

**The Value Relevance of Financial Accounting Information in a Transitional
Economy: The Case of the Czech Republic**

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Abstract

The paper investigates the value relevance of accounting information in the Czech Republic in 1994-2001. Value relevance is understood as the ability of financial statement information to capture or summarise information that affects share values and empirically tested as a statistical association between market values and accounting values.

The first objective is to evaluate the value relevance of accounting information in the Czech Republic in comparison to accounting information in a well-developed market economy. The second objective is to investigate whether the value relevance of accounting information has increased over time in the Czech Republic, as an indicator of improvements in the accounting regulation and practice. Sweden is chosen as a benchmark country for the comparison.

The results show that the value relevance of accounting information indeed is lower in the Czech Republic than in Sweden. The results, however, indicate an improvement in the quality of the Czech financial accounting information during the research period.

Key words: value relevance, financial accounting information, transitional economy, international accounting

1. Introduction

The present study investigates the value relevance of accounting information in the Czech Republic in the period 1994-2001, that is during the transition from a centrally planned economy to a market economy. Value relevance is one of the basic attributes of accounting quality (Francis et al. 2004). High quality accounting information is a pre-requisite for well functioning capital markets and economy as a whole and as such should be of importance to investors, companies and accounting standard setters. Investors rely on accounting information in their pricing of shares and companies which provide good quality information have thus an advantage in a lower cost of capital. In transition countries, capital is scarce and investment risk relatively high. This should be a motivation for improving the quality of accounting information in these countries. Value relevance is measured in the study by the ability of financial statement information to capture or summarise information that affects share values (Francis & Schipper, 1999, p.326). It is assumed that the function of accounting numbers is to reflect economic income as represented by stock returns and economic value as represented by market prices. Value relevance is tested cross-sectionally and over time as the association between stock market and accounting measures.

Research on value relevance of accounting information, its historical development and its comparison among different countries has increased since the 1990s. There has been concerns as to whether financial statements are losing their value relevance due to the shift from an industrialised economy to a high-tech, service oriented economy (Collins et al., 1997; Brown et al., 1999; Francis & Schipper, 1999 and Lev & Zarowin, 1999) and as to whether cross-country differences in disclosure and

measurement practices cause differences in the quality of accounting information (Harris et al., 1994; Joos & Lang, 1994; Alford et al., 1993 and Amir et al., 1993). Recent value relevance studies recognise and operationalise institutional factors affecting the level of accounting quality among the countries (Ali & Hwang, 2000; Ball et al., 2003 and Hung, 2001). Value relevance of financial accounting in transitional economies, however has so far been studied sporadically. Jindrichovska (2001) investigates the statistical association between market returns and accounting earnings in the Czech Republic and Jarmalaite Pritchard (2002) studies the relationship between accounting earnings and stock market returns in the Baltic countries. Both studies find that there exists a significant association between the market returns and accounting earnings in these countries. Jindrichovska (2005) investigates conservatism of the Czech accounting earnings and concludes that these are not significantly conservative.

The present paper extends and contributes to previous research in the following way. First, it investigates a relatively new data set in a more complex way than previous research which investigated the association between market returns and accounting earnings only. The present study includes association between market prices and accounting book value of equity assuming that not only accounting earnings but also accounting book value of equity summarise information relevant for investors. This assumption is based on the linear valuation model (Ohlson, 1995). It also employs a different methodology, namely the hedge investment portfolio strategy in the spirit of Alford et al. (1993). In such a way, it documents more broadly value relevance of the Czech accounting information. Second, it combines a quantitative and a qualitative

approach in that it offers a deeper description of accounting disclosure and measurement rules and of the accounting background in the Czech Republic. The author's opinion is that the qualitative procedure gives the reader a better insight into the results of the empirical statistical tests. Third, the present study offers a comparison of value relevance of accounting information in a transition country and in a well-developed market economy. Transition countries constitute a unique environment of development of accounting regulation and as such can add to our understanding of the accounting quality and factors that influence it. However, the results received in the empirical tests do not tell the whole truth if we do not have any possibility of comparison to other countries and accounting environments. It is of course possible to compare the achieved results to results reported in other studies, however, the research design may differ and therefore it seems more appropriate to make comparisons based on the same research design methodology.

