvun 13 §:ssä, jossa ei ole eksplisiittisesti asetettu olennaisuusvaatimusta. Tämä vaatimus ("olennaisesti alempi") sisältyy EVL 42 §:ään, joka koskee eräiden kulumattomaan käyttöomaisuuteen kuuluvien hyödykkeiden arvonalentumispoiston vähennyskelpoisuutta. Verosäännöksen esitöissä viitattiin olennaisuusvaatimuksen osalta kirjanpitolautakunnan kannanottoon (KILA 1989/1054). KILAn lausunnon mukaan käyttöomaisuusosakkeiden 20 %:n arvon alennus täytti olennaisuuden vaatimuksen.[165]

4) Hyödykkeen hankintamenoon voidaan KPL 4 luvun 5 §:n 2 momentin mukaan lukea kiinteät menot, jos niiden määrä on olennainen hankintamenoon verrattuna. Kirjanpitolautakunnan lausunnon (KILA 1993/1222) perusteella on katsottu, että ainakin 10 %:n osuus täyttää olennaisuusvaatimuksen.[166]

Huomion arvoisina vertailukohteina voidaan pitää auktoritatiivisia suosituksia olennaisuudesta ja tilinpäätöksen virheettömyydestä. Leppiniemi on aikaisemmin useasti kiinnittänyt huomiota yhdysvaltalaisen FASB:n kantaan, jonka mukaan olisi pyrittävä määrittelemään olennaisen erän suhteellinen koko. Tämän kannan mukaan olennaisia ovat sellaiset erät, jotka vaikuttavat tilinpäätöksessä ilmoitettavaan erään vähintään 10 %. Olosuhteista riippuen olennaisia voisivat olla myös erät, joiden vaikutus olisi 5-10 %.[167] Vahtera on puolestaan esitellyt ulkomaisessa tilintarkastuskirjallisuudessa esitettyjä käsityksiä virheiden korkeimmista nettomääristä, jotta tilinpäätös katsottaisiin oikeaksi.

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[164] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 509-510, Leppiniemi 2005: 12:46 ja Leppiniemi & Leppiniemi 2005: 208.
[165] Ks. HE 203/1992: 9 Ks. samoin Andersson & Ikkala 2005: 455 ja Leppiniemi 2000: 79.
[166] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 393 ja Leppiniemi 2000: 79.
[167] Ks. Leppiniemi 1995: 137.

Tuloslaskelmassa virheiden nettomäärä voisi olla korkeintaan 5–10 % tilikauden toiminnallisesta tuloksesta tai 0,5–1 % liikevaihdosta taikka taseen puolella kaikki virheet enintään 5–10 % taseen loppusummasta.[168]

Käsiteltyjen lähteiden mukaan olennaisuusvaatimuksen arvioinnissa olisi otettava huomioon informaation käyttäjän tiedontarpeet ja tilinpäätöstietojen vaikutus hänen päätöksentekoonsa. Tilinpäätösinformaation käyttäjinä mainitaan itse yrityksen lisäksi omistajat, sijoittajat, henkilöstö, luotonantajat, tavarantoimittajat ja muut velkojat, asiakkaat, julkinen valta eri elimineen (kuten veronsaaja) ja suuri yleisö.[169] Eri tahojen tiedontarpeet voivat olla hyvin yksilöllisiä ja toisistaan poikkeavia, joten rikostunnusmerkistön olennaisuusvaatimuksen arviointia ei voida sitoa pelkästään eri tahoja koskeviin hajanaisiin seikkoihin. Lakiesityksen perusteluissa on todettu, että riittävän ja oikean kuvan käsitteellä pyritään korostamaan tietojen oikeellisuuden ja riittävyyden arvioinnin riippumattomuutta niiden lukijasta.[170] Olennaisuusvaatimuksessa on kysymys siitä, vaikeuttaako tekotapatunnusmerkkien mukainen käyttäytyminen oikean ja riittävän kuvan saamista toiminnan taloudellisesta tuloksesta ja taloudellisesta asemasta. Näitä seikkoja ilmaistaan tuloslaskelmassa ja taseessa numeraalisilla suureilla. Niiden suhteen täytynee löytyä yleisluonteisia raja-arvoja samalla tapaa kuin näpistyksen ja varkauden tai veropetoksen ja törkeän veropetoksen välisessä rajanvedossa, koska tunnusmerkistön mukainen rajanveto ei voine olla pelkkää in casu -harkintaa ilman mitään ennakoitavuutta. Raja ei voine kuitenkaan olla absoluuttinen rahamäärä, koska yritysten taloudelliset olosuhteet poikkeavat merkittävässä määrin toisistaan. Pienyritykselle olennainen seikka voi olla vähäinen kansainvälisen suuryrityksen tilinpäätöksessä. Tästä syystä rajanveto olisi aiheellista suhteuttaa taloudellisen toiminnan laajuuteen ja taloudellisen aseman kokonaisuuteen. Tällöin ovat luontevia vertailukohtia tuloslaskelmassa liikevaihto, johon merkitään varsinaisesta toiminnasta saadut tuotot ja joka on tavanomaisin yrityksen toiminnan volyymin mittari,[171] ja taseella sen loppusumma, joka on tavallisin yrityksen koon mittari. Vertailua ei voine adekvaatilla tavalla suorittaa vain tilikauden tulokseen (voittoon, puhumattakaan tappioon), koska erilaisista vaihteluista johtuen sen määrä ei

[168] Ks. tarkemmin Vahtera 1986: 88.
[169] Ks. HE 23/1985: 5, HE 66/1988: 89, HE 111/1992: 15 ja Jänkälä & Kaisanlahti 2005: 232.
[170] Ks. HE 111/1992: 15.
[171] Ks. Järvinen, Prepula, Riistama & Tuokko 2000: 368.

kuvaa taloudellista kokonaisuutta eikä se siten muodosta yleistä taloudellista kiinnekohtaa (vertailuperustetta). Yritysten keskimääräiset katteet (myynti- ja käyttökate) vaihtelevat merkittävästi toimialoittain. Kannattavilla toimialoilla olisi mahdollisuus suurempiin tilinpäätösvirheisiin, jos yleisenä vertailuperusteena käytettäisiin tilikauden tulosta taikka myynti- tai käyttökatetta.

Selostettujen lähteiden perusteella voidaan katsoa, että 10 %:n rajan ylitys on yleensä täyttänyt olennaisuuden vaatimuksen. Normisuosituksenomaiseksi lähtökohdaksi voitaneen asettaa 10 %:n raja. Tämä raja-arvo olisi syytä laskea tuloslaskelmassa liikevaihdosta ja taseen puolella sen loppusummasta. Lähtökohtaisesti yli 10 %:n virheen voitaisiin yleensä katsoa vaikeuttavan olennaisella tavalla oikean ja riittävän kuvan saamista kirjanpitovelvollisen toiminnan tuloksesta tai taloudellisesta asemasta.[172] Esimerkiksi jos kirjaamatta jääneiden myyntituottojen tai palkkakulujen määrä on yli 10 %:ia liikevaihdosta, olennaisuusvaatimus täyttyisi. Vastaavasti täyttyisi olennaisuusvaatimus, jos kirjaamatta jääneiden osto- ja/tai siirtovelkojen määrä olisi yli 10 %:ia taseen loppusummasta. Taseen tai tuloslaskelman yksittäisestä erästä laskettu poikkeama ei välttämättä vaikeuta oikean ja riittävän kokonaiskuvan saamista toiminnan tuloksesta tai taloudellisesta asemasta.

Sanottu normisuositus voi toimia suuntaa antavana kriteerinä, jolla luodaan ennustettavuutta olennaisuusvaatimuksen rajan ylittymisestä. Yksittäistapauksessa asia voidaan joutua arvioimaan toisin erityisesti silloin, kun virhe on absoluuttisena rahamääränä sinänsä huomattavan suuri tai kun se koskee erää, jolla on asianomaisessa tapauksessa olennainen vaikutus taloudellisen tuloksen tai aseman oikeaan arviointiin.[173] Tuloslaskelmaan ja taseeseen perustuvassa arvioinnissa on otettava huomioon liitetiedoista ilmenevät seikat, koska liitetiedoissa on KPL 3 luvun 2 §:n 1 momentin mukaisesti ilmoitettava oikean ja riittävän kuvan kannalta tarpeelliset lisätiedot.

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[172] Ks. Mäkelä 2001: 128, Pettinen 1998: 19–21 ja Yli-Fossi 2004: 66.

[173] Ks. Turun HO 9.9.1991 Pn:o 1732, jossa olennaisuuden vaatimuksen katsottiin täyttyvän, kun myyntisaamisiin oli kirjattu yhteensä 250.000 mk kahden tosiasioita vastaamattoman laskun perusteella, joita ilman selvitystilasäännökset olisivat tulleet ajankohtaisiksi, koska yhtiön oma pääoma olisi jäänyt alle kolmanneksen osakepääomasta.

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The weekend effect on implied volatility in option valuation

Jussi Nikkinen and Seppo Pynnönen

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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An important question in derivative pricing is whether the volatility of a traded underlying is the same when the market is open as when it is closed. The usual practice is to use trading day scaling for volatility and calendar day scaling in interest rate in option pricing. This may be a justified approach with historical volatility estimates, because the weekends and non-trading days generally become taken into account implicitly in the estimation process. The situation is pretty much different in the case of implied volatility, which is forward-looking. Under the hypothesis that volatility is purely caused by trading, only the trading days are relevant. On the other hand, under the hypothesis that volatility is caused by random arrival of new information about the future returns, the non-trading days should be accounted for. An interesting question then is whether the non-trading days have the same information value as the trading days. This paper develops a model and estimates the relative importance of the weekends and other non-trading days in the volatility.

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Key words: weekend effect, implied volatility, option pricing

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1. Introduction

One of the most investigated questions in finance is how the market process information and how the information processing (see e.g. French and Roll 1986 and Jones, Kaul and Lipson 1994) and trading (see Karpoff 1987 for a review) affect volatility on the market. According to the existing literature (see e.g. Fama 1965, Granger and Morgenstern 1970, French (1980), Oldfield and Rogalski 1980, French and Roll 1986, Galai and Kedar-Levy 2005, Tsiakas 2006) volatilities are not zero during non-trading intervals but returns are more volatile when the market is open than when it is closed. For example, French and Roll (1986) find that trading period volatility of stock returns is between 13 and 100 times larger than that of the non-trading period, trading time volatility being 71.8 times larger than the weekend volatility.

Differences in the trading and non-trading variances have important implications especially to option pricing. For example, French (1984) suggests a modification of the Black-Scholes model to take into account the possibility that volatility is solely generated in trading days. Accordingly, he suggests assigning zero weight to the weekend volatility in the Black-Scholes formula. While this implies that volatility is essentially due to trading, there is strong evidence that volatility is caused by public and private information as suggested by French and Roll (1986) and Jones, Kaul and Lipson (1994).

Volatility of the underlying equity is generally considered as one of the most important determinant of the price of an equity option. All the above papers deal with the historical volatility. Implied volatility, which is forward looking, is considered many times a more preferable measure to the volatility. Nevertheless, it suffers similar weekend effect, such that the Friday implied volatility tends to be either lower than the Monday volatility or vice versa, depending whether non-trading days are ignored or included fully into the implied volatility formula. For example in the case of FT100 index options with maturities ranging form 32 to 14 days with the sample period from 4 January 1993 to 28 December 2001, the average at the money Friday implied volatility calculated using calendar days was 18.6 and Monday volatility was 19.4 (difference 0.8%).

Nevertheless, at least to the best knowledge of the authors there is no solid technique so far to adjust the weekend effect properly. Therefore, for instance practitioners are forced to set up various more or less *ad hoc* methods to account for the weekend effect. An example is Sundkvist and Vikström (2001) who suggest, *per se* interesting, graphical method to decide a suitable adjustment to scale the effect in implied volatility calculations. Thus overall, a solid-grounded and more general adjustment than the French (1984) is needed to account for the weekend effect.

The purpose of this study is to suggest a method for estimation and testing the magnitudes of public and private information, and trading as causes of variances implied by the market prices of options. By doing so, the study contributes to the existing literature in two main respects. First, it derives a model that can be used to estimate the magnitude that non-trading days contribute to implied volatility. Consequently, the proposed generalization contains both, the standard Black-Scholes assuming equal volatilities during the trading and non-trading days, and the modification by French (1984) assuming that volatility is caused by trading, as special cases.

Second, it presents a new method to examine the relative importance of public and private information and trading as causes of volatility. While the previous studies by French and Roll (1986), and Jones, Kaul and Lipson (1994), etc. investigate the subject using data on realized stock prices, the method proposed in this study uses the volatilities implied by market prices of options that can be considered as investors assessment of the future volatility over the remaining life of an option (see Mayhew 1994). The proposed method can be easily extend to investigate, for example, the importance of regularly released future macro news on the current volatility.

The plan of the rest of the paper is the following. Section 2 deals with the modelling of weekend and holiday effects on implied volatility. Section 3 suggests an estimation procedure of the effects. In Section 4 the data of the study are presented. Section 5 presents the estimation results, and Section 6 concludes.

2. Time value of weekends and other non-trading days in volatility

Consider the standard Black-Scholes option-pricing model for the call price

(2.1)
$$C_t = S_t N(d_1) - e^{-\tau r_f} X N(d_2)$$

where C_t is the call option price, S_t the share price at time t, X is the exercise price, r_f is the risk-free interest rate, $\tau = (T-t)/365$ is the relative time to maturity with T the expiration time, $N(\cdot)$ is the standard normal cumulative distribution function,

(2.2)
$$\begin{aligned} d_1 &= \frac{\log(S_t / X) + \tau r_f}{\sigma\sqrt{\tau}} + \frac{1}{2}\sigma\sqrt{\tau} \\ d_2 &= d_1 - \frac{1}{2}\sigma\sqrt{\tau}, \end{aligned}$$

and σ is the volatility of the underlying measured on annual scale.

In the model all terms except the volatility are directly observable on the markets. Consequently, given the other variables let

(2.3)
$$C_t = f(\sigma\sqrt{\tau})$$

denote the option price, then the volatility implied by the other values can be solved as

(2.4)
$$\sigma_{iv} = \frac{1}{\sqrt{\tau}} f^{-1}(C_t),$$

which is a constant with respect to time, where f^{-1} is the inverse function of f.

Under the hypothesis of the trading caused volatility, formula (2.4) is a biased estimate of the true volatility.

In order to construct a volatility model that accounts for the possible differences of the non-trading day volatilities, let σ_{td} denote the trading day volatility, σ_h the non-weekend holiday volatility, and σ_w the weekend volatility, all measured in daily basis. Then using the information hypothesis, by which volatility is a consequence of randomly, and, hence, independently arriving new information about the future stock returns, the variance to the maturity is the sum of the daily variances. Consequently, letting $n_{h,t}$ denote the number of non-weekend holidays and $n_{w,t}$ the number of weekend days from current time point t to the maturity, the variance to the maturity, σ^2_{T-t}, becomes

$$\begin{aligned} \sigma^2_{T-t} &= (T - t - n_{h,t} - n_{w,t})\sigma^2_{td} + n_{h,t}\sigma^2_h + n_{w,t}\sigma^2_w \\ &= (T - t - \theta_h n_{h,t} - \theta_w n_{w,t})\sigma^2_{td}, \end{aligned} \tag{2.5}$$

where

$$\begin{aligned} \theta_h &= 1 - \frac{\sigma^2_h}{\sigma^2_{td}} \\ \theta_w &= 1 - \frac{\sigma^2_w}{\sigma^2_{td}} \end{aligned} \tag{2.6}$$

indicate fractions the non-trading days reduce the trading day variance. If the trading caused volatility hypothesis holds, $\sigma^2_h = \sigma^2_w = 0$, implying $\theta_h = \theta_w = 1$, and that the non-trading days can be fully cancelled from volatility pricing. In the other extreme, if volatility is caused purely by new information shocks, $\theta_h = \theta_w = 0$. The intermediate case of $0 < \theta_h, \theta_w < 1$ supports the mixture of the two hypotheses. That is, if each day has the same information value, the extra volatility on trading days must be due to trading itself[1].

Note that the annual volatility in terms of (2.5) is obtained by selecting $T-t=365$. So we can generalize the relative time to maturity τ as

(2.7) $$\tau_\theta = \frac{\tau - \theta_h n_{h,t} - \theta_w n_w}{365 - \theta_h m_h - \theta_w m_w},$$

where m_h and m_w denote the number of non-weekend holidays and weekend days for the coming year (365 days) from the option's open. Using this generalized timing measure for the volatility, (2.4) becomes

(2.8) $$\sigma_{iv\theta} = \frac{1}{\sqrt{\tau_\theta}} f^{-1}(C_t).$$

The relationship between (2.4) and (2.8) is

(2.9) $$\sigma_{iv} = \frac{\sqrt{\tau_\theta}}{\sqrt{\tau}} \sigma_{iv\theta}.$$

That is, the calendar-day implied volatility becomes dependent on the θ-parameters. Thus, because the calendar-day implied volatility can be calculated from the market data, we can use (2.9) to estimate the unknown θ-parameters. The procedure is discussed in detail in the next section. Before that we, however, note another crucial implication of (2.9). From the relation we immediately see that both the calendar-day and the trading-day implied volatilities are biased estimates of the true implied volatility whenever $0<\theta<1$. In the former case it is pretty straightforwardly seen that $\tau_\theta > \tau$ for all $\theta > 0$, which entails that the calendar-day implied volatility overstates the true

[1] Of course a plausible alternative is that the rate of arriving information affecting stock prices is lower on non-trading days.

implied volatility. In the latter case if τ is replaced by the trading days, i.e., $\tau = \tau_{td} = td / 252$, where td indicates trading days to maturity, it is again straightforwardly seen that $\tau_{td} < \tau_{\theta}$, which implies that the trading-day implied volatility understates the true implied volatility for all $\theta < 1$.

3. Estimation procedure

In order to estimate the unknown parameters in (2.9), taking logs gives

$$\log \sigma_{iv} = \log \sigma_{iv\theta} + \frac{1}{2}\log\left(\frac{T - t - \theta_h n_h - \theta_w n_w}{365 - \theta_h m_h - \theta_w m_w}\right) - \frac{1}{2}\log\left(\frac{T-t}{365}\right). \tag{3.1}$$

Let $\tilde{\sigma}_{iv,it}$ denote the implied volatility of the i^{th} option calculated at time point t from the market data using calendar days. Parameters to be estimated are $\sigma_{iv\theta,i}$, θ_h, and θ_w with $\sigma_{iv\theta,i}$ specific to each option i, and θ_h and θ_w are common to all options. In order to estimate the unknown parameters, we define the following nonlinear regression

$$y_{it} = \alpha_i + x_t(\theta_h, \theta_w) + \varepsilon_{it}, \tag{3.2}$$

where $y_{it} = 2\log\tilde{\sigma}_{iv,it} + \log[(T-t)/365]$ with $\tilde{\sigma}_{iv,it}$ as defined above, $\alpha_i = 2\log\sigma_{iv\theta,i}$, $x_t(\theta_h, \theta_w) = \log((T - t - \theta_h n_h - \theta_w n_w)/(365 - \theta_h m_h - \theta_w m_w))$, and $\varepsilon_{it} = 2\log\tilde{\sigma}_{iv,it} - 2\log\sigma_{iv,i}$ is an error term assumed to have zero mean and constant variance. Note that parameter α can be used to estimate the time adjusted implied volatility for each option. Nevertheless, in our case this is not the main issue. The α-parameters here are more like nuisance parameters that must be handled properly.

Extracting implied volatilities using calendar time and specifying the non-weekend holidays and the number of weekend days, both to the expiry of the option and during the next year (365 days) from the options launch, we can construct data to estimate the unknown parameters.

Consider first a single option. Under the assumptions of the Black-Scholes pricing model the instantaneous volatility parameter is assumed constant. Then using (3.2) the unknown parameters could be estimated from data related to a single option. However, because the θ -parameters are assumed common for all options, use of panel-type data can be expected to lead more efficient estimation. The needed data is not necessarily traditional panel data, because all what are needed are just option and underlying stock prices, number of non-weekend holidays, weekend days, and maturity days. Thus the time series need not be contemporaneous as in traditional panel data.

Suppose there is a sample of n options with maturities T_i, and option market prices C_{it} up to time point $U_i < T_i$, $i = 1,\ldots,n$ then there are $n+2$ parameters to be estimated (θ_h, θ_w and n option specific α -parameters). Estimation of the parameters could be worked out by the method of maximum likelihood given that the distribution of the error terms, ε_{it}, is assumed known. Normality assumption could be a useful start off point. Because the distribution is not known, we prefer the (nonlinear) Least Squares, where the only needed assumptions are that the error terms are independent and identically distributed (with finite first and second moments). The minimized function is then

$$(3.3) \qquad (\hat{\alpha}_1,\ldots,\hat{\alpha}_n,\hat{\theta}_h,\hat{\theta}_w) = \arg\min \sum_{i=1}^{n}\sum_{t=0}^{U_i}(y_{it} - \alpha_i - x_{it}(\theta_h,\theta_w))^2 .$$

The first order condition for the minimum is that all the $n+2$ partial derivatives are zero, i.e.,

$$\sum_{i=1}^{n}\sum_{t=0}^{U_i}(y_{it}-\hat{\alpha}_i-x_{it}(\hat{\theta}_h,\hat{\theta}_w))\frac{\partial}{\partial\theta_h}x_{it}(\hat{\theta}_h,\hat{\theta}_w)=0$$

$$(3.4)\qquad \sum_{i=1}^{n}\sum_{t=0}^{U_i}(y_{it}-\hat{\alpha}_i-x_{it}(\hat{\theta}_h,\hat{\theta}_w))\frac{\partial}{\partial\theta_w}x_{it}(\hat{\theta}_h,\hat{\theta}_w)=0$$

$$\sum_{t=0}^{U_i}(y_{it}-\hat{\alpha}_i-x_{it}(\hat{\theta}_h,\hat{\theta}_w))=0,\ i=1,\ldots,n.$$

There are no closed form solutions to solve the estimates $\hat{\alpha}_i,\hat{\theta}_h,\hat{\theta}_w$. Thus numerical methods must be employed. For the purpose we utilize the Boyden-Fletcher-Goldfarb-Shanno (BFGS) algorithm (described e.g. in Press et al. 1988).

For the statistical inference purposes we can rely on the general theory of nonlinear least squares estimation (see e.g. Jennrich 1969). To sketch the main results, let us rewrite (3.2) in matrix form as

$$(3.5)\qquad \mathbf{y}=\mathbf{g}(\beta)+\mathbf{u},$$

where $\mathbf{y}$ is the vector of y_{it} observations and $\mathbf{g}(\beta)$ is the vector of $\alpha_i-x_{it}(\theta_h,\theta_w)$ with $\beta=(\alpha_1,\ldots,\alpha_n,\theta_w,\theta_h)'$, $t=0,1,\ldots,U_i$, $i=1,\ldots,n$, the prime denotes transposition, and $\mathbf{u}$ is the vector of the residuals ε_{it}. With these notations, conditions (3.4) simplify in matrix form to $(\mathbf{y}-\mathbf{g}(\hat{\beta}))'\frac{\partial}{\partial\beta}\mathbf{g}(\hat{\beta})=0$. Under fairly general regularity conditions [see Jennrich (1969)] $\operatorname{plim}\hat{\beta}=\beta$ and $\hat{\beta}\sim N(\beta,\sigma^2\mathbf{V})$ asymptotically, where $\sigma^2=\mathrm{Var}(\varepsilon_{it})$, and

$$(3.6)\qquad \mathbf{V}^{-1}=\left(\frac{\partial}{\partial\beta}\mathbf{g}\right)'\left(\frac{\partial}{\partial\beta}\mathbf{g}\right)$$

is an $(n+2)\times(n+2)$ matrix of the second derivatives of $\mathbf{g}$ evaluated at the true parameter value β. Generally a consistent estimator of $\mathbf{V}$ is $\hat{\mathbf{V}}=\mathbf{V}(\hat{\beta})$, which is obtained as a by-product from the BFGS algorithm. Consequently, the asymptotic standard errors of these are $\text{std}(\hat{\beta}_j) = \hat{\sigma}\sqrt{v_{jj}}$, where $\hat{\sigma}$ is the estimate of residual standard error and v_{jj} is the jth diagonal element of $\hat{\mathbf{V}}$.

4. Data description

We demonstrate the procedure with daily closing prices of FTSE100 index call options from London market. The underlying of these options is a market capitalization weighted index that consists of 100 largest companies in the UK stock market. Maximum weight of each stock in the index is limited to 15 percent. The FTSE100 index options are European type. Every year has 12 expiration months for the options and they expire every third Friday of the expiration month or, in case Friday is not a trading day, the last trading day before it. The sample covers the period from January 4, 1993 to December 28, 2001. Data for the study are obtained from LIFFE.

In order to obtain reliable estimation results the following criteria to select the options data are used. First, following Long and Officer (1997), options having two weeks or less time to expiration are excluded to avoid possible expiration week effects. Second, French (1984) shows that relative differences between the prices given by the traditional Black-Scholes model that uses the calendar-time and the modified model that uses both the trading and calendar time are greater for the short-term options, becoming less as time to expiration increases. Therefore, short maturity options (maturity less than 46 days) are used in the estimation. Third, in-the-money and out-of-the-money options are excluded to mitigate the problems induced by the smile effect. Therefore, we include only options within +/-2.5% range of moneyness. With these restrictions, descriptive statistics are presented in Table 1.

Table 1. Descriptive statistics: FTSE100 call options from January 4, 1993 to December 28, 2001. Number of observations 14,286.

	Mean	Standard Dev.	Minimum	Maximum
Option price	105.3	62.3	2.5	318.5
Index price	5011.8	1264.6	2733.0	6950.0
Strike price	5015.2	1267.5	2675.0	7125.0

In order to estimate the model (3.2), number of calendar and trading days and implied volatilities are needed. At this stage we assume that $\theta_h = \theta_w$. That is, the information value of non-weekend holidays and weekends are the same. Implied volatilities are estimated using the Black-Scholes/Merton model with calendar days. These data are presented in Table 2.

Table 2. Descriptive statistics for the data used in the estimation of theta.

	Mean	Standard Dev.	Minimum	Maximum
Implied volatility %	19.1	6.7	9.8	48.9
Calendar days to maturity	23.2	5.9	14	32
Trading days to maturity	16.9	4.3	8	24
Weekend days before maturity	6.1	1.6	4	8

Implied volatility is calculated at the money using the calendar days. Sample period is 4 January, 1993 to 28 December, 2001. The sample consists of observation of FT100 index option with maturity between 14 to 32 calendar days. Number of observations is 14,286.

5. Estimation results

Estimation results of model (3.2) with the constraint $\theta_w = \theta_h = \theta$ are given in Table 3. The theta estimate for the whole sample is 0.60. In order to check the stability of the estimation results, Table 3 reports also the results for the sub-samples of January 4, 1993 to June 23, 1998 and June 24, 1998 to December 28, 2001. The theta estimates are 0.67 and 0.56, respectively. All estimates are statistically highly statistically significant, with p-values equal to zero for at least three decimal places. The empirical magnitudes of the estimates indicate that the weekend variance is about 40% percent of the trading day variance, or in terms of volatility, the weekend volatility is 63% of the trading day volatility [recall that $100(1-\theta)$ indicates percentage of the weekend variance to trading day variance, and $100\left(\sqrt{1-\theta}\right)\%$ indicates the corresponding percentage in terms of volatilities]. The lower panel of Table 3 reports the volatility proportions for the sub-samples and the total sample. It is notable that the weekend effect seems to have increased towards the end of the sample period, such that the estimated proportion of the weekend volatility in the latter period is 67 percent, while it in the first period is 58 percent.

The high significance and high economic value of the θ-estimate implies that the information hypothesis of volatility, i.e., that the non-trading days are equally important as the trading days, is strongly rejected. Similarly the hypothesis $\theta = 1$, i.e., that the non-trading days are valueless with respect to volatility, is also strongly rejected by the data (the last column of Table 3). Thus, in all, the empirical evidence clearly indicates that the non-trading days should neither be counted fully nor totally cancelled from the implicit volatility calculations. According to the results of this paper, they should be counted with a weight about by 60 percent of the trading day.

Table 3. Estimation results for the share of weekend volatility from the trading day volatility.

Sample period	Number of observations	Estimate of θ	Std	p-value ($\theta = 0$)	p-value ($\theta = 1$)
Jan 4, 1993 to Dec 28, 2001	14,286	0.599	0.047	0.000	0.000
Jun 24, 1998 to Dec 28, 2001	7,122	0.670	0.067	0.000	0.000
Jan 4, 1993 to Jun 23, 1998	7,164	0.557	0.065	0.000	0.000

Volatility effects	Proportion
Jan 4, 1993 to Dec 28, 2001	63.4
Jun 24, 1998 to Dec 28, 2001	57.5
Jan 4, 1993 to Jun 23, 1998	66.6

The estimated (nonlinear) regression model is given in (3.1), where we have imposed the restriction that $\theta_w = \theta_h$, i.e. the weekend and non-weekend holiday effects in the volatility are the same. Proportion is the share of the weekend volatility from the trading day volatility (%). The moneyness range of the options are +/-2.5%. Time to maturity ranges between 14 to 35 days.

6. Conclusions

In this paper we introduced a model to account for the weekend and holiday effects on implied volatility. Furthermore, we derived a nonlinear regression model to empirically estimate weekend effect in the implied volatility. The model was tested empirically on FTSE100-index options. Here we, however, did not estimate separately the non-weekend holiday and weekend effect, but assumed that these are valued in terms of volatility in the same manner. The estimation results of this restricted model indicated that for options for short maturity options (expiration in about 2 months or less) the effect of holidays and weekends is about 40 percent of the trading day variance, or in terms of volatility, about 63% of the trading day volatility. This shows that the non-trading days should not be cancelled from the implied volatility calculations as is the usual practice, but weighted by a factor of about 0.6.

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The effect of analyst self-confidence on forecast rationality: Evidence from the Finnish Stock Market in 1989-2005

Timo Rothovius

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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This paper investigates the bias and over- or under-reaction to previous years earnings using Finnish data from 1988 to 2005. The purpose is to study the effect of analysts recommendations on these issues. In most of the previous literature it has been found that there is a positive bias in analyst's forecasts, and that they over-react to previous earnings changes. In this study, it is hypothesized that analysts' self-confidence can be seen in the accuracy of the forecasts. Self-confidence is measured with whether an analyst gives a clear recommendation (strong buy, buy, underperform, sell) or not. It is hypothesized that analysts' self-confidence can be seen in the accuracy of the forecasts. If an analyst is confident of his or her forecast, he or she would be more willing to give a recommendation on the company under investigation. First, it is found that the forecasts are overly optimistic in average, and that there is clear over-reaction to previous earnings changes. This is in accordance to previous studies. Second, according to the results, the optimism is greater for those forecasts that are equipped with a recommendation, but, the over-reaction is greater for the forecasts that are not equipped with any recommendation.

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Key words: eps, forecast, analyst, recommendation

1. Introduction

The accuracy of earnings forecasts is a crucial point for investment practitioners in portfolio decisions, because one of the key factors in share appraisal methods is the predicted price-earnings ratio (Arnold, Moizer and Noreen 1984), which involves forecasts of future earnings. The increasing number of analysts employed by the investment industry also speaks for the demand for accurate earnings forecasts. This situation has provided a fertile ground for academic research assessing the accuracy and other properties of analysts' forecasts. Furthermore, there are various studies that use the assumption of analysts' forecasts as a reliable indicator of market expectations, in research on share price reaction to unexpected earnings information.

Thus, the accuracy of analyst' earnings forecasts has been under intensive investigation in the empirical literature during several decades, see e.g. Duru and Reeb (2002) and the literature cited there. According to the most recent studies, analysts are more accurate than time series models, and this is true even for the more sophisticated time-series models, as shown by Lee and Chen (1990).

However, it is still an open question whether there is a bias in forecasts, and whether analysts systematically under- or over-react to the (imminent) earnings information. The first question refers to the empirical finding that analysts continuously estimate earnings too high (positive bias) or too low (negative bias) compared to actual earnings. There is more evidence in favor of analysts' earnings forecasts being overly optimistic, as first shown by Fried and Givoly (1982), and later by many others, e.g. De Bondt and Thaler (1990), Dreman and Berry (1995), Capstaff, Paydyal and Rees (2001) or Duru and Reeb (2002). However, Brown (1996 and 1997) argued that analysts' earnings forecasts are significantly pessimistically biased. He gives three primary reasons for the pessimism bias. First, institutional pressures by firm managers in order to boost analysts' expectations have reversed. Second, hard-to-quantify productivity growth has increased companies' profitability. Third, analysts have underestimated the impact of globalization on boosting firms' corporate profits.

The other open question is whether analysts systematically under- or over-react to the (imminent) earnings information. The latter is the case in e.g. De Bondt and Thaler (1990), according to whom analysts over-react to extreme earnings. This is in line with their earlier evidence of stock market overreaction to new information (De Bondt and Thaler 1985). The same kind of conclusions can also be found in Patz (1989), Capstaff et al. (1995), Hussain (1996) or Capstaff et al. (2001). Other studies have reported contrary evidence. For example, Klein (1990), and also O'Hanlon and Whiddett (1991), Mendenhall (1991), Abarbanell and Bernard (1992) and Ali, Klein and Rosenfeld (1992) show that analysts under-react to earnings announcements.

The purpose of this paper is to investigate the bias and over- or under-reaction to previous year's earnings using Finnish data from 1988 to 2005. More specifically, the paper studies the effect of analysts' self-confidence on these issues. In most of the previous literature it has been found that there is a positive bias in analyst's forecasts, and that they over-react to previous earnings changes. In this study, it is hypothesized that analysts' self-confidence can be seen in the accuracy of the forecasts. Self-confidence is measured with whether they give a clear recommendation (strong buy, buy, underperform, sell) or not. If an analyst is confident of his or her forecast, he or she would be more willing to give a recommendation on the company under investigation.

2. Methodology and data

The bias and over/under-reaction hypotheses are studied using the same method as in De Bondt and Thaler (1990) and several others after that (e.g. Capstaff, Paudyal and Rees, 2001). Thus, the following regression is implied:

$$EPS_{i,t} - EPS_{i,t-1} = \alpha + \beta(FEPS_{i,t} - EPS_{i,t-1}) + \varepsilon, \quad (1)$$

where

$EPS_{i,t}$ = Actual Earnings Per Share for firm i in year t.

$FEPS_{i,t}$ = Forecasted Earnings Per Share for firm i in year t

A rational forecast would require that the $\alpha = 0$ and $\beta = 1$. If the intercept is not zero, it suggests a bias in the forecast. If it is less than zero, it means that the forecasts are on average overly optimistic, and, conversely, greater than zero suggests a pessimistic bias. The β coefficient concerns the overreaction hypothesis. If it is exactly one, it means that there is neither over- nor under-reaction to actual earnings in analysts' forecasts. If β is less than one, the forecasted changes in EPS are overly extreme. A β greater than one suggests that analysts are too conservative in their forecasts, i.e. there is under-reaction.

The effect of the self-confidence of the analyst is controlled for by adding a shift and slope dummy variables in the regression:

$$(2)\quad EPS_{i,t} - EPS_{i,t-1} = \alpha + \beta(FEPS_{i,t} - EPS_{i,t-1}) + \gamma DUM + \delta DUM(FEPS_{i,t} - EPS_{i,t-1}) + \varepsilon,$$

where the Dummy variable (DUM) is one if there is no recommendation, and 0 if the recommendation is either 'stong buy', 'buy', 'underperform' or 'sell'. The coefficient α gives the bias for forecasts without a recommendation; a value greater than zero suggests a pessimistic bias. The coefficient γ is the difference between those forecasts and other firms' intercepts, and if $(\alpha - \gamma)$ is less than zero, it suggests an optimistic bias for the firms with recommendation. Similarly, coefficient β gives the overreaction for forecasts without a recommendation, so that a coefficient less than one suggest overreaction. Coefficient δ gives the difference between those and other firms' coefficients, and if $(\beta - \delta)$ is less than one, there is under-reaction.

Initially, all the Finnish HEX 25 firms in 2006 were selected for the study. To qualify for inclusion in the analysis, companies had to have comparable earnings per share numbers for at least one preceding year, because the regression model used demands a previous observation. Thus, there are observations between years 1989 and 2005. Only the forecasts released during the fiscal year for the same fiscal year are included in the study.

Before the analysis, one adjustment had to be made for the data, however. If the actual EPS is very small, i.e. near zero, the EPS forecast error (defined as the error deflated by the actual EPS), tends to be unusually high, even if the difference between forecasted and actual value is relatively small. The observations with a change of more than 400 percent or less than -400 percent were deleted. This is in line with previous research, which has usually eliminated those variables that are for example more than 100-400 % of the denominator, see e.g. Easterwood and Nutt (1999) or Capstaff et al. (2001). However, greater changes may be genuine and not data errors, although they are more probably caused by transient factors. Thus, the results without this mechanical deletion were also calculated, and are available from the author upon request.

Elimination of outliers is important because of the nature of the data. Abarbanell and Lehavy (2000) found that forecast data providers' procedures to exclude items from reported earnings are only applied to about a half of the sample, having effects that are primarily concentrated on the extreme negative information tail of the distribution of forecast errors.

All the data, including actual earnings per share, are from the same vendor, namely I/B/E/S International Inc. This is important since different vendors define forecasted and actual earnings numbers differently, and thus mixing data introduces error (Philbrick and Ricks 1991), potentially making analysts' earnings forecast errors appear larger than they actually are (Brown 1997). This is also studied here by using actual earnings numbers from two other vendors, namely Kauppalehti and Taloussanomat, which both calculate the values with their own method. Unfortunately, the actual EPS figures are available only for years 2001-2005, so that the results to the IBES figures are not directly comparable.

3. Results

The sample period is from 1988 to the end of 2005, for which there are enough observations. For Talouselämä and Kauppalehti, the data starts at 2001, for which there are less observations for those. Also, Talouselämä-data has fewer observations than Kauppalehti, which means that the results are not directly comparable.

The data used in the study is presented in Table 1. In average, the mean of the forecasts are slightly bigger than the mean of the actuals, although the medians are almost at the same level. Also, the standard deviations are quite close to each other.

Table 1. Sample statistics of actual EPS by IBES, Kauppalehti and Talouselämä, Forecast, and Forecast error by IBES, Kauppalehti and Talouselämä.

	Actual EPS by Ibes	Actual EPS by Kauppa-lehti	Actual EPS by Talouse-lämä	Forecast	Forecast Error (Actual by Ibes)	Forecast Error (Actual by Kauppal.)	Forecast Error (Actual by Talousel.)
Nobs	14268	9004	7503	14268	14268	9004	7503
Mean	1.392	0.740	0.988	1.529	0.254	0.432	0.266
t-value	80.936	127.367	62.279	83.075	34.416	12.956	22.204
Median	0.830	0.690	0.800	0.850	-0.005	0.057	-0.000
STD	2.0548	0.552	1.374	2.199	0.882	3.168	1.039
Skewness	2.801	0.784	0.612	3.440	1.793	-7.007	2.492
Kurtosis	10.653	2.374	4.170	16.166	4.540	133.797	9.655
Maximum	12,90	3.35	6.8	29.75	4.000	30.500	9.000
Minimum	-10.31	-0.43	-3.6	-10.20	-3.941	-78.091	-3.425

In order to investigate forecasts in more detail, first, the bias and overreaction hypotheses are studied. This is done by utilizing Regression Model (1). The results are given in Table 2. First, results derived using data from IBES are discussed. First of all, forecasts are overly optimistic, as shown by a negative intercept –0.115, which is statistically significantly different from zero. Second, forecasted changes in EPS are too extreme, i.e. there is over-reaction. This can be seen from the beta coefficient 0.832, which is statistically less than one.

In Model (2), shift and slope dummies have been added according to whether there is a recommendation or not. In other words, the forecasts are divided into two portfolios according to whether there is no recommendation or there is one of the following recommendations; 'stong buy', 'buy', 'underperform' or 'sell'. Both the intercept γ as well as coefficient δ are statistically highly significant (with risk levels less than 0.0001, tested against zero). Thus, according to the intercept, the positive bias is greater for the forecasts that are equipped with a recommendation. However, the over-reaction is greater for the forecasts that are not equipped with a recommendation.

Table 2. Bias and under/over-reaction to earnings changes in 1989–2005.

Actual EPS by	Est. of α (standard error)	Est. of β (standard error)	Est. of γ (standard error)	Est of δ (standard error)	F-value	R^2	Nobs
Ibes	-0.115*** (0.008)	0.832*** (0.005)			31718.3***	0.691	14184
	-0.171*** (0.013)	0.859*** (0.006)	0.096*** (0.017)	-0.063*** (0.009)	10649.1***	0.693	14184
Kauppa-lehti	0.005 (0.005)	0.327*** (0.007)			2112.0***	0.215	7700
	-0.045*** (0.008)	0.575*** (0.016)	0.075** (0.010)	-0.309*** (0.018)	837.3***	0.246	7700
Talous-elämä	-0.009 (0.014)	0.692*** (0.010)			4953.9***	0.438	6347
	-0.046 (0.024)	0.735*** (0.017)	0.055 (0.030)	-0.063** (0.021)	1659.8***	0.440	6347

Model (x): $EPS_t - EPS_{t-1} = \alpha + \beta(FEPS_t - EPS_{t-1}) + \varepsilon_t$, Model (x): $EPS_t - EPS_{t-1} = \alpha + \beta(FEPS_t - EPS_{t-1}) + \gamma(Dummy) + \delta(Dummy)(EPS_t - EPS_{t-1})$, subscript i omitted. The significance level according to t-statistic: * Statistically significant at 0.05 level, ** statistically significant at 0.01 level, *** statistically significant at 0.001 level.

Second, results derived from IBES data are compared to results derived from data from Kauppalehti and Talouselämä. The results are basically quite similar, although the bias seems to vanish completely! According to Kauppalehti-data, the intercept is positive but not significantly different from zero, and according to Talouselämä-data, the intercept is negative but not significantly different from zero, either. However, according to all different data sources, forecasted changes in EPS are too extreme, i.e. there is overreaction. This can be seen from the beta β-coefficients, which are statistically less than one.

Next, Model (2) is again utilized in order to study the shift and slope dummies in relation to the recommendations. The intercept γ is statistically significant with Kauppalehti-data, but not with Talouselämä-data. Thus, again, according to the intercept, the negative bias is greater for the forecasts that are equipped with a recommendation. And, further on, the over-reaction is greater for the forecasts that are not equipped with a recommendation. All δ-coefficients are also statistically significant.

4. Concluding remarks

As discussed in the paper, the accuracy of earnings forecasts is a crucial point for investment practitioners in portfolio decisions, because one of the key factors in share appraisal methods is the predicted price-earnings ratio, which involves forecasts of future earnings. Thus, the accuracy of analyst' earnings forecasts has been under intensive investigation in the empirical literature during several decades. According to the most recent studies, analysts are more accurate than time series models, and that is true even for the more sophisticated time-series models.

However, it is still an open question whether there is a bias in forecasts, and whether analysts systematically under- or over-react to the (imminent) earnings information. There is more evidence in favor of analysts' earnings forecasts being overly optimistic, but some argue otherwise. The other open question is whether analysts systematically under- or over-react to the (imminent) earnings information.

The purpose of this paper is to investigate the bias and over- or under-reaction to previous year's earnings using Finnish data from 1988 to 2005. More specifically, the paper studies the effect of analysts' recommendations on these issues. In most of the previous literature it has been found that there is a positive bias in analyst's forecasts, and that they over-react to the previous earnings changes. In this study, it is hypothesized that analysts' self-confidence can be seen in the accuracy of the forecasts. Self-confidence is measured with whether they give a clear recommendation (strong buy, buy, underperform, sell) or not. If an analyst is confident of his or her forecast, he or she would be more willing to give a recommendation on the company he or she is investigating.

It is found that the forecasts are overly optimistic in average, and the optimism is greater for those forecasts that are equipped with a recommendation. Also, there is clear over-reaction to previous earnings changes, but it is greater for the forecasts that are not equipped with any recommendation.

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Economic expectations and implied interest rate distributions

Jukka Sihvonen and Sami Vähämaa

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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This paper examines the relationship between economic expectations and implied probability distributions of future interest rates. The results show that monthly changes in the distributional form of future interest rates are significantly affected by expected macroeconomic developments and anticipated monetary policy shifts. In particular, we find that the expected level of future short-term interest rates is positively related to inflation and economic growth expectations. Moreover, the expected level of the short rate is found to be substantially affected by anticipated shifts in the monetary policy stance. The dispersion of expectations around the expected short-term rate appears to increase with increasing economic uncertainty and anticipation of monetary policy actions. Finally, the results indicate that market participants attach higher probabilities for extreme future movements in short-term interest rates in response to increasing expected inflation and economic output.