The paper has two objectives. The first objective is to investigate whether financial accounting information in the Czech Republic is more or less value relevant in comparison to a well-developed market economy. The hypothesis is that value relevance of accounting information is lower in the Czech Republic than in a well-developed economy. The second objective is to investigate whether the value relevance of information has changed over time in the Czech Republic. The hypothesis is that the value relevance of accounting information should have increased during the research period due to the improvements in both the accounting environment and society as such. The results are consistent with both hypotheses. The tests show that the value relevance of accounting information is lower in the Czech

Republic than in the benchmark market economy but that it has increased over time. As a benchmark, value relevance of Swedish accounting information is investigated. Sweden has been chosen from a number of reasons. The country is a member of the European Union (the Czech Republic applied for the membership in the European Union and became a member in 2004), has a similar-sized population (assuming similar economic resources and growth potential), reasonably well-developed efficient capital markets and well-developed accounting principles (both criteria may be assumed as an objective of the transition transformation). In addition, Swedish accounting belongs historically to the continental accounting tradition as well as Czech accounting that has been influenced by German and French accounting tradition.

The structure of the paper is as follows. Section two deals with the concept of value relevance. Section three describes the Czech accounting environment and the development of accounting in the 1990s. Section four provides details on the data, sample and research period. Section five describes the research design of the study. Section six documents the empirical results. Finally, section seven contains concluding remarks.

2. Value relevance and institutional factors

The present study investigates market value relevance of accounting information. Market value relevance means that there is a statistical association between financial information and prices or returns, and that the accounting based measures explain market prices in a good way, under the efficient market assumption that pricing

reflects available information (Francis & Schipper 1999, p.326). This definition of value relevance conforms to the statement of the importance of value relevance of accounting information in the Framework for the Preparation and Presentation of Financial Statements (IASB, 1989). Relevant information is such that “... *influences the economic decisions of users by helping them evaluate past, present and future events*”. From the investors’ perspective, relevant information is information which contributes to their equity investments decisions. It must be noted that market value relevance as defined above is only one of the possible interpretations of value relevance concept (Francis & Schipper, 1999). It must also be noted that value relevance of accounting information is not the same as the quality of accounting information. Francis et al (2004) specify seven different market- and accounting-based attributes of accounting quality and find that even if not the only one, value relevance is one of the most important attributes of accounting quality. They argue also that value relevance seems to be more important attribute of accounting quality than conservatism or timeliness. This finding should support the standpoint of Barth et al. (2001) who claim that market value relevance of accounting information as defined above is important not only for the investors, but provides insight into accounting issues to other user groups and to the standard-setters. This should be particularly important for the transition countries that are or have been developing their accounting regulation.

Value relevance can be evaluated from two major perspectives. It is measured either from a signalling perspective or from a measurement perspective. The signalling perspective means to study whether there is a reaction to the announcement of

accounting information. Amir et al. (1993) used this methodology to study value relevance of US GAAP versus non US GAAP. The measurement perspective measures the explicit relationship between market indicators of the value of the company and accounting measures. This perspective is used in most value relevance studies, Harris et al (1994), Ali & Hwang (2001) or Dumontier & Labelle (1998) are examples of the measurement perspective. The present paper studies value relevance from a measurement perspective.

The value relevance studies that rely on a valuation framework that models firm value as a linear function of book value of equity and earnings assume efficient markets. This is often stated as a limitation to the inferences that can be made from the value relevance tests. However, as Barth et al. (2001) point out, share prices reflect investors' consensus beliefs about the underlying economic value and not necessarily the underlying economic value itself. Thus the resulting inferences relate to the extent to which the accounting measures reflect measures implicitly assessed by investors. In such a case, market efficiency is not required as long as we interpret only the explanatory power of the statistical tests. However, as soon as the coefficients are interpreted, the assumption of market efficiency becomes important. This has an important implication for value relevance research in transition countries because doubts have been raised as to whether these markets really are efficient. Aboody et al. (2002) show that the market efficiency limitations may be overcome by including future price changes into the research design which adjusts for delayed market reactions. This procedure is, however, not used in the present study and the study does not investigate whether the Czech capital market is efficient or not either. It

investigates market value relevance of accounting information based on the assumptions referred in Barth et al. (2001).