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JEL classification: E43; E44; G13

Key words: interest rates, implied probability distributions, economic expectations

1. Introduction

Short-term interest rates are mainly determined by monetary policy of central banks. Monetary policy, in turn, is now widely understood to be guided by Taylor (1993) type policy rules (see e.g. Bernanke and Gertler 1999; Rudebusch and Svensson 1999; Clarida, Gali and Gertler 2000; Woodford 2001; Nelson 2003), which presume systematic reaction functions of monetary policy to prevailing inflation and economic output. Moreover, under forward-looking policy rules and inflation-targeting framework pursed by major central banks, official policy rates are adjusted in response to information about prospective future inflation and other economic factors which may affect the future rate of inflation. Short-term market rates, again, are affected not only by current and prospective inflation and economic output, but also by expectations about future monetary policy. Given that monetary policy operates under considerable uncertainty about future inflation and state of the economy, general economic uncertainty may also be expected to have a significant bearing on short-term market rates.

In this paper, we focus on the determinants of short-term interest rate expectations. In particular, we use data on three-month sterling LIBOR futures options to extract expected probability distributions of future interest rates, and attempt to relate the long-run movements in these distributions to changes in inflation and economic output expectations, perceived economic uncertainty, and anticipated monetary policy shifts. By focusing on the determinants of movements in implied interest rate distributions, this paper offers new insights into the relationship between macroeconomic factors and market expectations about future interest rates.

Expected probability distributions implied by option prices have gained considerable attention over the last few years. Central banks, in particular, are now increasingly using implied probability distributions to assess market expectations of future interest rates and exchange rates, and using these expectations as complementary information for the purposes of formulating monetary policy. A number of papers have recently used implied probability distributions to examine the behaviour of market participants' expectations around specific economic events, such as macroeconomic news announcements (e.g., Glatzer and Scheicher 2005; Vähämaa, Watzka, and Äijö 2005; Beber and Brandt 2006) and central bank actions (e.g. Bhar and Chiarella 2000; Galati, Melick, and Micu 2005; Vähämaa 2005).

Vähämaa et al. (2005) and Beber and Brandt (2006) show that macroeconomic announcements, and especially those related to inflation and unemployment, cause significant changes in the distributional form of expected future long-term bond yields. Bhar and Chiarella (2000) and Vähämaa (2005) document systematic movements in implied probability distributions of money market rates and bond yields in response to changes in the monetary policy stance. Perhaps most related to our approach, Glatzer and Scheicher (2003) examine the determinants of the long-run dynamics of implied probability distributions. Using data on German DAX index options, Glatzer and Scheicher (2003) find that the implied distributions of the DAX index are strongly affected by U.S. stock market developments, and appear to be virtually unaffected by macroeconomic factors.

This paper contributes to the literature in several respects. Most importantly, to our best knowledge, this paper is the first attempt to relate the long-run movements in implied interest rate distributions to changes in economic expectations. Given the forward-looking policy rules of central banks, and moreover, the forward-looking nature of money market interest rates, it is conceivable that the dynamics of implied interest rate distributions are related to economic expectations, rather than to prevailing levels of inflation, economic output and other macroeconomic fundamentals. Furthermore, by focusing on the dynamics of expected future interest rate distributions, this paper offers new insights into the determinants of short-term interest rates. This analysis may have important practical implications for financial market practitioners and monetary policy makers alike. From the viewpoint of monetary policy authorities, for instance, it is important to consider to what extent the market expectations of future short-term interest rates are affected by the economic factors that are related to the alleged forward-looking policy rules.

The empirical findings reported in this paper demonstrate that changes in the distributional form of expected future interest rates are significantly affected by expected macroeconomic developments and anticipated monetary policy shifts. In particular, the results show that the expected level of the three-month sterling LIBOR rate is positively related to inflation and economic growth expectations. Moreover, the expected level of the LIBOR rate is found to be substantially affected by anticipated shifts in the monetary policy stance. The dispersion of expectations around the expected short-term rate appears to increase with increasing economic uncertainty and anticipation of monetary policy actions. We are unable to find strong systematic relationships between economic expectations and asymmetries in implied interest rate distributions. We find, however, some evidence that suggests that implied probability distributions may become more negatively skewed with increasing economic uncertainty. Finally, the results indicate that market participants attach higher probabilities for extreme future movements in short-term interest rates in response to increasing expected inflation and economic output.

The remainder of this paper is organized as follows. Section 2 presents the methodology applied to extract implied probability distributions from option prices. Section 3 describes the three-month sterling LIBOR futures options and the economic expectations data sets used in the analysis. In Section 4, the empirical findings on the relationship between economic expectations and implied interest rate distributions are reported. Finally, concluding remarks are provided in Section 5.

2. Extracting expected probability distributions from option prices

Options are inherently forward-looking financial instruments, and thereby contain information about market participants' expectations regarding future price developments of the underlying instrument or asset. In particular, since the price of an option depends on the probability of the underlying asset price exceeding the strike price of the option, a set of option prices with the same maturity but with different strike prices can be used to extract the expected probability distribution of the underlying asset price at the maturity of the option (see e.g. Bliss and Panigirtzoglou 2002; Jackwerth 1999; Söderlind and Svensson 1997).

Formally, the price of an option equals the discounted expected value of the option's terminal payoff function. Let c_t denote the time t value of a call option written on an underlying asset S_t, with a single expiration date T, and a contractual terminal payoff function $\max[S_T - K, 0]$, where K is the strike price of the option. Assuming that the market is arbitrage free, and following the risk-neutral valuation principles of Harrison and Kreps (1979), the time t value of the call option can be written as:

$$c_t = e^{-r(T-t)} E_t^{\tilde{P}} \left[\max(S_T - K, 0) \right] \tag{1}$$

where r is the risk-free interest rate and $E_t^{\tilde{P}}$ denotes the conditional expectations operator under the risk-neutral probability measure $\tilde{P}$. Furthermore, as shown by Cox and Ross (1976), the time t value of the call option can be equivalently expressed in terms of a risk-neutral probability density function of the underlying asset price:

$$c_t = e^{-r(T-t)} \int_{-\infty}^{\infty} \max(S_T - K, 0) f(S_T) dS_T = e^{-r(T-t)} \int_{K}^{\infty} (S_T - K) f(S_T) dS_T \tag{2}$$

where $f(S_T)$ denotes the risk-neutral probability distribution of the underlying asset price at the maturity of the option. Because the option price can be expressed as a function of the probability distribution of the underlying asset price, a set of option prices observable in the market can be used to extract this distribution.

Various methods for extracting the expected probability distribution from option prices have been proposed in the literature (for reviews, see e.g. Bahra 1997; Jackwerth 1999). These methods are often classified to parametric and nonparametric techniques. The parametric methods specify a certain parametric form for the terminal underlying asset price distribution. Perhaps the most commonly used parametric techniques are the lognormal-mixture model proposed by Melick and Thomas (1997) and the Gram-

Charlier expanded model of Corrado and Su (1996) and Brown and Robinson (2002). Rather than specifying a particular parametric form for the terminal price distribution, the nonparametric methods initiated by Shimko (1993) utilize some flexible functions to fit the observed option prices as well as possible, and then apply the results derived by Breeden and Litzenberger (1978) to extract the implied probability distribution.

Comparisons of alternative methods for extracting implied distributions are provided e.g. in Campa, Chang and Reider (1998), Bliss and Panigirtzoglou (2002), and Andersson and Lomakka (2005). Campa et al. (1998) show that different methodological approaches lead to virtually similar implied distributions, while the findings reported in Bliss and Panigirtzoglou (2002) and Andersson and Lomakka (2005) indicate that the nonparametric smoothing methods produce more accurate estimates of implied probability distributions.

In this paper, the implied probability distributions of future short-term interest rates are estimated with the nonparametric volatility-smoothing method proposed by Bliss and Panigirtzoglou (2002). This nonparametric method combines the approaches of Malz (1997) and Campa et al. (1998) by using cubic splines to fit implied volatilities as a function of option deltas. The starting point in the Bliss-Panigirtzoglou (2002) method is the Breeden-Litzenberger (1978) result, which demonstrates that the second partial derivative of Equation (2) with respect to the strike price of the option gives the discounted risk-neutral probability density function of the underlying asset price:

$$f(S_T) = e^{-r\tau} \frac{\partial^2 c(K,T,t)}{\partial K^2}. \tag{3}$$

Unfortunately, Equation (3) as such is of limited use because only a discrete set of option prices can be observed in the market. Thus, in order to extract the implied probability distribution, the discrete option price observations must first be transformed into a continuous pricing function. We begin the transformation by applying the Black-Scholes (1973) option pricing model to convert the observed option prices from the price/strike price space into the implied volatility/delta space. Subsequently, we fit a cubic spline to the discrete implied volatilities as a function of option deltas by solving the following minimization problem:

$$\min_{\Theta} \sum_{i=1}^{N} \omega_i \left[IV_i - \hat{IV}_i(\Delta_i, \Theta) \right]^2 + \lambda \int_{-\infty}^{\infty} f''(\Delta, \Theta)^2 \, d\Delta \tag{4}$$

where $f(\Delta,\Theta)$ is the cubic spline function, Θ denotes the parameter matrix of the cubic spline, IV_i and $\hat{IV}_i(\Delta_i,\Theta)$ are the actual and the spline fitted implied volatility observations, respectively, Δ_i is the option delta corresponding to implied volatility observation i, ω_i is the weighting parameter for observation i, and λ is the smoothing parameter.

The fitted cubic smoothing spline provides a continuous function of implied volatilities in terms of option deltas. By utilizing the Black-Scholes model for the second time, we next convert the continuous implied volatility function from the implied volatility/delta space into the option price/strike price space to obtain a continuous pricing function. Then finally, the Breeden-Litzenberger result given by Equation (3) can be applied to calculate the expected probability distribution of future interest rates.

In order to alleviate the day-to-day variation in the estimated implied distributions due to time-to-maturity effects of option prices, we construct a time-series of implied probability distributions with a constant maturity of three months. The constant maturity distributions are obtained by using a cubic spline to interpolate between implied volatilities of options with different maturities, but with the same delta. By repeating this interpolation for different values of delta, we obtain a hypothetical implied volatility/delta space with three months to maturity for each trading day in the data set. This set of hypothetical implied volatilities against deltas is then used to estimate the constant maturity implied distributions with the nonparametric volatility-smoothing method described above.

3. Data

3.1. LIBOR futures options

The implied interest rate distributions used in the empirical analysis are extracted from the settlement prices of the three-month sterling LIBOR futures options currently traded on the Euronext.liffe and formerly on the London International Financial Futures and Options Exchange. The option price data spans from January 1992 to August 2006. The three-month sterling LIBOR derivatives contracts are commonly referred to as the "short sterling" futures and options. These derivatives are based on the three-month LIBOR spot rate, which is the rate of interest at which large banks are willing to lend cash to other large banks in the London interbank market. In general, the short sterling derivatives are widely used and highly liquid contracts, and are therefore ideal for extracting implied probability distributions of expected future interest rates.

Because the LIBOR rate itself cannot be purchased or sold, the LIBOR derivatives are written on a notional asset that equals 100.00 minus the LIBOR rate. Hence, the settlement price for a short sterling futures contract is 100.00 minus the three-month sterling LIBOR rate prevailing on the contract's delivery date. Short sterling futures options, in turn, are European options written on the short sterling futures contracts. The expiration months for the short sterling futures options are the three nearest calendar months and the following seven months within the quarterly cycle of March, June, September, and December. Both short sterling futures and futures options expire on the third Wednesday on the expiration month.

We impose three filtering constraints to the option price data set in order to reduce noise in the estimation of implied probability distributions. First, options with less than five trading days to maturity are eliminated from the sample in order to avoid expiration-related unusual fluctuations in option prices. Second, only at-the-money (ATM) and out-of-the-money (OTM) options are used in the empirical analysis. In-the-money (ITM) options are discarded because they are less liquid than OTM and ATM options, and because by using both OTM call and put options it can be ensured that the complete strike price spectrum is efficiently utilized in the estimation of implied distributions. Finally, we require that the option prices are convex and monotonic functions of the corresponding strike prices, and thereby satisfy the basic theoretical option price conditions.

Panel A of Table 1 reports descriptive statistics for the estimated implied interest rate distributions. The table shows that the expected value of the three-month LIBOR rate, or the mean of the implied distribution, has ranged from 3.345 to 10.917 with an average of 5.863 during the sample period. The maximum levels of the expected future LIBOR rates occurred in the beginning of the sample period when the United Kingdom was still part of the European Exchange Rate Mechanism (ERM). In September 1992, however, the UK was forced to withdraw from the ERM. On the infamous "Black Wednesday", the three-month LIBOR rate dropped 1.5 percentage points overnight, and over the following three months the Bank of England (BoE) cut its official policy rate altogether by 3.0 percentage points.

The higher order moments reported in Panel A are for the implied return distributions of future LIBOR rates. As can be noted from the table, the annualized implied volatility of the three-month LIBOR rate is, on average, about 10.5 %. However, implied volatility estimates have varied considerably over the sample period, ranging from 4.7 % to 20.9 %. Again, the maximum levels of implied volatility are related to the "Black Wednesday", which was followed by a year-long period of market uncertainty during which the implied volatility peaked up to 20.9 %. Implied volatility was unusually high also during years 1997 and 1998 when incidents such as the UK General Elections, the Russian debt default, and the collapse of Long-Term Capital Management distressed the LIBOR markets. Furthermore, expectations about the Bank of England attaining operational independence in 1997 seemed to rouse investors to gauge their views about the uncertainty of future LIBOR rates.

Panel A also demonstrates that the implied return distributions of future LIBOR rates are slightly negatively skewed and fat-tailed, with mean skewness and kurtosis estimates of –0.054 and 3.168, respectively. In February 1997, three months before the

BoE's Monetary Policy Committee gained sole responsibility for setting the official policy rate, implied skewness soared to its maximum value of 1.067. Concurrently, also implied kurtosis, which measures the expected likelihood of extreme interest rate movements, rose to its maximum value of 4.285.

Table 1. Descriptive statistics.

Panel A reports descriptive statistics for the moments of option-implied 3-month LIBOR probability distributions. Panel B reports descriptive statistics for the economic expectations used as independent variables in the analysis. CPI and GDP denote the expected growth rates of the consumer price index and the real gross domestic product over the next 12 months. ISV is the implied volatility of the FTSE 100 index. MP is the difference between the 3-month LIBOR spot rate and the official Bank of England rate. The sample period extends from January 1992 through August 2006, for a total number of 176 monthly observations.

Panel A: Dependent variables

	Implied Mean	Implied Volatility	Implied Skewness	Implied Kurtosis
Mean	5.863	0.105	-0.054	3.168
Median	5.585	0.100	-0.047	3.128
Standard Deviation	1.543	0.036	0.294	0.174
Min	3.345	0.047	-0.742	2.943
Max	10.917	0.209	1.067	4.285
No. of Obs.	176	176	176	176

Panel B: Independent variables

	CPI	GDP	ISV	MP
Mean	2.635	2.338	18.934	0.088
Median	2.500	2.440	16.950	0.089
Standard Deviation	0.488	0.643	7.202	0.168
Min	1.950	0.500	8.900	-0.375
Max	4.130	3.400	43.000	0.688
No. of Obs.	176	176	176	176

3.2. Economic expectations

We attempt to relate the movements in implied interest rate distributions to changes in inflation and economic output expectations, perceived economic uncertainty, and anticipated monetary policy shifts. To measure inflation and economic output expectations, monthly data on the expected growth rates of the consumer price index (CPI) and real gross domestic product (GDP) over the next 12 months are used. The data on these macroeconomic expectations are obtained from Consensus Economics. Every month, Consensus Economics surveys about 600 economists for their forecasts regarding future macroeconomic developments. The average forecasts of this survey are used to measure inflation and economic output expectations. These expectations data consist of year-on-year growth expectations for the current and the next year. In order to obtain a comparable and consistent time-series of inflation and real GDP growth expectations, the expectations for the current and the next year are weighted together to measure 12-month ahead expectations:

$$E_{12,t} = \frac{m}{12} E_{C,t} + \frac{12-m}{12} E_{N,t} \tag{5}$$

where $E_{12,t}$ denotes the 12-month ahead expectations of a given macroeconomic variable at time t, $E_{C,t}$ and $E_{N,t}$ denote the time t expectations of the macroeconomic variable for the current and the next year, respectively, and m is the number of remaining months during the current year.

Perceived economic uncertainty is proxied by the volatility implied by stock index options. Provided that market participants are rational, implied volatility should incorporate all the available information that is relevant for forming expectations about future stock market uncertainty, which in turn is considered to be closely related to the general uncertainty in the economy. To capture stock market implied volatility, we use data on the FTSE 100 index options to construct an at-the-money implied volatility time-series with a constant maturity of three months.

Finally, we measure anticipated shifts in the monetary policy stance by the difference between the three-month LIBOR spot rate and the official Bank of England policy rate. A positive spread between the LIBOR and the official policy rate may be considered to reflect market participants' anticipation of monetary policy tightening in the near-term future, while a negative spread correspondingly indicates anticipation of loosening policy. All the economic expectations data used in the analysis span from January 1992 to August 2006, for a total number of 176 monthly observations.

Panel B of Table 1 reports the descriptive statistics for the economic expectations variables used in our empirical analysis. The table shows that inflationary expectations, in general, have hovered around 2.64 %. However, the expected growth rate of the CPI has varied from 1.95 % to 4.13 % during the sample period. The inflationary expectations soared up to over 4 % during the monetary turmoil in 1992. After the UK withdrew from the joint monetary policy of the ERM, the inflation expectations descended to 2.4 % by March 1993. Not surprisingly, these events generated considerable uncertainty in the forward-looking LIBOR markets. The expectations about the economic output growth rate appear to have fluctuated even more than the inflationary expectations. On average, the economic output was expected to grow at the annual rate of 2.34 %. It seems, however, that these expectations varied in a quite drastic fashion during the sample period. For instance, between 1997 and 2000, the average growth expectation dropped from the maximum level of 3.40 % to the minimum of 0.50 %.

Perceived economic uncertainty, as proxied by implied stock market volatility, has also varied considerably during the sample period. On average, the implied volatility of the FTSE 100 index has been about 19 %. In the aftermath of the Russian debt default and the collapse of the Long-Term Capital Management in 1998, market participants were extremely uncertain about the future economic developments, and implied volatility surged to 43 %. Finally, Panel B reports the statistics for the difference between the three-month LIBOR spot rate and the BoE policy rate. This variable is used to proxy the market expectations regarding future shifts in the monetary policy stance. As can be seen from the table, the spot LIBOR rate has, on average, been 0.09 percentage points above the policy rate. The spread reached its maximum in October 1999 when the LIBOR spot rate was 0.69 percentage points above the BoE policy rate. This maximum spread reflected anticipation of substantial monetary policy tightening, which was also realized as the BoE's Monetary Policy Committee increased the policy rate by 0.75 percentage points during the following three months.

4. Results

The long-run relationship between implied interest rate distributions and economic expectations is examined by regressing the monthly changes in the moments of the estimated option-implied LIBOR distributions on changes in inflation and economic output expectations, perceived economic uncertainty, and anticipated shifts in the monetary policy stance. In particular, we estimate alternative univariate and multivariate versions of the following regression specification:

$$\Delta\mu_{i,t} = \alpha + \beta_1 \Delta CPI_t + \beta_2 \Delta GDP_t + \beta_3 \Delta ISV_t + \beta_4 MP_t + \varepsilon_t \qquad (6)$$

where $\mu_{i,t}$ denotes the ith moment of the implied LIBOR distribution at time t, CPI is the expected growth rate of consumer price index, GDP is the expected growth rate of real gross domestic product, ISV is the implied stock market volatility, MP is the difference between the 3-month LIBOR spot rate and the official Bank of England policy rate, and Δ is the percentage-difference operator. In the regression specifications for implied volatility and kurtosis, we redefine MP as a dummy variable that equals 1 if the absolute difference between the 3-month LIBOR spot rate and the official Bank of England rate exceeds 0.20, and zero otherwise. The Ljung-Box statistic indicates significant serial correlation in the residuals of the regressions for implied skewness and kurtosis, which we account for by adding AR(1) terms into the regression specifications. Moreover, Engle's LM test indicates significant conditional heteroskedasticity in the residuals of the regressions for implied mean and kurtosis, which we kill with a GARCH(1,1) structure.

Table 2 reports the estimation results of the univariate and multivariate regressions for the mean of implied LIBOR distributions. The univariate regressions indicate a strong positive relationship between the monthly changes in the mean expected LIBOR rate and movements in the expected level of future inflation and economic output. The univariate estimates, in fact, imply that a one percent upsurge in the output or inflation expectations leads to about 0.20 % increase in the expected LIBOR rate.

Table 2. Implied mean and economic expectations.

The table reports the estimates of alternative univariate and multivariate versions the following regression specification:

$$\Delta\mu_t = \alpha + \beta_1 \Delta CPI_t + \beta_2 \Delta GDP_t + \beta_3 \Delta ISV_t + \beta_4 MP_t + \varepsilon_t$$

where μ_t denotes the mean level (futures rate) of implied LIBOR futures distribution at time t, *CPI* is the expected growth rate of consumer price index, *GDP* is the expected growth rate of real gross domestic product, *ISV* is the implied stock market volatility, *MP* is the difference between the 3-month LIBOR spot rate and the official Bank of England rate, and Δ is the percentage-difference operator. The sample period used in the regressions extends from January 1992 through August 2006, for a total number of 176 monthly observations. t-statistics for the coefficient estimates are reported in parentheses. Serial correlation in the squared residuals is removed with a GARCH(1,1) error structure. The reported adjusted R^2s exclude the effects of GARCH terms. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-0.002	-0.003	-0.003	-0.009 ***	-0.009 ***
	(-0.461)	(-0.906)	(-0.825)	(-2.805)	(-2.952)
CPI	0.197 **				0.131 *
	(2.026)				(1.780)
GDP		0.191 ***			0.064 ***
		(4.595)			(3.072)
ISV			-0.029		-0.026
			(-1.512)		(-1.501)
MP				0.108 ***	0.109 ***
				(7.333)	(8.016)
Adjusted R^2	0.003	-0.006	-0.002	0.182	0.188
F-stat.	1.467	0.003	0.611	39.837 ***	11.140 ***

Furthermore, Table 2 shows that anticipated changes in the monetary policy stance are positively related with the expected level of future LIBOR rates. As can be noted from the table, a one percentage point spread between the LIBOR spot rate and the official monetary policy rate yields a 0.10 % change in the expected LIBOR rate. This finding is consistent with Gwilym, Buckle, Clare and Thomas (1998), who show that after the UK implemented the inflation-targeting monetary policy framework in 1992, the average reaction in the three-month spot rate to a scheduled monetary policy announcement dropped from one third of a percent to practically zero. This indicates that, due to the transparent monetary policy of the BoE, the policy information is to a large extent incorporated in the short rate expectations.

Table 3. Implied volatility and economic expectations.

The table reports the estimates of alternative univariate and multivariate versions the following regression specification:

$$\Delta\sigma_t = \alpha + \beta_1 \Delta CPI_t + \beta_2 \Delta GDP_t + \beta_3 \Delta ISV_t + \beta_4 MP_t + \varepsilon_t$$

where σ_t denotes the volatility of implied LIBOR futures return distribution at time t, *CPI* is the expected growth rate of consumer price index, *GDP* is the expected growth rate of real gross domestic product, *ISV* is the implied stock market volatility, *MP* is a dummy variable that equals 1 if the absolute difference between the 3-month LIBOR spot rate and the official Bank of England rate exceeds 0.20, and Δ is the percentage-difference operator. The sample period used in the regressions extends from January 1992 through August 2006, for a total number of 176 monthly observations. t-statistics for the coefficient estimates are reported in parentheses. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-0.007	-0.005	-0.002	-0.009	-0.006
	(-0.604)	(-0.433)	(-0.183)	(-0.753)	(-0.464)
CPI	-0.282				-0.062
	(-1.028)				(-0.221)
GDP		-0.084			-0.129
		(-0.553)			(-0.861)
ISV			0.334 ***		0.307 ***
			(7.956)		(2.897)
MP				0.075 **	0.049 *
				(2.338)	(1.690)
Adjusted R^2	0.001	0.009	0.120	0.036	0.131
F-stat.	1.119	2.637	24.864 ***	7.557 ***	7.609 ***

The multivariate regression in Table 2 provides further evidence for the positive relationships between the mean of implied distributions and inflation, economic output, and monetary policy expectations. However, the relative impacts of inflation and economic output expectations seem to become somewhat smaller in the multivariate model. Finally, Table 2 shows that economic uncertainty has no impact on the expected level of future three-month LIBOR rate.

The regression results for the dispersion of expectations, or implied volatility, are reported in Table 3. As can be noted from the table, there seems to be a robust positive relationship between perceived economic uncertainty and dispersion of expectations about future LIBOR rate. The estimated coefficients for economic uncertainty are positive and statistically highly significant both in the univariate and in the multivariate regressions. The estimated coefficients suggest that about one third of a percent increment in the perceived stock market uncertainty diffuses to the LIBOR markets. This seems to be consistent with flexible inflation targeting, which enables the central bank to adapt complementary short-run monetary policy objectives, like financial stability suggested by Bernanke et al. (1999). Under such forward-looking policy, the perceived uncertainty in the stock markets could affect the future monetary policy decisions, depending on the costs and benefits of such actions.

Besides perceived economic uncertainty, Table 3 also indicates that increased expectations of a change in the monetary policy stance generate uncertainty about the level of future LIBOR rate. Finally, Table 3 demonstrates that the dispersion of LIBOR expectations is unaffected by movements in the expected inflation and economic output.

Table 4 presents the regression results for implied skewness. The estimation results suggest that the asymmetries in market expectations about future LIBOR rate are not systematically affected by movements in economic expectations. The only statistically significant estimate in Table 4 is the negative coefficient for perceived economic uncertainty in the univariate regression. This suggests that implied probability distributions may become more negatively skewed or less positively skewed with increasing economic uncertainty. This finding is economically reasonable, as implied volatility is typically high during the worsening states of the economy, which, in turn, may increase the probability of declines in the official Bank of England policy rate. However, this borderline significant effect of economic uncertainty disappears in the multivariate framework.

Table 4. Implied skewness and economic expectations.

The table reports the estimates of alternative univariate and multivariate versions the following regression specification:

$$\Delta\mu_{3,t} = \alpha + \beta_1 \Delta CPI_t + \beta_2 \Delta GDP_t + \beta_3 \Delta ISV_t + \beta_4 MP_t + \varepsilon_t$$

where $\mu_{3,t}$ denotes the skewness of implied LIBOR futures return distribution at time t, *CPI* is the expected growth rate of consumer price index, *GDP* is the expected growth rate of real gross domestic product, *ISV* is the implied stock market volatility, *MP* is the difference between the 3-month LIBOR spot rate and the official Bank of England rate, and Δ is the percentage-difference operator. The sample period used in the regressions extends from January 1992 through August 2006, for a total number of 176 monthly observations. *t*-statistics for the coefficient estimates are reported in parentheses. Serial correlation in the residuals is removed with AR(1) terms. The reported adjusted R^2s exclude the effects of AR(1) terms. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.001	-0.001	0.000	0.004	0.004
	(0.063)	(-0.134)	(0.038)	(0.358)	(0.421)
CPI	0.408				0.348
	(1.577)				(1.259)
GDP		0.078			0.030
		(0.825)			(0.308)
ISV			-0.085 *		-0.073
			(-1.747)		(-1.520)
MP				-0.048	-0.036
				(-0.868)	(-0.641)
Adjusted R^2	0.003	-0.005	0.002	-0.001	-0.004
F-stat.	1.567	0.188	1.426	0.760	0.814

The estimation results for implied skewness are somewhat contradictory to previous studies. Vähämaa (2005) documents that the implied distributions of German government short-term bond futures are systematically asymmetric around monetary policy actions of the European Central Bank. Moreover, Beber and Brandt (2007) and Vähämaa et al. (2005) find systematic changes in asymmetries of bond yields in response to surprises in inflationary developments. These previous studies have, however, only examined the short-run dynamics of implied distributions, and moreover, have focused on the implied distributions of bond yields rather than short-term money market rates.

Table 5. Implied kurtosis and economic expectations.

The table reports the estimates of alternative univariate and multivariate versions the following regression specification:

$$\Delta\mu_{4,t} = \alpha + \beta_1 \Delta CPI_t + \beta_2 \Delta GDP_t + \beta_3 \Delta ISV_t + \beta_4 MP_t + \varepsilon_t$$

where $\mu_{4,t}$ denotes the kurtosis of implied LIBOR futures return distribution at time t, *CPI* is the expected growth rate of consumer price index, *GDP* is the expected growth rate of real gross domestic product, *ISV* is the implied stock market volatility, *MP* is a dummy variable that equals 1 if the absolute difference between the 3-month LIBOR spot rate and the official Bank of England rate exceeds 0.20, and Δ is the percentage-difference operator. The sample period used in the regressions extends from January 1992 through August 2006, for a total number of 176 monthly observations. *t*-statistics for the coefficient estimates are reported in parentheses. Serial correlation in the residuals and squared is removed with a AR(1)-GARCH(1,1) error structure. The reported adjusted R^2s exclude the effects of AR(1) and GARCH(1,1) terms. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.001	0.001	0.001	0.001	0.000
	(0.681)	(0.466)	(0.485)	(0.362)	(-0.115)
CPI	0.075 *				0.060
	(1.704)				(1.292)
GDP		0.030 *			0.029 *
		(1.863)			(1.701)
ISV			0.005		0.006
			(0.603)		(0.802)
MP				0.002	0.005
				(0.157)	(0.757)
Adjusted R^2	0.010	0.004	-0.005	-0.005	0.002
F-stat.	2.771 *	1.786	0.057	0.140	1.102

Finally, Table 5 reports the results for the relationship between implied kurtosis and economic expectations. The univariate regressions suggest that implied LIBOR distributions become more fat-tailed in response to upwards adjusted inflation and economic output expectations. Interestingly, although these two variables do not seem to cause significant changes in uncertainty, as can be noted from Table 2, they still enforce market participants to price an additional jump risk premium in the LIBOR options. As an upward adjustment in both of these expectations may be interpreted to indicate warming economy, the jump premium could actually result in increased likelihood of a substantial tightening of monetary policy. However, in the multivariate regression, only the coefficient for economic output expectations appears statistically significant.

5. Conclusions

This article focuses on the determinants of short-term interest rate expectations. In particular, we use data on three-month sterling LIBOR futures options to extract expected probability distributions of future interest rates, and attempt to relate the long-run movements in these distributions to changes in inflation and economic output expectations, perceived economic uncertainty, and anticipated monetary policy shifts. By examining the determinants of movements in implied interest rate distributions, this paper offers new insights into the relationship between macroeconomic expectations and market expectations about future interest rates.

Our empirical findings demonstrate that the monthly changes in the distributional form of expected future interest rates are significantly affected by expected macroeconomic developments and anticipated monetary policy shifts. In particular, the results show that the expected level of the three-month sterling LIBOR rate is positively related to inflation and economic growth expectations. Moreover, the expected level of the LIBOR rate is found to be substantially affected by anticipated shifts in the monetary policy stance.

The dispersion of expectations around the expected short-term rate appears to increase with increasing economic uncertainty and anticipation of monetary policy actions. We are unable to find strong systematic relationships between economic expectations and asymmetries in implied interest rate distributions. We find, however, some evidence that suggests that implied probability distributions may become more negatively skewed with increasing economic uncertainty. Finally, the results indicate that market participants attach higher probabilities for extreme future movements in short-term interest rates in response to increasing expected inflation and economic output.

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ACTA WASAENSIA

Earnings forecasts used by the market in the valuation of shares: A comparison of alternative time series models

Arto Suvas

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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This paper examines the consistency of alternative time series forecasts with the market valuation of shares, using Finnish data from years 1979-1995. Competing forecasts for Net Income/Total Assets are obtained using random walk, mean of past observations, and alternative exponential smoothing models. These forecasts are used, each in turn, in empirical models based on the Litzenberger - Rao (1971) theoretical model. It is concluded that the market does not rely on random walk forecasts in evaluating the long-run earnings prospects of firms. The best explanatory power is found, in general, for earnings expectation variables obtained using exponential smoothing models with moderate smoothing parameters.

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Key words: Accounting time series, Earnings forecasts, Share valuation, Market value of equity

1. Introduction

Research on time series properties of accounting income numbers is largely motivated by the importance of obtaining good earnings forecasts for proper functioning of share valuation models.[1] Yet, this research has been carried out outside a direct valuation framework. On the other hand, the usefulness of alternative time series forecasts has not been examined in cross-sectional tests of share valuation models.

The market is composed of a large number of market participants, investors on the aggregate. Past financial statements of listed firms provide a major source of data for the market participants. Presumably, these past time series data are utilized to forecast future years' realizations of the earnings series of interest, most notably of the net income series. The market might focus only on the most recent single realization of the net income series, and use this figure as the forecast for each future period (*random walk forecast*). Alternatively, the mean of a number of past realizations could be calculated as an forecast for future realizations (*mean reverting forecast*). Still, the market might use some other weighing procedure. Presumably, recent observations might be more heavily weighted than very old realizations. (*Exponential smoothing methods* are examples of such procedures.)[2] The main problem of this study can be stated as: *What basic time series forecast model for future annual net income realizations can best explain the market valuations of common stocks?*

The classic article by Ball & Watts (1972) was followed by numerous studies examining the time series behavior of accounting income numbers (e.g. Albrecht et al. 1977; Watts & Leftwich 1977; Whittred 1978; Ball & Watts 1979; Caird & Emanuel 1981; Kinnunen 1991). A widely accepted view that has emerged from these studies is that the behavior of the annual income series can be characterized, at least on average, as a submartingale (random walk with or without a drift component) or some similar process.

There nevertheless exist findings that either oppose the random walk evidence or suggest that the strict random walk interpretation should be modified. Beaver (1970) found that the behavior of earnings, deflated by market or book value of equity, could

[1] This is stressed e.g. by Lev (1974: 109–132) and Foster (1986: 212).

[2] Each of these forecasts might be also be adjusted by a growth or drift term, possibly extrapolated from the past time series.

be characterized by a moving average model, where the underlying process is mean reverting.[3] Focusing on undeflated accrual earnings per share series, Salamon & Smith (1977) observed that optimal coefficients in exponential smoothing models for individual firms were widely scattered, suggesting diversity in time series characteristics across firms. Brooks & Buckmaster (1980), Beaver et al. (1980), and Freeman et al. (1982) find that extreme earnings changes are likely followed by non-random walk behavior. Forecasting accuracy tests in Suvas (1996 a) found several time series models statistically significantly outperforming the accuracy of random walk forecasts at the net income level.[4]

In empirical tests of theoretical share valuation models, the statistical models typically contain at least an earnings (sometimes a dividend), a risk, and a growth variable. The specification of the earnings variable varies across previous studies. For example, Tse (1986) uses most recent accounting earnings (implying a random walk forecast for earnings), whereas Litzenberger & Rao (1971) and Bowen (1979) use a seven year average of the ratio earnings to book value of equity of the previous period (i.e., a mean reverting forecast for the ratio). Alternative forecast specifications are not examined in these studies.

2. The Theoretical Equity Valuation Model

Probably the most widely tested theoretical valuation model is the finite horizon growth potential model by Litzenberger & Rao (hereafter LR) (1971).[5] Studies utilizing the LR theoretical background include Higgins (1974), Foster (1977), Bowen (1981), Daley (1984) and Tse (1986). In the LR (1971) model, the current market value of equity is expressed as:

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[3] Still, Albrecht, Lookabill & McKeown (1977) found random walk adequate to describe the process generating deflated earnings. Earnings were deflated by the stockholders' equity of the previous period.

[4] In the long-run (five year horizon) forecasting accuracy test, the smallest average forecast error for the net income series of Finnish listed firms was provided by the exponential smoothing model with a low smoothing coefficient (0.3), having more affinity to mean reversion than to random walk. It outperformed random walk statistically significantly (at the 0.0001 level.) Mean reverting models that were included in the tests were also significantly (at the 0.01 level) superior to random walk.

[5] A similar model was expressed by McDonald (1971). The LR and McDonald models are influenced by the earlier models developed by Miller & Modigliani (1961, 1966).

$$V_i = \frac{\overline{E}_i}{R_f} - \frac{br_{im}S_{E_i}}{R_f} + G_i, \tag{1}$$

where

$\overline{E}_i$ = the expected value of earnings (in the absence of any new investments that expect to earn in excess (or less than) the required rate of return on equity)
R_f = the risk-free rate
b = $(\overline{R}_m - R_f) / \sigma(R_m)$, where $\overline{R}_m$ represents the expected rate of return on the market, and $\sigma(R_m)$ is the standard deviation of the market portfolio
r_{im} = correlation coefficient between the rate of return on security i and the rate of return on the market portfolio
S_{E_i} = standard deviation of the rate of return on security i
G_i = net present value of future earnings growth

The current net present value of future earnings growth, G_i, is approximated by LR as

$$G_i = \left[\frac{\Delta B_i(\pi_i - R_i)}{R_i(1 + R_i)}\right] T, \tag{2}$$

where ΔB_i is the expected dollar amount of equity investment for firm i during the current year, π_i is the expected rate of return to equity on new investment, and R_i represents the required return on an equity share. After T years, π_i is assumed to equal R_i.

3. The Statistical Model

The LR theoretical model has been tested extensively using a variety of specifications. To remove or reduce heteroscedasticity, both sides of the valuation equation are generally expressed in a deflated form. In this study, we also rely on the LR theoretical model. The empirical version that is tested in cross-sectional regressions is stated as follows:

$$\frac{V_i}{TA_i} = \beta_0 + \beta_1 \overline{NITA}_i + \beta_2 RISK_i + \beta_3 GROWTH_i + u_i \tag{3}$$

The dependent variable is the market value of equity as of March 31, V_i, deflated by the book value of total assets, TA_i, at the end of the most recent accounting period.[6] The independent variables are:

$\overline{NITA_i}$ = the expected value of the net income (earnings after interest and taxes) to beginning of period book value of total assets ratio = $E[NI_{i,t+1}/TA_{i,t}]$

$RISK_i$ = $r_{im}\sigma(NI_{i,t}/TA_{i,t-1})$. Here r_{im} represents the correlation between the rate of return on book value equity of firm i (i.e., $NI_{i,t}/BV_{i,t-1}$) and the rate of return on the market portfolio (R_m), and $\sigma(NI_{i,t}/TA_{i,t-1})$ is the standard deviation of the rate of return on (beginning of period) book value of total assets[7]

$GROWTH_i$ = the mean of up to eight past realizations of the ratio $(BV_{i,t} - BV_{i,t-1})/TA_{i,t-1}$ (change in the book value of equity divided by the book value of total assets at the start of the period)[8]

u_i = error term

In addition, the following simplified model containing only the earnings expectation variable is tested cross-sectionally:

[6] The cross-section date being the end of March in year t+1, observations with accounting periods ending prior to the start of November in year t, or after the end of February in year t+1 are discarded from the tests.

[7] The length of the horizon used in calculating r_{im} and $\sigma(NI_{i,t}/(TA_{i,t-1}))$ depends on data availability. Up to nine most recent observations are generally used. Since the first three observations for each firm are excluded from the cross-sections, the minimum number of past observations used in calculating the $RISK_i$ variable is four. (Instead of dropping the first observation in the series, it is approximated as $NI_{i,t}/(TA_{i,t})$.)

[8] The growth effect (equation (2)) of the theoretical model can be broken in two terms: $\Delta B_i \pi_i T/[R_i(1 + R_i)]$ and $-\Delta B_i T/(1 + R_i)$. Deflating by total assets the terms become $\Delta B_i \pi_i T/[R_i(1 + R_i)(TA_i)]$ and $-\Delta B_i T/[(1 + R_i)(TA_i)]$. This would allow estimation of coefficients for variables $\Delta B_i \pi_i/(TA_i)$ and $\Delta B_i/(TA_i)$. (Tse (1986) uses such a division, deflating by the book value of equity.) The former variable represents growth multiplied by profitability while the second is a pure growth variable. This would, at least in principle, allow to isolate the effect of pure expansion that is not accompanied by a rate of return in excess of the cost of capital (which theoretically should not add value) from profitable growth (that should increase value). Alternative versions of such a division were initially examined. Unfortunately, the latter term typically had an unexpected positive sign (being often significant). A great number of reasons might have contributed to this feature, including effects abstracted from the theoretical model (e.g. inflation effects, personal taxation, bankruptcy risk, differences across the average life spans of capital expenditures across firms), firm specific features that the statistical model is unable to catch (differences among required rates of return R_i, different horizons for growth potential T), investor behavior (love of expansion, or inability to properly discern growth potential from mere expansion), or defects in model specification or measurement of variables.

$$\frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + u_i \tag{4}$$

4. Alternative Time Series Forecasts for the Earnings Variable

The main objective of this study is to find evidence on how the market forms expectations for future earnings of firms. For this end, alternative versions of the earnings expectation variable $\overline{NITA}_i$ are tested in the yearly cross-sections. The competing forecasts, calculated from the past realizations of net income to beginning-of-period total assets, are random walk (*RW*), the mean of seven most recent observations (*ME7*), and various "single exponential smoothing" forecasts with smoothing coefficients ranging from 0 to 0.90 with increments of 0.10.

A single exponential smoothing model has one smoothing parameter (α) and the following general form:

$$E(X_{t+1}) = \alpha X_t + (1 - \alpha)E(X_t). \tag{5}$$

When α = 1.00, the model yields a pure random walk forecast. (Then the forecasted value $E(X_{t+1})$ is equal to the most recent realized observation X_t). At the other extreme, $\alpha = 0$ gives a mean reverting constant process expectation. (In this case the forecast will be equal to the initial value of the series.)[9] Intermediate smoothing coefficients produce forecasts that are mixtures of mean reversion and random walk, letting the most recent observation have various degrees of impact on the forecast.[10]

The alternative time series forecast formulations are summarized in Table 1, where $E(X_{t+1})$ is equivalent to E(Net Income$_{t+1}$/Total Assets$_t$). If the market forms expectations according to random walk forecasts, then the random walk-based model should

[9] In this study, the initial value is the mean of the first two observations in each series. This initialization procedure should to some extent reduce the impact of the first observations in the series. The initial value has a quite far lasting influential effect on the later years' forecasts when the smoothing α is low.

[10] Brooks & Buckmaster (1980) consider an exponential smoothing model as random walk (with or without a drift) if the smoothing coefficient exceeds 0.80 ($\alpha > 0.80$), and as a constant or mean reverting process if $\alpha \leq 0.20$. Intermediate coefficients $0.20 < \alpha \leq 0.80$ indicate a moving average or higher than first order autoregressive process.

consistently possess higher explanatory power (measured by adjusted R^2) than any of the competing versions.

Table 1. Abbreviations and specifications of the competing time series models that generate the forecasts for $\overline{NITA}_i$. The first observation for each firm comes from period t=1.

Exponential smoothing models: $E(X_{t+1}) = \alpha X_t + (1 - \alpha)E(X_t)$

ES0	$\alpha = 0.00$	*ES5*	$\alpha = 0.50$
ES1	$\alpha = 0.10$	*ES6*	$\alpha = 0.60$
ES2	$\alpha = 0.20$	*ES7*	$\alpha = 0.70$
ES3	$\alpha = 0.30$	*ES8*	$\alpha = 0.80$
ES4	$\alpha = 0.40$	*ES9*	$\alpha = 0.90$

Random walk: $E(X_{t+1}) = X_t$

RW = *ES10* with $\alpha = 1.00$

Equally weighted moving average of past seven observations: $E(X_{t+1}) = \mu_{t+1}$

ME7 where $\mu_{t+1} = \text{sum}(X_t,\ldots, X_{t-6})/7$

5. Data

The data contain financial statement information from accounting years 1974-1994, and stock price information from calendar years 1979-1995 of most listed non-financial Finnish corporations.[11] The numerator of the dependent variable is the market value of equity at the end of March, and is obtained by multiplying the number of outstanding shares by the market price of the share quoted at the Helsinki Stock Exchange (HeSE). The net income figures are obtained by making the major corrections suggested by the Finnish Committee for Corporate Analysis (CCA). These corrections are the elimination of non-cash increases or decreases in the inventory reserve or in other reserves, and

[11] This long range for financial statement data is obtained by utilizing two data bases. The first data base contains years 1974-1989, and the second one cover years 1984-1995. The first data are used for the 1979-1989 cross-sections (the earlier years being utilized in calculation of the independent variables). The 1990-1995 cross-sections are from the second data base (data from 1984 on being used in calculation of the regressors). The year 1987-1989 regressions were also run using the latter data base, yielding highly similar results than are those reported here. Therefore, no material effect resulted from the shift to the second data base in year 1990.

applying of CCA suggested methods of depreciation.[12] Extraordinary income and expense items are excluded in calculating the corrected net income figures. At least four consecutive financial statements immediately preceding the cross-section are required for an observation to qualify for estimation.[13]

The time span of the data covers a variety of economic conditions, including the bull stock market in the 80's (especially years 1983 and 1986-1988), and the exceptionally deep depression of 1990-1993 that was accompanied with negative means of the year 1992 and 1993 net income figures in the data.

6. Results

Table 2 summarizes the explanatory powers of the 12 competing versions of the one-variable model (equation (4)) in the yearly cross-sectional regressions. Corresponding figures for the three-variable model (equation (3)) are presented in Table 3. For each year, the exponential smoothing model with highest explanatory power is highlighted by underlining the figure. (Random walk, having an α of 1, is also considered belonging to the exponential smoothing model category.) In case *ME7* yields the highest explanatory power of all models considered, that figure is also emphasized by underlining. Yearly means of the dependent variable, the most recent realized net income to beginning-of-period total assets ratio, the risk and growth variables plus the market return are also shown in the two tables.[14]

The one-variable results in Table 2 indicate a tendency for optimal forecasts (those with highest adjusted R^2) to concentrate in the lower α region. These models can be classified as either mean reverting models or mixed models (mixtures of random walk and mean reversion) with a closer affinity to mean reversion than to random walk. The three-variable model results are similar, except that the tendency to low smoothing

[12] The two relevant CCA suggested depreciation methods are depreciations according to plan (the recommended method when possible), and maximum depreciations permitted by the Business Tax Law. The latter method has been the rule prior to 90's. Reporting depreciations according to plan has become mandatory in 1995. In anticipation of this, most firms adopted reporting these figures a few years earlier. Therefore, most observations from the 90's are based on depreciations according to plan.

[13] From 590 initial observations, 39 were discarded as outliers or exceptional.

[14] Market return is calculated as the rate of change in market index from March 31 of the preceding year to March 31 of the cross-section year.

coefficients is not quite as clear cut. This evidence nevertheless clearly suggests that, in general, the market does not use random walk forecasts for corporate earnings in determination of the market prices of shares.

Interestingly, there are two occurrences where random walk works very well. These are the year 1993 and 1994 cross-sections. Both cases are from the early recovery phase after the exceptionally deep recession, suggesting that the optimal forecast may depend on the phase of the business cycle.[15]

[15] In the early phase of the recovery, the market obviously could anticipate that some industries would soon be in good condition again, while some other lines of business would remain stuck with difficulties. (In this particular case, the construction, real estate and hardware firms were among those that were hit especially hard, and at the time of writing this paper, these lines of business are still in a state of crisis). In the beginning of recovery, the low-α models cannot react quickly. Now the high-α models or *RW* provide forecasts that are better consistent with the long-run earnings prospects of the firms, as they can differentiate firms that are going back to "normal" from those that are expected to have permanent or long lasting earnings difficulties. This advantage of *RW* probably will not last long, however, as the medium and low-α models become soon back to form and will be again, on the average, more consistent with market's *long-run* earnings forecasts than *RW*. (The results for year 1995 are indicative of a return back towards lower optimal smoothing coefficients.)

Table 2. Adjusted R^2 statistics of alternative one-variable models in yearly cross-sections.

$$\frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + u_i, \text{ where } \overline{NITA}_i = E\left[NI_{i,t+1} / TA_{i,t}\right] \text{ is obtained by alternative time series models.}$$

	Smoothing parameter / Model abbreviation												Yearly means of variables					
	α=0	α=.1	α=.2	α=.3	α=.4	α=.5	α=.6	α=.7	α=.8	α=.9	α=1.0							
Year	*ES0*	*ES1*	*ES2*	*ES3*	*ES4*	*ES5*	*ES6*	*ES7*	*ES8*	*ES9*	*RW*	*ME7*	*N*	V_t/A_t	NI_t/TA_{t-1}	*RISK*	*GROWTH*	R_m
1979.094	.187	.259	.298	.315	.320	.320	.315	.308	.297	.281	.273		34.160		.0082	−.0001.033		.134
1980.168	.360	.476	.476	.424	.358	.293	.230	.174	.126	.086	.476		35.169		.0504	.0104.037		.170
1981.026	.172	.287	.277	.211	.140	.082	.039	.011	.000	.000	.312		35.136		.0416	.0086.038		−.032
1982.083	.222	.286	.261	.217	.182	.160	.149	.145	.146	.148	.314		36.171		.0250	.0085.039		.350
1983.007	.200	.320	.336	.326	.313	.304	.296	.290	.284	.277	.379		37.202		.0094	.0065.044		.323
1984.011	.400	.559	.576	.551	.512	.470	.427	.385	.342	.298	.607		36.323		.0162	.0068.047		.562
1985.200	.502	.570	.564	.541	.508	.467	.421	.374	.326	.282	.456		39.301		.0342	.0035.056		−.113
1986.104	.438	.526	.518	.486	.444	.401	.359	.319	.283	.252	.454		32.301		.0295	−.0013.056		.251
1987.079	.271	.330	.356	.369	.369	.361	.346	.326	.302	.275	.244		28.438		.0247	−.0058.061		.668
1988.026	.246	.310	.330	.336	.334	.326	.312	.292	.268	.240	.230		27.548		.0369	−.0073.065		.256
1989.000	.059	.235	.298	.319	.325	.324	.319	.309	.297	.282	.100		33.523		.0477	−.0082.081		.306
1990.169	.230	.212	.165	.127	.105	.093	.086	.086	.079	.076	.186		26.365		.0374	−.0029.084		−.186
1991.180	.271	.281	.257	.243	.239	.239	.238	.234	.229	.221	.173		26.249		.0054	.0052.073		−.311
1992.165	.322	.383	.389	.385	.379	.375	.373	.373	.373	.373	.310		29.211		−.0206	.0110.063		−.214
1993.029	.239	.371	.418	.442	.462	.483	.505	.526	.544	.559	.370		28.274		−.0182	.0089.050		.158
1994.062	.172	.249	.309	.361	.408	.449	.483	.509	.526	.535	.129		32.521		.0151	.0048.040		.872
1995.130	.353	.393	.401	.415	.426	.428	.420	.404	.382	.359	.246		38.383		.0397	.0013.039		−.143

Table 3. Adjusted R^2 statistics of alternative models in yearly cross-sections.

$$\frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + \beta_2 RISK_i + \beta_3 GROWTH_i + u_i, \text{ where } \overline{NITA_i} = E\left[NI_{i,t+1} / TA_{i,t}\right] \text{ is obtained by alternative time series models.}$$

	Smoothing parameter / Model abbreviation												Yearly means of variables			
	α=0	α=.1	α=.2	α=.3	α=.4	α=.5	α=.6	α=.7	α=.8	α=.9	α=1.0					
Year	*ES0*	*ES1*	*ES2*	*ES3*	*ES4*	*ES5*	*ES6*	*ES7*	*ES8*	*ES9*	*RW*	*ME7*	*N* V_t/A_t	NI_t/TA_{t-1}	*RISK* *GROWTH*	R_m
1979.234	.261	.283	.292	.294	.292	.290	.288	.287	.284	.279	.293		34.160	.0082	–.0001.033	.134
1980.444	.486	.497	.486	.471	.457	.443	.425	.406	.386	.368	.491		35.169	.0504	.0104.037	.170
1981.138	.226	.266	.255	.215	.163	.114	.081	.062	.053	.048	.290		35.136	.0416	.0086.038	–.032
1982.180	.262	.274	.258	.243	.231	.221	.214	.211	.211	.212	.297		36.171	.0250	.0085.039	.350
1983.302	.355	.383	.386	.383	.380	.378	.377	.377	.377	.377	.409		37.202	.0094	.0065.044	.323
1984.391	.470	.555	.576	.569	.549	.525	.500	.477	.457	.438	.586		36.323	.0162	.0068.047	.562
1985.482	.558	.592	.594	.585	.568	.549	.530	.512	.497	.485	.509		39.301	.0342	.0035.056	–.113
1986.509	.564	.581	.572	.561	.552	.545	.539	.534	.530	.525	.545		32.301	.0295	–.0013.056	.251
1987.350	.350	.344	.346	.351	.353	.354	.353	.352	.349	.347	.318		28.438	.0247	–.0058.061	.668
1988.100	.193	.274	.340	.345	.314	.283	.257	.234	.213	.194	.165		27.548	.0369	–.0073.065	.256
1989.000	.047	.204	.273	.299	.312	.319	.320	.317	.310	.300	.055		33.523	.0477	–.0082.081	.306
1990.200	.203	.162	.125	.110	.108	.114	.125	.138	.151	.164	.135		26.365	.0374	–.0029.084	–.186
1991.239	.266	.236	.214	.217	.234	.254	.267	.269	.262	.249	.157		26.249	.0054	.0052.073	–.311
1992.250	.324	.398	.450	.485	.500	.499	.490	.480	.469	.459	.320		29.211	–.0206	.0110.063	–.214
1993.256	.342	.443	.500	.529	.546	.556	.564	.572	.578	.582	.389		28.274	–.0182	.0089.050	.158
1994.338	.350	.373	.401	.427	.449	.467	.483	.496	.506	.509	.281		32.521	.0151	.0048.040	.872
1995.177	.319	.359	.370	.385	.397	.399	.392	.379	.365	.354	.205		38.383	.0397	.0013.039	–.143

Table 4. Optimal models in yearly cross-sections.

	$\frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + u_i$				$\frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + \beta_2 RISK_i + \beta_3 GROWTH_i + u_i$					
Year	$\overline{NITA}$ version	β_0	β_1	Adj. R^2	$\overline{NITA}$ version	β_0	β_1	β_2	β_3	Adj. R^2
1979	ES5	0.16***	1.04***	.320	ES4	0.15***	0.82**	0.42	0.33	.294
		(12.19)	(4.07)			(7.60)	(2.08)	(0.72)	(0.73)	
1980	ME7	0.15***	1.53***	.476	ES2	0.12***	1.22***	0.24	0.71	.497
		(12.23)	(5.65)			(6.95)	(3.31)	(0.61)	(1.67)	
1981	ME7	0.12***	1.18***	.312	ME7	0.11***	1.09***	0.28	0.27	.290
		(11.17)	(4.05)			(6.02)	(3.31)	(0.75)	(0.65)	
1982	ME7	0.15***	1.53***	.314	ME7	0.13***	1.36***	0.39	0.64	.297
		(10.92)	(4.13)			(4.40)	(3.20)	(0.56)	(0.94)	
1983	ME7	0.17***	2.06***	.379	ME7	0.11***	1.43**	0.80	1.53*	.409
		(9.83)	(4.80)			(2.91)	(2.69)	(0.77)	(1.79)	
1984	ME7	0.23***	4.61***	.607	ME7	0.19**	4.14***	–0.07	0.97	.586
		(7.33)	(7.42)			(2.65)	(3.90)	(0.03)	(0.56)	
1985	ES2	0.17***	4.98***	.570	ES3	0.10*	3.76***	–2.64	2.00*	.594
		(5.13)	(7.17)			(1.80)	(3.81)	(1.35)	(1.81)	
1986	ES2	0.18***	4.67***	.526	ES2	0.08	2.77**	–0.11	2.63**	.581
		(5.38)	(5.95)			(1.58)	(2.48)	(0.05)	(2.37)	
1987	ES5	0.32***	3.94***	.369	ES6	0.23**	2.01	–0.21	2.44	.354
		(7.00)	(4.10)			(2.58)	(1.20)	(0.08)	(1.28)	
1988	ES4	0.38***	5.05***	.336	ES4	0.52***	8.89***	0.07	–4.12	.345
		(5.80)	(3.76)			(4.54)	(3.09)	(0.02)	(1.53)	
1989	ES5	0.40***	3.34***	.325	ES7	0.33***	2.56***	–1.53	0.99	.320
		(8.32)	(4.05)			(4.20)	(3.86)	(0.63)	(1.27)	
1990	ES1	0.23***	3.69***	.230	ES1	0.17**	3.26*	–2.21	0.84	.203
		(4.22)	(2.91)			(2.11)	(2.01)	(0.86)	(0.92)	
1991	ES2	0.15***	3.17***	.281	ES8	0.18***	2.15**	2.08	0.39	.269
		(3.94)	(3.28)			(3.73)	(2.30)	(0.91)	(0.49)	
1992	ES3	0.17***	2.95***	.389	ES5	0.16***	2.44***	3.62**	0.20	.500
		(8.88)	(4.23)			(4.20)	(3.81)	(2.61)	(0.35)	
1993	RW	0.32***	2.42***	.559	RW	0.30***	2.33***	2.91*	–0.26	.582
		(14.34)	(5.93)			(5.42)	(4.42)	(1.86)	(0.28)	
1994	RW	0.42***	6.47***	.535	RW	0.44***	6.33***	1.53	–0.54	.509
		(10.88)	(6.05)			(6.83)	(3.72)	(0.47)	(0.35)	
1995	ES6	0.29***	3.68***	.428	ES6	0.28***	3.64***	–0.45	0.34	.399
		(10.91)	(5.36)			(7.28)	(4.39)	(0.30)	(0.39)	

Absolute values of t-statistics in parentheses.
* Significant at the .10 level in a two-tailed test.
** Significant at the .05 level in a two-tailed test.
*** Significant at the .01 level in a two-tailed test.

Table 4 reports the estimated coefficients and significance levels for those models that proved to possess the highest explanatory power in yearly cross-sections.[16] The intercept and the earnings expectations variable are always significant in the one-variable models at least at the 0.01 level, with expected signs. As for the three-variable model, the earnings variable always has the expected positive sign and is nearly always significant. The risk variable works very poorly, as there is no evidence of the expected negative relationship between risk and value. In the two cases when the risk variable is significant, it has the unexpected sign. The growth variable usually has the expected positive sign but is only seldom significant.

Due to limited number of yearly observations, additional regressions were run with all yearly observations pooled.[17] These results are summarized in Table 5. High significance of the earnings variable is confirmed again, and the best fit is obtained using exponential smoothing forecasts with $\alpha = 0.30$ in the one-variable case and with $\alpha = 0.40$ in the three-variable case. These optimal coefficients are consistent with the features that were observed in the yearly regressions. The risk variable remains insignificant, whereas the growth variable now emerges highly significant with the expected sign.[18]

In both yearly and pooled regressions, the reciprocals of estimated coefficients for the earnings expectations variables in the three-variable models are too high to be reasonable approximations for the risk-free rate that they should represent. The reciprocal of β_1 should approximate the average cost of equity capital in the one-variable version. These estimated coefficients are also quite low, and one would have anticipated that the earnings coefficients in the three-variable models would have usually been higher than those in the one-variable version, but this is not the case.

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[16] Reporting is restricted to these "optimal" models for parsimony.

[17] The models were estimated using dummy variables for years 1980-1995. The signs and coefficients of these yearly dummies are not reported for brevity.

[18] For reasons described earlier (see footnote 8), the growth variable specification is a very crude one. Whether the market merely loves expansion, or really values opportunities to invest funds for projects that are expected to earn in excess of the cost of capital, remains unfortunately without evidence.

Table 5. Pooled data results (years 1979–1995 combined). 551 observations.

A. Adjusted R^2 statistics

$$\text{Model: } \frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + u_i$$

ES0	*ES1*	*ES2*	*ES3*	*ES4*	*ES5*	*ES6*	*ES7*	*ES8*	*ES9*	*RW*	*ME7*
.345	.466	.524	.535	.532	.523	.513	.500	.487	.473	.459	.486

$$\text{Model: } \frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + \beta_2 RISK_i + \beta_3 GROWTH_i + u_i$$

ES0	*ES1*	*ES2*	*ES3*	*ES4*	*ES5*	*ES6*	*ES7*	*ES8*	*ES9*	*RW*	*ME7*
.459	.506	.535	.544	.545	.544	.541	.537	.531	.526	.519	.505

B. Optimal pooled models.

$$\frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + u_i$$

$\overline{NITA}$ version	β_0	β_1	Adj. R^2
ES3	0.14***	3.30***	.535
	(5.28)	(16.72)	

$$\frac{V_i}{A_i} = \beta_0 + \beta_1 \overline{NITA}_i + \beta_2 RISK_i + \beta_3 GROWTH_i + u_i$$

$\overline{NITA}$ version	β_0	β_1	β_2	β_3	Adj. R^2
ES4	0.12***	2.58***	-0.31	1.02***	.545
	(4.12)	(11.03)	(0.78)	(4.12)	

Absolute values of t-statistics in parentheses.
* Significant at the .10 level in a two-tailed test.
** Significant at the .05 level in a two-tailed test.
*** Significant at the .01 level in a two-tailed test.

7. Concluding Remarks

The theoretical model abstracts from the possibility of bankruptcy. When the expected net income is negative (as was typical for the year 1992 and 1993 *RW*-based forecasts), the theoretical model predicts that the market value of equity is negative. (With the expected negative effect of risk, the model predicts a negative equity value even for small positive earnings levels.) Of course, the value of equity cannot become negative due to limited liability. From this follows that the true relationship between market value and expected earnings is not a linear one.[19] Thus, the theoretical model cannot properly handle situations when expected earnings are very low (i.e., when the probability of bankruptcy is non-trivial).

Note that the theoretical model (1) predicts that the estimated intercepts would be statistically indistinguishable from zero. Yet, all yearly estimated intercepts for the optimal models are positive and practically always significantly different from zero (being each time significant at the 0.01 level in the optimal one-variable versions.) As a test of linearity, the yearly observations were sorted by increasing order of the dependent variable, and the Durbin-Watson statistic was calculated for the residuals each year. The test results were similar for the competing versions. For example, with *RW*-based forecasts in the three-variable model, the null hypothesis of no positive autocorrelation was rejected at the 0.05 level in 14 out of the 17 yearly regressions, being inconclusive in the remaining three. The corresponding results by earnings variable *ES2* were 15/17, with inconclusive results in two yearly regressions. A likely consequence of this non-linear relationship is that the coefficients of the earnings variables are biased downward, causing the reciprocals of these coefficients to be poor proxies for the risk-free rate or cost of capital. Poor empirical performance of the growth and especially of the risk variable in this study, and in empirical tests of valuation models in general, may also be caused by this non-linear relationship. This emphasizes the importance of developing testing methods that can deal with valuation of high risk/low earnings firms.

As for the main issue of this paper, consistency of alternative time series forecasts with the market valuation of shares, this evidence of Finnish market valuations from years 1979–1990 suggest the conclusion that the market does not rely on the random walk

[19] See Scott (1976), Chen (1978) and Suvas (1996 b) for theoretical models where the bankruptcy probability is an integral part of the valuation equation.

model in evaluating long-run earnings prospects of firms. Of the competing alternatives considered in this study, the best explanatory power is found, in general, for earnings expectation variables obtained using exponential smoothing forecasts that can be classified as mixed models (mixtures of random walk and mean reversion). The optimal smoothing coefficient is around 0.30 or 0.40 in pooled data regressions, implying somewhat closer affinity to mean reversion than to random walk. Yet it appears that the optimal coefficient depends on the phase of the business cycle. This suggests that combining macroeconomic variables with past accounting time series could result in earnings expectations variables that still better reflect market forecasts on the long-run earnings prospects of firms.

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Global manufacturing strategies require "dynamic engineers"? Case study in Finnish industries

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Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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Purpose – This paper studies multifocused global manufacturing strategies under the influence of China effect taking the dynamic, complex and situational business strategies into account.
Design/methodology/approach - This study compares the competitive priorities of manufacturing strategies in four different types of companies with some international comparisons and one longitudinal case study for benchmarking. The AHP method also made possible to compare inconsistencies in the answers between the companies.
Findings - As a result of these case studies, it is possible to understand the competitive priorities of manufacturing strategies for the case companies, to show the other companies the route for developments.
Research limitations/implications - All four types of companies should grow internationally and utilize the developing countries as a means of lowering costs. But each type of company has its own special strategies to suit their markets.
Practical implications - Companies in western countries should utilize multifocused manufacturing strategies based on their business strategy in a holistic way, e.g. through RAL concept, and to specialize through quality, e.g. by differentiating product and service technology for global high dynamic and complex business. Global sourcing in purchasing shall also be more and more used effectively for cost and productivity competitiveness.
Originality/value – The development steps, from technology specialist to problem solver, are proposed in this paper. Human resources have to be trained to be more "dynamic engineers", all the time more also in industrial engineering and management.
Key words: competitive advantage, operations strategy, manufacturing, analytical hierarchy process
Paper type: Case study

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1. Introduction

With the impact from low cost labor markets from Asian countries, traditional manufacturing is moving from Europe to Asia. This new "China effect" influences the business and manufacturing strategies within many different business areas. For example, Kauppalehti Optio (2005) shows the fast growing trade between China and Finland, which in 2004 was valued to 5.5 billion dollars, as compared to 0.5 billion in the 1980's. The Finnish institutions and corporations have about 200 posts in China. The China effect shows bigger impact and influence to Western enterprises than ever before. Likewise, the China effect as it is currently understood as a macro phenomenon of impact from low cost countries, does not consist of only business with China but also with all other corresponding industrial business relationships e.g. to Russia, the new EU countries (Slovakia, Poland, Baltic Countries etc), Brazil, and to other Asian countries like India.

Concepts for global manufacturing strategies:

The main concepts, as used in this paper, are the following:

Outsourcing: a part of the functions and/or resources of an organization are transferred to be taken care of by a service provider outside the organization.

Insourcing: opposite to outsourcing.

Global sourcing: an organization is purchasing services from just the right place at just the right prize (not necessarily only from countries having lower labor costs).

Off-shoring: To transfer functions and/or resources from a country having higher labor costs to a far away country with lower labor costs (e.g. transferring manufacturing from Finland to China, or transferring them just to the opposite direction, e.g. transferring R&D from China to Finland).

Near-shoring: To transfer functions and/or resources from a country having higher labor costs to a close-to country with lower labor costs (e.g. transferring manufacturing from Finland to Estonia, or transferring them just to the opposite direction, e.g. transferring R&D from Estonia to Finland).

The objective of this explorative study is to *describe* the mechanisms and to *create preliminary normative models* by answering three ***research questions:***

1. What kind of competitive business and manufacturing strategies do different, high- performing Western companies utilize to design their operations in dynamic, situational and complex conditions of the China effect?
2. How are these strategic plans analyzed and implemented in the case companies? The research task is to find out the differences between manufacturing strategies and/or technology levels, and collaboration levels etc the China effect influence.
3. What kind of assets and resources would a technologically intensive country need to create and utilize these strategies? And what kind of requirements does this place for the human resources (engineers)?

To make our analysis more valuable and useful, we must take into account how the “China effect” will influence the manufacturing strategies. Manufacturing strategies have been changing from focused, in the 1970’s, to multi-focused (Takala 2002).

2. Up-to-date theories for the implementation of business and manufacturing strategies

According to Porter (1985), the only competitive global business strategies would be based on differentiation by unique specialization by quality or product or service technology or cost leadership. These, evidently, are also the strategic competitive weapons against the China effect. Barney et al (2001) suggest sustainable competitive advantage as a resource-based strategy, which evidently is a very powerful business strategy today. Takala (1997) states that most high performance organizations (HPOs) have had systematic and long-term development activities for more than 10 previous years to improve their competitiveness. For quickly changing business conditions, Bradley et al (1998) and Markides (2000) developed dynamic business strategies basing them on the sense-and-respond thinking.

Heikkilä (2004) shows that market forces are the most important motives in foreign production investments. Big developing countries like China, India, Russia and Brazil are continuously making stronger connections to global markets, causing growth in their production statistics. The case study in Finland, Germany, Sweden, Japan and US – trying to find out what is the strategical role of production in globally operating companies, by comparing what business strategies lead to certain production strategies – shows that there are no remarkable differences in business or production goals between these countries. Up to 25% of the surveyed companies consider their own production to be critical for them, whereas 10% state that it is not important. Operational agility is a multidimensional matter, in which the success may demand several equally important production goals, as Takala (2002) claims in his previous publications about multi-focused strategies. Operational agility requires typically the companies to conduct their own production, and supports mostly specializing strategies that are based on quality and special features of the product or services related to it. Know-how in production technology, in all forms, is a remarkable factor to agility as well. When competing with low price, volumes and input costs are most critical, but on the production level it is hard to affect these factors because this kind of decisions are made on business level.

Technology is understood as know-how (human competence), a relevant part of resource based strategy, including all types of assets and resources, or strategic networking (collaborations by using partnerships (Braun, 1998; Takala, 1997)).

Madu et al. (1996) introduced the concept of strategic groups for different technology and collaboration levels. The idea has been modified by the authors by adding the typical development route of global industries to be later considered when studying the influences of China effect (Figure 1). The main idea is that in global markets, when a company starts export activities, it has to move cautiously from being a technology specialist to selling commodity products, from that further to a collaboration partner, and finally to problem solver especially in technologically intensive countries such as Finland or Sweden. It is not typically possible to move from a technology specialist position directly to a problem solver role, even though that would be desirable.

The Indian Express (2005) published an article about a study criticizing the arguments that US would have lost its technological edge, an argument of anti-offshoring lobbies: *"The debate over outsourcing has moved from American City Halls to engineering colleges in India. A new report released by Duke University (...) has argued instead, that the quality of engineers coming out of India – and China – is not really comparable with those graduating from US colleges. (....) study classifies engineers as*

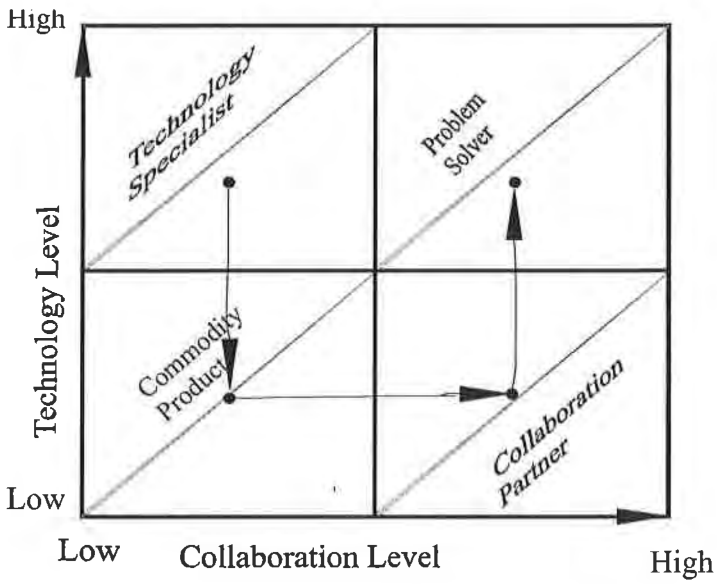

Figure 1. Development route for global industries (modified from Madu et al (1996)).

*"**dynamic**" or having "high-level problem solving (skills) using scientific knowledge", or "**transactional**", implying the person may have engineering fundamentals but not the experience of expertise to apply this knowledge to larger problems (e.g. to projects). While dynamic engineers thrive in teams, work well across international borders, have strong interpersonal skills, and are capable of translating technical engineering jargon into common diction, the transactional lot is typically responsible for rote and repetitive tasks in the workforce. The dynamic engineers can lead innovation and typically have four-year degrees, but the transactional subset, have associate, technician or diploma awards rather than a bachelor's degree."*

A manufacturing strategy based on a business strategy includes three objectives: competitive priorities, manufacturing objectives and action plans. In the first phase competitive priorities are defined, they should answer what the manufacturing strategy function should achieve regarding to cost, quality, flexibility and delivery in order to support the business strategy effectively. In the second phase manufacturing objectives are determined on the base of the competitive priorities. Manufacturing objectives have relative emphasis on performance measures that are related with cost, time, and quality. In the third phase manufacturing objectives are used to result action plan. In action plan it is described possible improvement programs and recognizing its expected effects on specific operating objectives. Process model of manufacturing strategy can be seen in Figure 2.

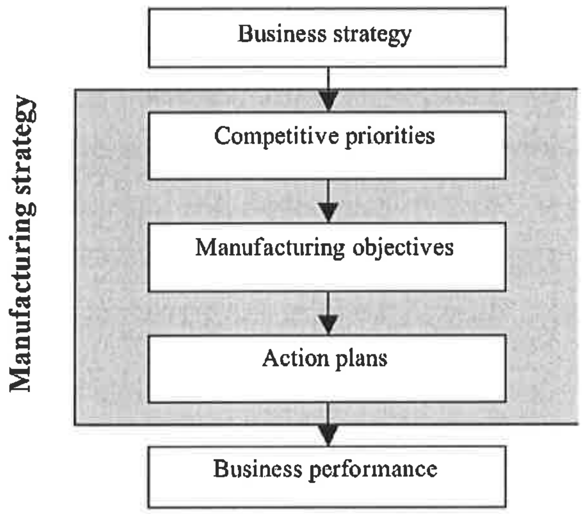

Figure 2. A process model of manufacturing strategy (Kim et al. 1996).

A very challenging example of holistic and multifocused manufacturing strategies, based on business goals is Responsiveness, Agility and Leanness (RAL) model shown in Figure 3. RAL has basically been created for understanding the success factors of logistics, but it is relevant for all operations strategies and operations management, thus for manufacturing strategies as well. The main dimensions of RAL are R= responsiveness; "speed by which the system satisfies unanticipated requirements", A= agility; "speed by which the system adapts to the optimal cost structure", and L= leanness; "minimizes waste in all resources and activities".

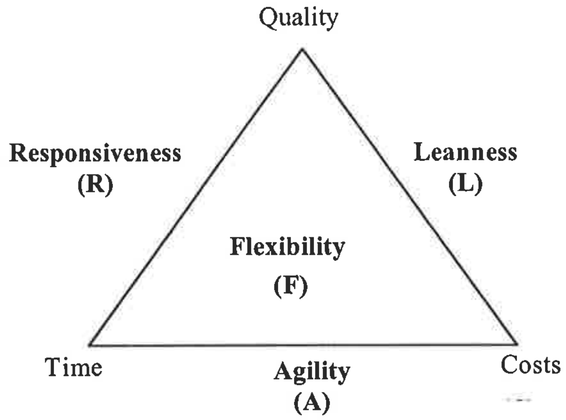

Figure 3. The RAL model (Takala 2002).

Flexibility, as the focused core concept, means product mix, volatility in conditions (changes in volumes), complexity (technology level, number of modules and modularity and life cycle flexibilities.

Phusavat et al. (2005) carried out comparative case studies related to outsourcing especially in manufacturing strategies between Finland and Thailand. The RAL model, with fast learning requirements for innovative adaptation (shown also by Bogan et al (1994)), could be utilized in both the countries. Quite big differences could be found out in manufacturing practices: e.g. closer quality (innovations), flexibility and even time-based partnerships in Finland, and systematic efforts especially for higher cost effectiveness in Thailand.

3. Methodology and sample

Situational case studies, under dynamic business conditions, can effectively be carried out by building inductively new theories by hermeneutic case study research (Eisenhardt, 1989). These mostly qualitative case studies can be realized in a reliable way by using Sykes (1991) idea about "careful documentation" of the cases.

The Analytical Hierarchy Process method (AHP) was employed for analysis in the case studies. Rangone (1996) has illustrated the use of the AHP model in solving strategic problems in organizations, by informational examples how to implement AHP model in practice. The AHP is a decision making tool to help people set priorities and make the best decision when both qualitative and quantitative aspects of a decision need to be considered. It is also a comprehensive, logical and structural framework, which allows the understanding of complex decisions by decomposing the problem in a hierarchical structure. The AHP helps decision makers to arrive at the best decision, and provides a clear rationale that it is indeed the best. The incorporation of all relevant decision criteria, and their pair-wise comparison, allows the decision maker to determine the trade-offs among objectives. Such multi-criteria decision problems are typical for manufacturing strategy and R&D project selections.

The application of the AHP approach explicitly recognizes and incorporates the knowledge and expertise of the participants in the priority setting process, by making use of their subjective judgments, a particularly important feature for decisions to be made on a poor information base. However, AHP also integrates objectively measured information (e.g., yields) where this information is available. The AHP is based on three principles:

1. Decomposition of the decision problem,
2. Comparative judgment of the elements, and
3. Synthesis of the priorities.

The first step is to structure the decision problem in a hierarchy (as depicted in Figure 4). The goal of the decision, such as "Optimal Allocation of Research Resources", is at the top level of the hierarchy. The next level consists of the criteria relevant for this goal and at the bottom level are the alternatives (for example research projects) to be evaluated.

The second step is the comparison of the alternatives and the criteria. They are compared in pairs with respect to each element of the next higher level. For this relative comparison, the fundamental scale of Table I can be used. It allows expressing the comparisons in verbal terms that are then translated in the corresponding numbers.

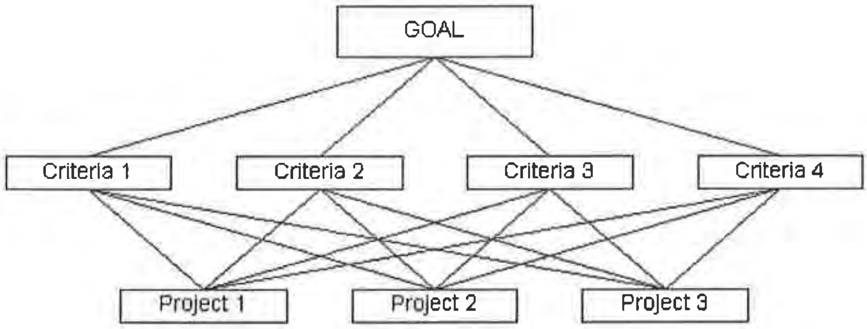

Figure 4. The decision problem in a hierarchy.

The last step is connecting the comparisons to get the priorities of the alternatives with respect to each criterion and the weights of each criterion with respect to the goal. The local priorities are then multiplied by the weights of the respective criterion. The results are summed up to get the overall priority of each alternative.

Table 1. A fundamental scale for pair wise comparisons.

Verbal scale	**Numerical values**
Equally important, likely or preferred	1
Moderately more important, likely or preferred	3
Strongly more important, likely or preferred	5
Very strongly more important, likely or preferred	7
Extremely more important, likely or preferred	9
Intermediate values to reflect compromise	2, 4, 6, 8

According to an expert interview with Phusavat (Takala, 2006), the firms investing in China can be categorized at least into three different groups. The first category (I) is the firms that have their product development and design (R&D), and production offshore, but have their distribution and retail in China, expecting to have more Chinese buyers. The second category (II) represents the firms that have their R&D off-shore but their production, distribution and retail in China. The last category (III) focuses on the firms that have their production in China (to take advantages of lower labor costs) but sell products elsewhere (thus not focusing only on Chinese clients).

Sample

This study compares the competitive priorities of manufacturing strategies of a small amount of different, ideal typical western companies (in this sample represented by four companies with their main seats in Finland) with some international comparisons and one longitudinal case study for benchmarking, to show the other companies the route for developments. All these companies are in some way affected by this China effect and are selected to resemble the ideal types that were studied by Madu et al (1996). Company A, a medium-sized company, produces high tech products within electrical power engineering. The other three are small companies. Company B represents high tech software business, company C medium tech traditional mechanical engineering works and company D low tech industry manufacturing special types of clothes. All case studies have been conducted with AHP methodology. The case studies in the companies have been carried out by the students of course Corporate Strategy Planning / manufacturing strategies at University of Vaasa by using RBL principle (see acknowledgment). The main criteria and sub criteria prepared in the questionnaires for interviews have been defined by the students who have good knowledge about the operation of the case companies, i.e. some of them are working or have been working there in the management group. The interviewees are the decision makers in the case companies, and the number of them is depended the size of case company. From same case company the inconsistent results are left out. The case companies and studies are clarified in more details in Chapters 4, 5, 6 and 7.

4. High Tech medium business strategies (Company A) under the influence of China effect

The business of Company A is based on a quite high technology and modular specification for gaining flexibility e.g. in global deliveries of main component supplies of wind power plants in dynamic business conditions. The main business areas are power and automation technologies and it is a leader in these areas. The case company manufactures low voltage motors in six countries, in some since about 100 years ago: Finland, Sweden, Spain, Italy, India and China. In the year 2003 the revenues in the case unit were 132M EUR, amount of employees was 615 and there were manufactured 37 870 pieces of motors.

The main focus of the company is to be a fast and reliable provider for the products and services according to customer's needs. It is important to reach both competitiveness in the networked world and the results defined by the shareholders. One main factor in this work is skilled personnel. The company also follows the principles of sustainable development. For the case factory, there are several other important considerations in addition to above basic principles of strategies. These are e.g. flexibility according to customer needs, delivery promptness, quality of the products, etc. (Figure 5).

According to the analysis of data from the questionnaires answered by this company's management, we find that the production manager emphasizes customer focus more than the representatives from other functions. The engineering manager thinks that quality is most important, but the marketing manager seems to focus much less on quality than the others. The marketing manager thinks that customer focus is the most important which is logical from his point of view. The production manager emphasizes that still more. Through the data analysis, for this high tech and mature company, product quality and customer focus are the most important factors in manufacturing strategies.

To increase the market shares, the company has founded one of its affiliates in Beijing in 1979 and began to enter the Chinese market. In China, it has been able to maintain its high product quality available in other countries. At the same time, it has set a technology center in China to consolidate its local market share. As the CEO stated, the sales in the China market ranked third in the world only behind the USA and Germany, and he believes that during the next five years the Chinese market will become the biggest market in the world. Just because of the huge market in China, to enter Chinese market and maintain a share there is no doubt central for the company's strategy. To increase the Chinese market shares, its branch company in China, a joint venture, has made the following plans for the next years: firstly, to maintain the growth rate of 20% per year at least before 2008, and secondly, to increase the investments. From now to 2008, it will add another 100 million US dollars in new product lines and new factories in China. Furthermore, it plans to buy the raw materials in local market instead of from European market as before which way will reduce cost greatly. It also plans to establish the research centre in Beijing, aiming at enhancing its innovation ability and meet the local customers' needs optimally. Finally, the unit plans to cultivate local human resources, leading to an increase in the quality of product and service and at the same time reduce the cost.

From the above analysis, we conclude that the big market in China attracted this multinational enterprise and for better adoption to the Chinese market it has changed some strategies such as the adopting of new materials resources and local providers, moving from only final assembly in China to the new style of maximizing the utilization of local providers and subcontractors, using not only low cost local labor but also low cost local material, adopting the Chinese enterprise standards to meet the international standards, etc. But as a company famous with its high product quality, it stresses its quality in China as well. This is solved by studying the Chinese quality management system and applying the same standards in quality control.

The answers to the first two research questions would therefore evidently be to dynamically multifocus and specialize by quality and customer focus in a global high dynamic and complex business. Global sourcing in purchasing is also used effectively for cost and productivity competitiveness. The third research question, about human resources, is answered as having and training every day more dynamic engineers, especially in industrial engineering and management.

5. High Tech small business strategies (Company B) under influence of China effect

Company B is as a subcontracting supplier comparable to category III as investor in China. This business is based on high technology and modularity, e.g. in subcontracting deliveries in dynamic and complex business conditions with more and more globally active clients.

Company B which represents high tech software subcontracting business was founded 1999. It has 8 main big, international customers, and it only employs 31 highly skilled experts. It acts as a partner of internationally operating industrial companies, which means that this company knows the technology and develops itself quickly. It has the ability to provide independent information technology services and carry out entire product development and delivery design projects. Its design services consist of software subcontracting, electronics and software design, SMS/MMS-service platform and electrical gateways. This company is mainly focusing on industrial software technology and software subcontracting and makes customer specific software, electronic design and software projects. The company values are operational excellence, product leadership and customer intimacy. Superb operations and execution often provides a reasonable quality at a very low price. The focus is on efficiency, streamlining operations, supply chain management, no-frills and volume counts.

The product leadership is very strong in innovation and brand marketing, operating in dynamic markets. The focus here is on development, innovation, design, time-to-market, and high margins in a short time frame. And customer intimacy means that B has to excel in customer attention and customer service and tailor their products and services to individual or almost individual customers. Focus in this area is on CRM (Customer Relationship Management), to be able to deliver products and services on time and above customer expectations, offering lifetime value concepts, reliability, and being close to the customer. In these values, customer intimacy plays the most important role in its strategies with weight of 67.2%, followed by operational excellence that weighs 25.7%. The last is product leadership, with a weight of only 7%.

According to the investigation and questionnaire provided to the management in the company and through analysis based on the AHP, we can find the most important strategy in this company is quality, with a weight of 45.6% followed by customer focus 21.1% and cost 15.3% (Figure 5). From this analysis, we find that customer focus and quality is the perceived most important criteria for success. The two criteria are consistent with the characters of small and high tech companies. We also know that the small companies mostly provide their products and services to local customers. If this assumption is correct, the China effects may not affect this type of companies significantly. This might be also because software industry in China is not so developed and many software companies only meet the local market needs for special software that is designed for special requirement of customers. In this way, Chinese software hardly occupies European markets.

Considering the cheap labor in China, small and high tech companies may subcontract some orders to Chinese software companies to benefit through a reduced cost. Nowadays, outsourcing has been an important trend in the world software industry. According to the forecast of IDC, software outsourcing over the world has increased at the speed of 29.2% per year. However, in the process of outsourcing, small and high tech companies will meet several problems and should adjust their old strategies. Firstly, big cultural differences will be barriers between these companies and Chinese software companies. Thus, this type of companies should hire the Chinese engineers who have studied or worked in the European countries for a long time to serve as a connection "bridge". Secondly, the size of Chinese software companies are normally not as big as Indian software companies, thus the Chinese companies hardly would complete huge projects. This requires the Finnish high tech companies to subcontract the project to several companies, but in this way, the education cost, management difficulties and outsourcing risks also increase. An effective method is to find an intermediate agency in China to assist in managing the outsourcing projects and educating Chinese software companies.

The answers to the research questions therefore would evidently be to dynamically multifocus and specialize by quality and customer focus for high dynamic and complex business with globally active clients, and train for more dynamic engineers, as for Company A.

6. Medium/low Tech small business strategies (Company C) under influence of China effect

The third company in our study is a medium/low tech, local "collaboration partner" company C. Company C is as a subcontracting supplier comparable to category III as investor in China, and it is not currently specialized in its business. This business has quite low technology and the products are of low modularity.

Company C, a small business, is a metal company formed in the 1940s. Its turnover is about 7.1M EUR and it employs just little bit over 60 persons. The strategy of this company is to follow the development in their manufacturing sector and to further develop the production and machining methods in their own production as well as in subcontracting. Through the AHP analysis, according to the mean values of the main criteria, the most important criteria in the company's manufacturing strategy is time management. The next most important aspects are costs and flexibility. The least important of the criteria according to the respondents is quality. The production strategy of C seems to be that of ordinary, old-fashioned manufacturing company that concentrates on timing and costs. On the other hand, the company's strategy is changing towards more quality driven and flexible. For such a company with medium or low technology base, good service will be the most important factor, influencing the company's business hugely. Thus it is very important to be on time. With timely and reliable deliveries it is possible to gain new customers and keep the existing customers satisfied, whereas low reliability of deliveries and delivery times may result to customer loss (Figure 5).

Now, how will this type of manufacturing strategies change under the China effect? Firstly, this type of company with medium or low technology base should keep the strategy of being on time no matter when and where they are located. Being on time is the guideline in the actual business environment of this type of company. When lots of Chinese firms enter Western markets, the incumbents should maintain their loyal customers by keeping their timeliness that should be easier from nearby locations. Secondly, Chinese firms are known for their low cost. This is why most people think Chinese firms are competitive. Usually, reducing the cost stems from both inner and outer aspects. From an inner aspect, the incumbent Western companies should improve their productivity and reduce the redundant personnel, which methods are already broadly adopted companies such as C, so we should concentrate more on the outer aspect. The outer aspect concerns the network of suppliers and customers. In order to be able to procure low cost materials, the only way is to start up branches in developing countries. In this way, the companies not only can get the low cost materials but also reduce part of the manufacturing cost. In the same time, this step can help these companies to establish the market shares in developing countries. This step thus also helps these companies become international.

The answers to the research questions 1 and 2 would therefore, for companies similar to C, be to multifocus and “specialize” by costs, flexibility and quality. Every day increasingly global sourcing is used for cost and productivity competitiveness.

7. Low Tech small business strategies (Company D) under influence of China effect

Finally, the fourth case company D is a small, medium/low tech yet unspecialized “global collaboration partner”, trying to change to be "problem solver” company. D is a category III investor in China. This business utilizes increasingly high (but at this moment yet not so high) technology.

Company D was established in 1937. Their factory is located and almost their whole production is made in a small Northern-European country. They produce work clothes for smaller and bigger clients, developed for changing environments and a multitude of jobs. Their main strategy is to serve clients with flexible expertise, high quality materials and above all comfortable and good work clothes. Some decades ago they employed almost 200 workers. Nowadays they only have approximately 20 workers. Based on the data analysis and questionnaire provided to the company's management, we draw the conclusion that low costs are the most important factor in the business of this company. On the other hand, quality gets the lowest values of importance. The other fields are rather equal. Flexibility is however perceived to be a little bit more important than customer focus and know-how. To emphasize the low cost level, this company is attempting to follow the trend of their branch, that is, most of the textile industry enterprises have transferred their production to the cheaper labor countries, for example to Russia, Estonia and China (Figure 5).

Especially concerning low-tech branches such as textile industry, we have to talk about China effect. Chinese textile occupies a big share (over 90%) of world textile market. This is firstly due to the advanced technology. Chinese textile products represent a level of quality warmly welcomed by the customers. Secondly, and maybe much more important, Chinese textile companies excel in cheap raw materials and labor. Many textile companies set branches in China in order to reduce the cost, and more companies, even many world-known luxury brands, just sign contracts with Chinese local factories to manufacture clothes or textiles.

At the same time, there are many large, medium or small textile factories in China, so many textiles are exported to the USA or the European markets. As a result, Chinese products occupy big market shares also in Western markets, so the European companies have to close because they cannot afford the cost. The only sustainable solution is to transfer to China in order to survive. For a freely available, low technology business such as textiles, the best way to survive in the market is to reduce the cost. Thus, the decision of company D is to transfer their production to the cheap labor countries as for example to Russia, Estonia and China. At the same time, due to many competitors in the markets, being flexible to customer needs while maintaining low price will be beneficial, especially to small companies.

The propositions for answers to the research questions 1 and 2 would, for a small low-tech company, therefore be to "situationally" multifocus and specialize more and more by costs, flexibility and quality. Global sourcing should be used effectively for cost and productivity competitiveness. Thus, also here the 3rd research question about human resources is answered by recruiting more dynamic engineers, especially in industrial engineering and management.

8. Evaluation of the analysis of the four cases

The main criteria of AHP evaluation results are listed in Table II, based on the case studies of four companies that represent four typical categories of Finnish companies (see also Figure 5).

Table 2. AHP evaluation results (S for Small, M for Medium and L for Large companies).

	High-tech M/L	High-tech S	Medium/Low -tech M/L	Medium/Low -tech S
Customer focus	26.3%	21.1%		13.7%
Cost	15.9%	15.3%	51.8%	45.7%
Quality	45.3%	45.6%	9.4%	10.6%
Flexibility	6.7%	9.6%	9.4%	17.3%
Other	5.8%	8.4%	29.4%	12.7%

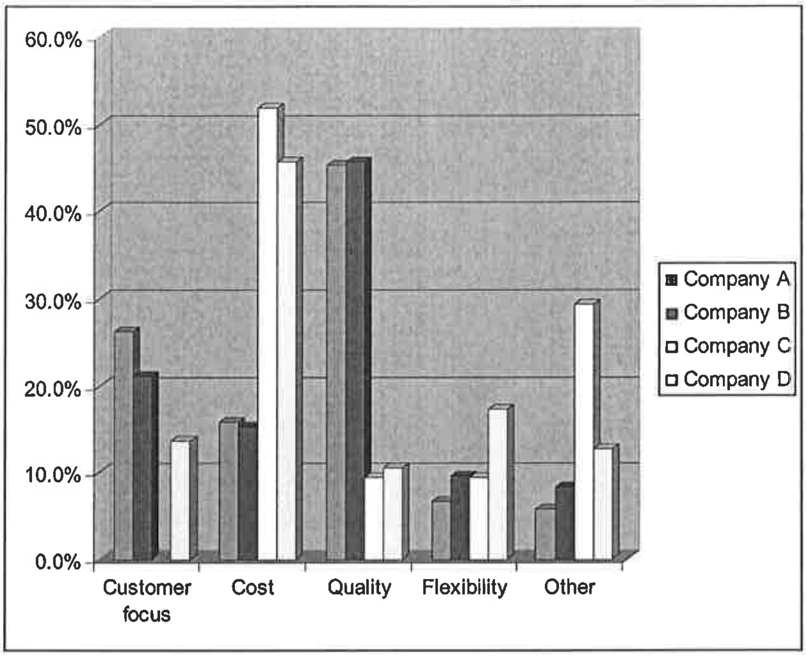

Figure 5. Comparison of the competitive priorities of the manufacturing strategy for Case Companies A, B, C and D.

From the evaluation and comparison results it can be concluded that quality is the manufacturing competitive priority number one in high technology-based industries and costs in low tech businesses showing the influence of China Effect. In countries such as Finland, having quite high technological capabilities in the manufacturing businesses, flexibility and timing are the manufacturing competitive priorities number two or three. They are probably the most typical factors by which the Finnish companies try to survive against the China Effect. Flexibility, as the heart of the RAL model, and all the other dimensions of the multifocused manufacturing strategy related to it, are evidently worth defining in an accurate way to understand the specialization strategy in any business, from one situation to another. All the inconsistency ratios (internal or RAL based construct validity) of the manufacturing strategies researched by AHP were on an acceptable level in this case study.

The Benchmarking Case Study

The China effect has also been researched longitudinally, from 2003 to 2005, for comparing and benchmarking purposes in a medium/large, high tech, highly specialized "problem solver" company LWBM (Madu et al, 1996). The comparison could be carried out especially to Case company A (see Chapter 4) because both Case A and LWBM belong to category I as investors in China. This business is based on high technology and modularity for flexibility in complex global project deliveries of diesel power plants in dynamic business conditions. It has reduced its locations in Europe from 15 different locations of manufacturing to only two in the last 10 years. The manufacturing is being done more and more by subcontractors, joint ventures or even by other companies by license. This is due to the general cost effectiveness of ship manufacturing in Far East. The cheapness of manufacturing marine vehicles in Far East reflects also the vehicle power supplies that must reflect the same price consciousness. Though the marine power supplies are not the only product of this company, changes in marine vehicle markets have affected also the production of other products.

As can be seen from the data analysis, for this high-tech but mature business, product quality and customer focus were the most important factors in manufacturing strategies even some years ago. The latest study pointed out that cost has become one of the most important factors even for high- technology large business companies. Quality is still

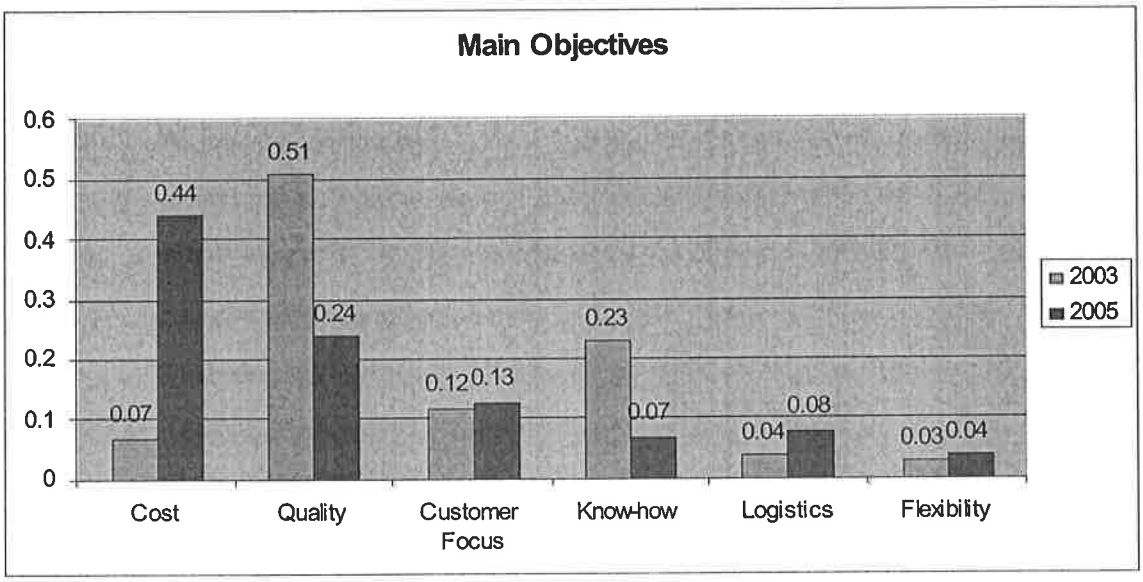

Figure 6. Competitive priorities for LWBM.

being considered in company A (see Figure 5) as the best advantage in competition against rivals in global markets, but LWBM is concentrating especially on lowering their prices to get its share of the markets under China effect (Figure 6).

By comparing the results of 2003 (Takala, 2003) and 2005, we can see that LWBM has recently concentrated on cost though the cost of quality and customer focus. This is a typical way of companies to achieve a market share in new areas (Madu et al, 1996). When the customer base is wide and the company is established in Asian markets, it may be able to return to more quality-focused strategies. The lowering of the quality and customer focus can be seen for example in the strategy where LWBM admitted licenses to local companies to manufacture products under their trademark, but the responsibility over the quality of the products is being held by the local manufacturer.

The answers from case LWBM to the research questions 1 and 2 would therefore also to be dynamically multifocus, this time by specializing through quality and customer focus for global high dynamic and complex business. Global sourcing in purchasing is situationally used very effectively for cost and productivity competitiveness. The 3rd research question about human resources likewise is to have and train every day more dynamic engineers, more and more also in industrial engineering and management.

As a conclusion from the case studies, the answers to the research questions 1 and 2 would be for all types of companies to dynamically multifocus the manufacturing strategies basing it on the main business strategy, in a holistic way, e.g. through mirroring it to the RAL model. The emphasis must naturally be different for different types of companies, as illustrated by the ideal typical companies above as can be seen from Takala et al (2006b) concentrating on quality and especially customer satisfaction management. There is also always needs to focus to specific areas, such as agility and productivity, of RAL model and to specific industries, such as electronics industry, as in Helo (2004). And, to emphasize the most critical approach to change management in specific dynamic business processes, such as automotive supply chains we could utilize e.g. Childerhouse et al (2003). Global sourcing in purchasing shall also be more and more used effectively for cost and productivity competitiveness. Figure 1 (Madu et al,

1996) shows the route for the development of companies from a local technology specialist to international problem solver. To enable this change, the companies should recruit and train every day more dynamic engineers, all the time more also in industrial engineering and management. The framework for performance measurements for white-collar workers, created by Takala et al (2006a), could be effectively utilized in the future research on developing the definition and measurements of the concept and performance of the dynamic engineer. And, concepts and models for service quality, according to Ghobadian et al (1994), could be utilized for analyzing performance of knowledge intensive business services, that evidently will have an important role in the global competitiveness of Finnish Industry.

9. Principle for quantification RAL – model

RAL model in Figure 3 only generally defines relations among the flexibility – F and R, L. This is only idea of relation, not the explicit defined relations.
Triangle created from R, L, A defines the square which is adequate to the volume of manufacturing system flexibility – (F)

$$F = f(R, L, A)$$

However RAL model in Figure 7 does not define for example the relations such as:

$$R = f(T,Q),\ L = f(Q,C),\ A = f(T,C)$$

If it is assumed, that L, A, R have similar priorities and are defined in relative form in "%". In this case, when in some moment t_1 all variables Q, C, T are 100 % triangle will be always symmetric – "META RAL" triangle. Sides of triangle are equal, in such case the Pythagoras formula can be applied for calculation of R, L, A, F.

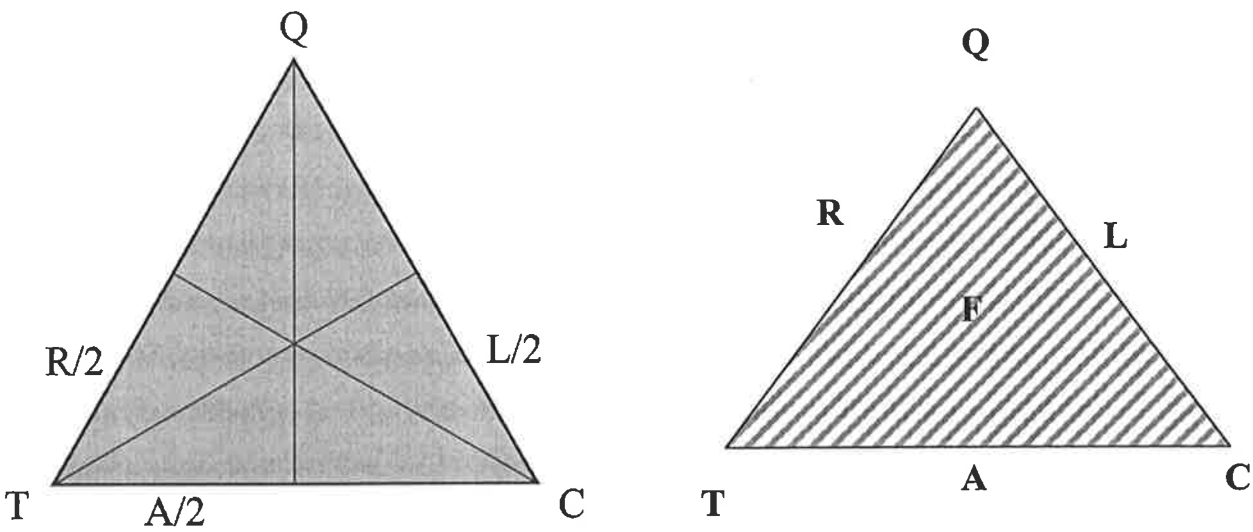

Figure 7. Quantification principles for RAL model.

If it will be calculated in the time t_1 max. R, L, A, F will be compared with volume of this variables in time t_2.

From the triangle R, L, A (Figure 7) are:

Responsiveness:

$$R^2 = T^2 + (L/2)^2$$

Leanness:

$$L^2 = Q^2 + (A/2)^2$$

Agility:

$$A^2 = C^2 + (R/2)^2$$

The flexibility F is adequate to the square of triangle (T, C, Q) and can be calculated

$$F = \frac{Q}{2}\sqrt{\frac{64}{63}(C^2 + \frac{T^2}{4} + \frac{Q^2}{16})}$$

If we verify these algorithms on case study Figure 6 – diagram “Main Objectives”

In year 2003 was priority:

Cost	0.07
Qualify	0.51
Costumer focus time	0.12

In year 2005 was priority:

Cost	0.44
Qualify	0.24
Costumer focus time	0.13

From this are calculate Flexibility for year 2003 and year 2005

$$F(2003) = \frac{Q}{2} \times \sqrt{\frac{64}{63} \times (c^2 + \frac{T^2}{4} + \frac{Q}{16}} = 0{,}12 \times \sqrt{1{,}01 \times (0{,}07^2 + \frac{0{,}12^2}{4} + \frac{0{,}51^2}{16}} = 0{,}03$$

$$F(2005) = \frac{0{,}24}{2} \times \sqrt{1{,}01 \times (0{,}44^2 + \frac{0{,}13^2}{4} + \frac{0{,}24^2}{16})} = 0{,}054$$

These calculated results are very near results in this case study, F(2003) = 0.03 and F(2005) = 0.04.

10. China effect, opportunity or threat?

According to Sähkö & Tele (2005), during the last months China, India, Russia, as well as some other fast developing countries and the USA have kept up the growth of world economy. China attracts more foreign investments than USA, while global corporations are not so interested in small western countries as a place of investments. For example, the statistics in high-tech business area of 2004 shows that foreign investment to Finland was 5.5 billion euros in compare to the 21 billion euros that Finland has invested to other countries. In Europe, the new EU members Poland, Russia, Germany, Hungary and Czech are the most popular countries to invest in. Opening of the markets, growth possibilities in productivity, flexible labor market lures companies particularly to Central and Eastern Europe. The Finnish high-tech corporations have more than 160,000 employees all over the world and only 10% of those are in central and Eastern Europe like Estonia, Poland, Hungary and Czech. Finnish companies, especially high-tech companies see these countries as options to go. However they admit that these central and eastern European countries, every country has its own individual advantages and competitiveness, but China has their total advantages in all, so it's probably the best option to invest. Recent statistics also shows that the Finnish high-tech export has a growth 10% in turnover, which has gained an increase in Europe and the Middle East but a decrease in the Far East in consequence of China-effect. The situation should be quite similar in most Western-European countries, even if it is naturally exaggerated in small countries with very limited home markets, such as the Nordic countries are.

From the discussion of this paper, under the influence of China effect, Western companies should all adjust their operational strategy, more or less. If the strategies are adjusted properly, many companies will see China effect as a great and valuable opportunity they can dramatically benefit from, but on the other hand if these strategic changes are not understood it can lead to disasters for the companies. During the adjustment process, the companies should notice several issues that may affect their decisions. According to Kauppalehti Optio (2005), the biggest problem in trade relationship with China is language. The second biggest problem, cultural collision, will eventually block business development. This requires the management of Western companies to think and treat things locally in a Chinese way. The third issue, trade customs and procedures, are different from the ones the Western companies are used to, which will complicate the practical operations. Finally, political issues will influence the whole economic environment; thus the foreign companies should be flexible. A good sign is that the political atmosphere in China and most other countries discussed under the "China effect" is getting more stable and corruption is decreasing.

Comparing studies of Heikkilä (2004) with our case study we found out some differences and similarities. Both pieces of research indicate several multifocused and even equally important competitive priorities, but our case study shows a clear need of a hierarchy from business to manufacturing strategies, and up to resource categories (such as dynamic engineers) through which the strategies are implemented (Takala, 2002). Heikkilä's more internationally oriented study also found out that there are more differences in business and manufacturing strategies between companies and factories than between countries. Both the studies found out, related to Nordic Countries, especially to Finland, that there are many companies that are specialized with differentiation strategies. This suggests that many companies from Nordic Countries may have difficulties to operate in business environments that are hard to anticipate.

11. Conclusion

Many companies should nowadays grow internationally and utilize the developing countries as the means of lowering cost. However, each type of company should have its own special strategy to suit to these markets, utilizing dynamic multifocused manufacturing strategies basing on business strategy, in a holistic way, e.g. by RAL model. Global sourcing in purchasing shall also be more and more used effectively for cost and productivity competitiveness. This means that Porter (1985)'s both options for global differentiation should be utilized simultaneously in a balanced way, the emphasis depending of the size, tradition and situation of the business. The development steps from technology specialist to problem solver are also natural for all companies. This requires that human resources have to be trained to be more "dynamic engineers", all the time more also in industrial engineering and management. The "dynamic engineer" will really be the decision maker for the future world-class industries.

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ACTA WASAENSIA

Use of interim earnings information on the Helsinki Stock Exchange

Markku Vieru and Hannu Schadewitz

Dedicated to Paavo Yli-Olli on the occasion of his 60th birthday

Abstract

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In this paper we study how the market uses the information on current and past interim earnings. Our hypothesis is that investors focus on a comparison of year-to-year changes in interim earnings. We provide further evidence on how the market acts in the face interim earnings announcements in an emerging market. The data is based on the Finnish market covering the years 1992-2002. We found, consistent with Ball and Bartov [1], evidence that investors underestimate the magnitude of the serial correlation in interim earnings. The results suggest that investors use, at least in part, a seasonal random walk model when forming earnings expectations.

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1. Introduction

An essential part of financial accounting is a firm's communication with outside interest groups, especially with the capital markets. Earnings announcements provide market participants with one public information source with which to evaluate the performance of a firm. The response of market actors to interim and annual accounting earnings announcements has interested practitioners and academics alike for decades. The major issue has been the use of these disclosures in the marketplace.

There has been a lot of discussion and research whether investors use all the earnings information available when assessing the value of the company. For example, Rendleman, Jones and Latané (1987) and Bernard and Thomas (1990) report that investors base their interim earnings expectations, at least in part, on year-to-year changes in interim earnings (called a naïve earnings expectation model). In other words, investors seem not to take full advantage of the interim earnings information available on the market. However, Ball and Bartov (1996) find these conclusions somewhat ambiguous and design a test which provides new, more accurate, insight into the phenomena. They show, among other things, that the market does not act as if using a naïve earnings expectation model. However, the magnitude of the serial correlation in quarterly earnings is underestimated. Consistent with Maynes and Hand (1996), Brown and Han (2000) find that when firms' quarterly earnings follow a simple autoregressive (*AR1*) process, their stock prices do not fully reflect the implications of current earnings for future earnings. Liang (2003) suggests and finds evidence that underreaction to current earnings surprises is due to investors' overconfidence in their private information and underconfidence in public announcements.

This paper studies the market's use of information on current and past interim earnings applying Finnish emerging market data. Specifically, we focus on whether and to what extent investors are aware of the autoregressive process of interim earnings. This study contributes to the existing body of literature in the following respects. Firstly, there are very few studies in which interim earnings announcements are analyzed based on Finnish data.[1] However, the Finnish stock market, with its thin and unequally distributed trading volumes, provides a suitable forum to study the robustness of previous findings produced in other stock markets (e.g. the US). Also the institutional setting in Finland differs considerably from the setting in the US. These differences could have an impact also on the relevance of earnings figures for investors' decision making. Historically the importance of investors has been better recognized in the Finnish accounting regulations (Kettunen, 1993). Also the activity of foreign investors in the Helsinki Stock Exchange has increased during the research period. In order to illustrate the development in the stock market we can look at the percentage of foreign ownership (market values) at two points of time. In October 1994 foreign ownership in terms of the market value of Helsinki Stock Exchange firms was 30.7% while in October 2003 the respective figure was 61.8%. Thus, the relative ownership of foreigners has roughly doubled. Due to the rapidly increased activity of foreign investors at the HSE we believe that the paper contributes, not only as a comparison to the US market findings, but also adds the principal knowledge about the possible use of interim earnings in several other international markets as well.

Secondly, post-earnings announcement drift is evidenced worldwide, also in Finland (Kettunen 1993; Martikainen, Rothovius, and Yli-Olli 1993). However, despite the increased understanding of the phenomenon, the explanation for the drift is still incomplete (Kothari 2001). One research approach tackling the earnings anomaly is to study whether the markets fully recognize the potential serial correlation in earnings time series as in Ball and Bartov (1996), which investigated mature markets.

The remainder of the paper is organized as follows. In the next section the Ball and Bartov (1996) methodology is described briefly. The data and sample are presented in the third section. The measurement and empirical model are presented in the fourth section. The empirical results are presented in the fifth section. Finally, the sixth section concludes the study.

2. Ball and Bartov's (1996) methodology

Prior research (e.g. Bernard and Thomas 1990) shows that innovation in terms of the unexpected portion of current earnings is approximately a linear function of lagged quarterly earnings innovations:

$$SUE_0 = b_0 + b_1SUE_{-1} + b_2SUE_{-2} + b_3SUE_{-3} + b_4SUE_{-4} + \varepsilon_0 \tag{1}$$

where *SUE*s are standardized unexpected earnings. Usually b_1, b_2, b_3, are positive, and b_4 is negative and ε_0 is a random disturbance term. Explanatory variables are the changes in earnings relative to the equivalent quarter last year, detrended and scaled by the standard deviation.

According to Ball and Bartov (1996) when the market fully understands the *SUE* process, then the stock price response, CAR_0, to earnings innovation, ε_0, is:

$$CAR_0 = \alpha + \beta\varepsilon_0 + \omega_0 \tag{2}$$

where $\beta > 0$ and ω_0 is white noise. We can solve ε_0 in Eq. (1) and substitute ε_0 from Eq. (1) for ε_0 in Eq. (2) resulting in Eq. (3) below

$$CAR_0 = \alpha - \beta b_0 + \beta SUE_0 - \beta b_1SUE_{-1} - \beta b_2SUE_{-2} - \beta b_3SUE_{-3} - \beta b_4SUE_{-4} + \omega_0 \tag{3}$$

In the empirical form of the model, if CAR_0, is regressed on *SUE*s, we have the following model:

$$CAR_0 = k + a_0SUE_0 + a_1SUE_{-1} + a_2SUE_{-2} + a_3SUE_{-3} + a_4SUE_{-4} + u_0. \tag{4}$$

If investors are fully aware of the magnitude of serial correlation in *SUE*, then $k = \alpha - \beta b_0$, $a_0 = \beta$, $a_1 = -\beta b_1$, $a_2 = -\beta b_2$, $a_3 = -\beta b_3$, and $a_4 = -\beta b_4$. Certain implications can be made based on the magnitudes as well as signs of the regression coefficients in equation (4). First, if investors are unaware of the *SUE* process expressed in Eq. (1), they may form (naïve) interim earnings expectations from year-to-year changes for interim earnings. That is, CAR_0 is independent of lagged *SUE*s because investors respond only to the current *SUE* and they ignore serial correlation of the complete *SUE* process. If this is the case, regression coefficients for these lagged *SUE*s would be close to zero. In other words, the pricing process of unexpected earnings would be inefficient. Alternatively, *SUE*s can have significant coefficients in Eq. (4) but the magnitude can be too low or too high relative to the *observed* serial correlation in the *SUE* process. If estimated coefficients are too small (for example $a_1 < -\beta b_1$), then the market systematically underestimates the magnitude of serial correlation in *SUE*. As said, also the opposite (overestimation) can occur.

3. Data and sample selection

The sample of HSE-listed firms (*main list*) is selected from the period 1992-2002 using the following criteria: i) availability of daily return indices in HSE's indices file from 281 days preceding to 30 days following the date of each interim earnings announcement, ii) availability of at least four consecutive interim earnings announcements with the same reporting period for the firm, iii) availability of the market value of the equity for the company at the end of the previous year in the HSE's *Annual report* (1993, 1994, 1995, 1996) and *Fact book* (1997, 1998, 1999, 2000a, 2001, 2002, 2003), and iv) banks, as well as investment and insurance companies are excluded because they follow different accounting practices in Finland.

The first criterion is employed in order to calculate risk-adjusted returns. The second criteria must be fulfilled in order to calculate lagged unexpected earnings. In the final sample there must be at least three observations available for the company. In Finland there is no public data source for interim earnings. However, the number of listed companies is relatively low: 65 at the beginning of the sample period. Thus the interim earnings data is collected from the firms. The third criterion defines the data needed to scale the variables. A total of 287 announcements released by 40 companies fulfil all the sampling criteria. The main reason for the rather low number of observations in the final sample was the lack of the previous year's comparative earnings figures due to changes in interim reporting periods.

Typically the calendar year and the fiscal year of a firm are the same, resulting in clustered interim earnings releases in June and in October if two interim reports per year are released. If only a six-month report is released, it is typically released in August. Information transfers among firms are likely to occur, especially within the same industry, which may cause cross-sectional trading dependencies. However, the firms in the sample represent quite a wide variety of industries, which reduces potential problems with announcement-time clustering. The firms which have interim earnings available can be characterized as stable, large and actively traded on the HSE.

The frequency of reporting has increased. During 1992, our first sample year, about 60% of the HSE-listed firms published at least two interim reports[2]. The corresponding figure for 1997 was about 80%. Recently, legislation stipulates that firms should make three interim earnings reports (quarterly reporting). Furthermore, the rules of the HSE require firms to announce to the public the date(s) on which their interim report(s) will be released. The interim earnings disclosure dates of the firms are provided by the HSE. The content of the interim reports during the research period was regulated by the recommendations concerning interim reports and by the Securities Markets Act. The current legislation and regulation of interim reports in Finland conform with EU practices.

The Securities Markets Act has changed during the research period with respect to insider trading. Before July 26, 1996 short-term trading (six months) by insiders was prohibited. An amendment to the Securities Markets Act abolished the 6-month trading rule and the public insider register was introduced. According to the Act an individual who is considered to be an insider is obliged to announce to the public all changes in his/her stockholdings. In addition, the HSE has issued rules on trading by insiders in listed companies restricting, for example, pre-announcement trading.

4. Measurement and empirical models

4.1 Measurement of unexpected earnings

The literature has presented several ways to measure unexpected earnings since Ball and Brown (1968). Frequently, the previous year's earnings are employed as a proxy for expected earnings. Estimating unexpected earnings as the change relative to the previous year assumes that annual earnings follow a random walk time-series process, i.e. shocks to annual earnings are considered to be permanent and there are no competing information sources available to the market. However, in the presence of transitory components in earnings, the previous year's earnings are a poor proxy for the current year's expected earnings. For this reason, changes in earnings are also a poor proxy for unexpected earnings (Easton and Harris 1991; Hayn 1995; Martikainen, Kallunki and Perttunen 1997). The presence of a transitory component in earnings implies a lower slope coefficient between returns and unexpected earnings compared to a situation where earnings are purely permanent. This is also widely documented in prior research. The finding that earnings appear to explain only a small fraction of the total variation in returns has led to much discussion (Lev 1989).

When the (seasonal) random walk model for earnings is sensitive to the above-mentioned shortcomings, more timely proxies for expected earnings are called for. An example of a more timely proxy for expected earnings is analysts' mean (or consensus) earnings forecast. By comparing reported (actual) earnings to analysts' mean earnings forecast, one can obtain a proxy for the (average) information content of an announcement. In other words, we can infer how much new, previously unknown, information the release of interim report brings to the market. Unfortunately, due to the emerging nature of the Finnish stock market, analysts' earnings forecasts for interim earnings were not available. In the literature (Booth, Broussard and Loistl 1997; Easton and Harris 1991) the following measure for unexpected earnings is common:

$$UE_{it} = \frac{INC_{it} - INC_{it-1}}{MV_{it-1}} \tag{5}$$

where INC_{it} is income before extraordinary items and taxes for firm i during interim report period t, INC_{it-1} is income before extraordinary items and taxes for firm i during the corresponding interim report period of the previous year, and MV_{it-1} is the market value of the company at the end of the previous year. The model assumed that earnings (E) follow a seasonal random walk model. This means that $E[E_t] = E_{t-1}$ meaning that the difference $E_t - E_{t-1}$ is unexpected earnings. In order to take into account firm-specific differences in the earning generation process, the unexpected earnings are standardized by the standard deviation of the company's earnings with the same length of reporting period. Thus, we have standardized unexpected earnings

$$SUE_{it} = \frac{UE_{it}}{Std(UE_i)} \tag{6}$$

The lagged *SUE*s are based on seasonal lags.

4.2 *Measurement of information content of an announcement*

Several types of statistical models have been employed to measure the information content of an information event. In principle the information content can be measured by observing the price reactions in the semi-strong form efficient market for the unexpected earnings. Examples of price reaction models include beta-adjusted returns, mean-adjusted returns, and market-adjusted returns. However, according to Brown and Warner (1980, 1985) the event study results obtained via these models are substantially very much the same (Kallunki 1996).

Daily returns were used for stocks listed on the HSE[3]. The returns, covering the years 1991–2002, were calculated as differences in logarithmic price indices, including splits, stock dividends, and new issues, as based on (Hernesniemi 1990) and computed by the HSE[4]. In this study the cumulative abnormal return, *CAR*, measures the information content of the announcement. Using daily data, the market model parameters were estimated using OLS regression with 250 return days (t = -261,...,-11) prior to each announcement date t. Thus,

$$R_{it} = a_i + b_i R_{mt} + e_{it} \tag{7}$$

where R_{it} is the return on asset i at time t, a_i is the intercept term of asset i, b_i is the beta coefficient of asset i, R_{mt} is the return on stock market value-weighted portfolio m at time t and e_{it} is an error term. Thus the beta-adjusted return on day t for stock i, e_{it}, is R_{it} - (a_i + $b_i R_{mt}$). *CAR* is computed by cumulating beta-adjusted returns from the announcement day up to three (five) days after the announcement. Several firms have different classes of shares listed on the HSE. The most traded stocks are selected for analyses. The maximum weight for a firm's share is 10% in the portfolio index.

4.3 *Empirical models*

The adaptation of Ball and Bartov's (1996) method in the context of Finnish interim earnings requires some adjustments. These adjustments are mainly due to the changes in legislation: the Securities Markets Act requires a quarterly reporting period since the year 2000. Before 2000 HSE-listed firms were supposed to release at least one interim report per fiscal year. Therefore the reporting frequency has increased during the research period. Appendix 1 reports the number of interim reports with a given reporting period during each sample year.

The number of observations is much lower in our study than in Ball and Bartov's (1996) study and the interim reporting period in Finland is usually longer especially in the beginning of the research period. The informed use of interim reports could have been somewhat limited during the research period. In the emerging market phase it could well be that other information besides past interim earnings are of relevance with respect to the historical development of interim earnings. In addition, firms' reporting environment deviates significantly from that in US (Kettunen, 1993). Also characteristic of the late 1990s was the stock market boom for firms especially in high technology. The forecasting of earnings for these firms is difficult due to the lack of a stable earnings history and the lack of an adequate understanding of the earnings generation process. Thus, it is interesting to see whether investors are aware of this autocorrelation in earnings surprises discussed in the next section.

In Eq. (6) above standardized unexpected earnings, *SUE*, are defined as the difference between reported earnings and the previous year's earnings scaled by the market value of equity of the whole company at the end of the previous year and scaled by the standard deviation of the company's earnings during the same length of a given reporting period. In the spirit of Eq. (1) the relation between current unexpected earnings and lagged unexpected earnings are studied using the following regression model:

$$SUE_{it} = b_0 + b_1\, SUE_{it-1} + \varepsilon_{it} \tag{8}$$

The second step in the empirical analysis is to explore whether investors are aware of the process in unexpected earnings presented by Ball and Bartov (1996). Thus cumulative unexpected returns (*CAR*s) associated with the earnings releases, is regressed on the measures for unexpected earnings (*SUE*s) with a lag. Thus, we have the following model:

$$CAR_{it} = k + a_0\, SUE_{it} + a_1\, SUE_{it-1} + u_{it} \tag{9}$$

In Eq. (9) above, as in Ball and Bartov (1996), the dependent variable (CAR_{it}) measures the stock market response of the earnings announcement event, the first independent variable (SUE_{it}) measures the unexpected component of current earnings for year t and the lagged independent variables (SUE_{it-1}) measure the unexpected interim earnings for year $t-1$.

5. Empirical results

5.1 Descriptive statistics

Table 1 below presents descriptive statistics for reported earnings (*E/P ratio*) and corresponding current standardized unexpected earnings, *SUE,* for each year in the research period. Also cumulative abnormal returns (*CAR*s) for three return windows are displayed in Table 1.

Table 1. Descriptive statistics.

Year	*N*	*E/P ratio*	*SUE*	*CAR(0)*	*CAR(0,3)*	*CAR(0,5)*
1992	22	0.177	0.556	0.011	0.023	0.030
1993	24	0.127	1.009	0.007	-0.004	-0.012
1994	28	0.077	0.547	-0.007	-0.010	-0.014
1995	30	0.091	0.437	-0.013	-0.020	-0.023
1996	27	0.087	-0.201	-0.008	-0.007	-0.011
1997	17	0.059	0.266	-0.002	-0.005	-0.011
1998	16	0.062	0.664	-0.019	-0.037	-0.008
1999	15	0.081	0.397	0.016	0.018	0.011
2000	50	0.077	0.272	-0.008	-0.008	-0.011
2001	88	0.069	-0.020	0.012	0.026	0.032
2002	109	0.053	0.254	0.004	-0.001	-0.001
Average		0.078	0.282	0.001	0.002	0.002

Note: *SUE* is unexpected earnings measured as the difference of reported earnings and previous year earnings scaled by the market value of the company at the end of previous year and scaled by the standard deviation of the company's unexpected earnings during a given reporting period of the same length; *CAR(0)* is the information content of the announcement measured as the beta-adjusted return during the announcement day 0; *CAR(0,2)* is the information content of the announcement measured as the beta-adjusted return during days 0 to 2; *CAR(0,5)* is the information content of the announcement measured as the beta-adjusted return during days 0 to 5.

In general, seasonal differences in earnings are positive. The exceptions to this are the years 1996 and 2001, where average *SUEs* are negative. These are due to the record high earnings for the years 1995 and 2000 causing high forecasted earnings based on the seasonal random walk model for the years 1996 and 2001. Overall the positive *SUE*s are in line with the notion that during the research period there has been mainly a positive economic trend.

5.2 Prediction on current unexpected earnings

Table 2 reports pooled OLS regression results based on Eq. (8). The table shows that lagged (one lag) values of *SUE* predict the current *SUE*. The high statistical significance of the *F*-test value indicates that the overall model provides evidence of a linear relationship between SUE_{it} and the explanatory variables[5]. In the regression model Lag 1, SUE_{it-1} is positively related to the current *SUE*.

Table 2. Regression results for $SUE_{it} = b_0 + b_1\, SUE_{it-1} + \varepsilon_{it}$ (Eq. (8)).

	N	B_0	b_1	*Adj.* R^2	*F*
	426	0.0786	0.703***	0.501	427.6***
p-value		(0.247)	(0.000)		(0.000)

Note: The notations are based on the p-values adjusted for an unknown type of heteroskedasticity using (White 1980). * 10% risk level, ** 5% risk level, *** 1% risk level.

Consistent with Ball and Bartov (1996), the results suggest that there exists a positive relationship between the current *SUE* with the lagged one. This suggests that successive unexpected earnings are autoregressive. The relation is quite strong and the regression coefficient b_1 is much larger compared to Ball and Bartov (1996), where it is 0.443 in Table 1. The analyses below will be performed applying SUE_{it} and SUE_{it-1} as explanatory variables.

5.3 Incorporation of lagged unexpected earnings into current earnings expectations

Table 3 presents the results based on Eq. (9). In the table the relation between current and lagged unexpected earnings and the stock market response to interim announcements are presented. The market response is measured using three event windows: *CAR(0)*, *CAR(0, 2)* and *CAR(0, 5)*. The evidence in table 3 suggests that historical *SUE*s are insignificantly ($p>0.05$) related to cumulative unexpected returns. Only the measure for current unexpected earnings, SUE_{it}, is significantly ($p<0.05$) related to the stock market response. In other words, the parameter estimate for a_0 is positive and significant but the estimate for a_1 is insignificant. The constant term k is insignificant suggesting that there is no systematic overlooking of a variable that would have given an additional explanation for *CAR*s.

Table 3. Regression results for $CAR_{it} = k + a_0\, SUE_{it} + a_1\, SUE_{it-1} + \varepsilon_{it}$ (Eq. (9)).

	1-day event window		*3-day event window*		*6-day event window*	
Variable	*coefficient*	*p-value*	*coefficient*	*p-value*	*Coefficient*	*p-value*
k*100	0.075	(0.784)	0.071	(0.856)	0.105	(0.811)
a_0*100	0.553**	(0.015)	0.977***	(0.003)	0.939**	(0.018)
a_1*100	-0.280	(0.224)	-0.597*	(0.069)	-0.480	(0.211)
Adj. R^2	0.011		0.018		0.013	
F	3.44**	(0.033)	4.95***	(0.008)	3.74**	(0.024)

Note: N = 426. The notations are based on the p-values adjusted for an unknown type of heteroskedasticity using White (1980). * 10% risk level, ** 5% risk level, *** 1% risk level.

Table 4 below compares time-series estimates with those implied by market reactions to earnings. The implied market reaction is achieved using the methodology presented in Eqs. (3) and (4). For example, implied market reactions to earnings for Lag 1, a_1, during a 6-day event window are calculated as $-a_0b_1$ being –0.660 (computed as –0.939*0.703). The observed stock market response is –0.480, which is low compared to the value implied by full recognition. This suggests that investors do not properly take into account the time-series behaviour in the previous year's *SUE*. Qualitatively the results are very similar also for other return windows. These findings support the view that investors' underestimate the magnitude of the serial correlation in interim earnings. The results suggest that investors use, at least in part, a seasonal random walk model when forming earnings expectations.

The Table 4 above shows that the observed parameter values in column (5) are closer to zero than the corresponding implied values in column (4). This means that the markets are taking into account the intertemporal dependence (serial correlation) of earnings only partially. Column 6 in table 4 shows the relative difference between the observed recognition of time series behaviour (column (5)) and the implied time series behaviour (column (4)). The markets are underestimating the time series of earnings in their share valuation around the announcement. More specifically, the obtained evidence shows that the market is aware of the existence and sign of serial correlation but underestimates its magnitude. For the three-day event window the underestimation is smallest at 13.1% (=100% - 86.9%). In Ball and Bartov (1996) prices incorporated approximately 45% of the serial correlation at lag 1. The higher incorporation of the serial correlation in the present study may be partly due to the different return window. In Ball and Bartov (1996) CAR is computed for a three-day (-2, 0) window, where 0 is the earnings announcement day. They focused on the pre-event period. We applied three different CAR windows focusing on the event and post-event periods: (0), (0, 2), and (0, 5). It could be that at and after the event markets have better possibilities to adjust themselves to the serial correlation of earnings compare to the windows before the event.

Table 4. Comparison of time-series estimates with those implied by market reactions to earnings.

event window (1)	*Time-series estimate b_1 (2)*	*a_0 (3)*	*Implied $-a_0b_1$ (4)=-(2)*(3)*	*Observed a_1 (5)*	*Relative Difference (6)=100*(5)/(4)*
CAR(0)	0.703	0.553	-0.389	-0.280	71.8%
CAR(0, 2)	0.703	0.977	-0.687	-0.597	86.9%
CAR(0, 5)	0.703	0.939	-0.660	-0.480	72.7%

Note: The market response is measured using three event windows: *CAR(0)*, *CAR(0, 2)* and *CAR(0, 5)*. The implied market reaction is achieved using methodology presented in equations (3) and (4). N=426.

The results show that investors are aware of the seasonal earnings process. However, the autocorrelation in unexpected earnings series is partially overlooked. The prior relevant literature in empirical finance has documented and commented on this phenomenon (Schleifer, 2003; Thaler, 1993). The tradition of Finnish interim earnings reporting is still somewhat young. That may give a partial explanation for the functional fixation of investors on the most recent unexpected earnings figure. It could well be that in the future, when there is a longer unexpected earnings series available, investors could digest this intertemporal earnings behaviour more fully in their investment decisions.

The results show that there is a difference between investors' actual valuation of firms and the seasonal random walk model based valuation. It is likely that investors are using all the available timely information in their firm valuation. In contrast, a seasonal random walk assumes, unrealistically, that only the activities during a specific season are relevant in the valuation.

6. Summary

In this paper we study how the market uses the information on current and past interim earnings. In line with the prior literature, we examine whether investors focus on a comparison of year-to-year changes in interim earnings and potentially underestimate the dependence of the seasonal earnings series. We provide further, emerging market, evidence on how the market acts in the face of interim earnings announcements. The data is based on the Finnish market covering the years 1992–2002. We found, consistent with Ball and Bartov (1996), evidence that investors underestimate the magnitude of the serial correlation in interim earnings.

In conclusion, the results suggest that investors use, at least in part, a seasonal random walk model when forming earnings expectations. This overall finding calls for additional investigations of the reasons (firm-specific, market-specific) for the underutilization of seasonal unexpected earnings information.

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Appendix 1. Length of reporting period in interim reports by year.

Year	3 month	4 months	6 months	8 months	9 months
1992	0	11	1	10	0
1993	0	12	1	11	0
1994	0	14	1	13	0
1995	0	15	1	14	0
1996	0	13	1	13	0
1997	0	7	1	9	0
1998	1	5	2	7	1
1999	2	3	3	5	2
2000	15	1	17	1	16
2001	26	2	30	2	28
2002	35	2	35	2	35
Total number	79	85	93	87	82

[1] There are some studies which have used interim earnings data from Finland (Schadewitz, 1997; Schadewitz and Kanto 2002; Vieru, 1998; Vieru, 2002) but their scope differs from that of this study.

[2] Both mandatory and voluntary interim report releases were included in the sample. This practise is supported at least by two arguments. First, there is no theory indicating that the consequences of mandatory interim reports should be somehow different compared to voluntary interim reports. Second, also empirical evidence strongly supports the view that mandatory and voluntary interim reports are very alike (Schadewitz, 1997).

[3] For more information on how the index is calculated see also (Helsinki Stock Exchange, 200b).

[4] Due to the thin trading volume a number of missing prices could cause misspecification in abnormal returns (Maynes and Rumsey 1993; Kallunki, 1996). However, there are findings in event studies (Sponholz, 2004; Vieru, 1998; Vieru, Schadewiz and Perttunen, 2006) demonstrating that the results are not in empirical studies reported to be sensitive to various return allocation procedures employed to mitigate problems associated with the thin trading.

[5] In the model only one lag is employed due to data limitation reasons detailed above in section 4.3. However, we employed also extended models where we have regressions with more lags with a significant decrease of observations. Since only the first lagged *SUE* was significant in the extended models we turn to use the model with one lag.