Beaver (2002) and others raise concerns as to the demands put on the value relevance researcher. He states that value relevance research requires an in-depth knowledge of accounting institutions and accounting standards. This talks in favour of research based on case country studies rather than large comparative studies where the researcher has limited possibilities to understand the accounting institutions and standards of all the researched countries. Also, value relevance researchers have become aware of the fact that the value relevance of accounting information is not based solely on accounting regulation but is influenced by a number of factors external to the accounting environment (Ball et al. 2000, Ball et al. 2003, Hung 2001 and Bushman & Piotroski, 2005). The large comparative studies quantify institutional factors while studies investigating individual countries describe the institutional background in a qualitative manner which is also the case of the present study. The following five factors that influence the degree of and changes in value relevance are identified: development of accounting regulation, control mechanisms, business climate change, internationalisation and business cycle, economic development and industry structure.

The quality of accounting laws and regulations is the primary prerequisite of the value relevance. Recognition, measurement and valuation principles determine whether the information in the balance sheet and the income statement can be used for decision making. These principles differ across countries and are subject to development.

Therefore tracking the changes in accounting principles in a country is important for understanding their effect on the development of value relevance. The transition of a centrally planned economy to a market economy means that accounting regulation has to be completely transformed in order to satisfy the requirements of the market economy. The accounting system in the beginning of the transition can be expected to lack value relevance because it is not based on the principles of a market economy. The implementation of a new accounting regulation should thus have a positive effect on the value relevance of accounting information.

However, accounting standards might be of a high quality and still, the value relevance of accounting information might be low if they are not followed. In other words, such regulation and control mechanisms must exist that secure that the companies follow the accounting regulation and reveal financial information to its external users. Control mechanisms were missing in the beginning of the transition period, have been rather inefficient in the process of transition and were only later been subject to improvements. Better control of companies' financial information and a better information disclosure suggests that value relevance of this information should increase.

The business environment under the centrally planned economy was secretive and closed. Public did not have any insight into the companies and economy. In the market economy, the companies must act in a different way. They are not anymore closed units managed by the state, but they need to open themselves to their surroundings– to their customers, suppliers, employees, creditors and investors.

Information channels become a powerful tool in competition with other companies. It would be unrealistic to expect that managers who were used to secretive practices during the centrally planned economy would understand the need for openness immediately after the political and economic shift. Instead, the change takes time and requires that the managers experience the effects of their actions. This change is also connected to the overall changes in attitudes and atmosphere in the whole society. These attitudes include fundamental values like trust, confidence and responsibility of each individual. Changed attitudes towards less secrecy, greater openness and cooperation, better information disclosure and more trust in the society in general should promote higher value relevance of the information.

Internationalisation of the transitional economy, either through foreign customers and suppliers or through foreign investors entering capital markets or foreign companies establishing themselves in the country, changes the informational environment of transitional economies. Entrance of the actors from well-functioning markets into the transitional economy encourages domestic enterprises to be more responsive and accountable to a larger number of stakeholders. It has a positive effect on the change in business environment. Increased internationalisation and globalisation of business should have positive effects on value relevance of accounting information.

Previous research has shown that the value relevance of accounting information and its significance for pricing is associated to the business cycle (Runsten, 1998). During the economic boom, investors value companies high irrespective of their actual performance and accounting measures, while in the periods of recession, the actual

performance becomes important and investors' decisions are based on the fundamental analysis of accounting numbers which in turn affects the relationship between the market and accounting values.

The degree of value relevance is a function of all the above five factors. It is not possible to separate the effect of the individual factors in the association tests as specified in the traditional value relevance research. It is however possible to indicate the effect that the individual factors have on value relevance, that is whether the factor increases or decreases the value relevance and under which conditions. It shows also that the development of high quality accounting standards is not the only concern in the transitional economies and that for example a mere adoption of international accounting standards as such does not guarantee high quality of accounting information if other conditions are not fulfilled.

3. Czech accounting environment

Accounting practices are a product of the historical, political, economic and institutional development of each country. Accounting environment is influenced by the nature of enterprise ownership, legal system, sources of finance, capital markets, economic growth and development. With respect to transitional economy, the main issue is the development of private ownership as opposed to previous state ownership. The privatisation in the Czech Republic was implemented between 1990-1993. The privatisation process lead to increase in private ownership from 3% in 1989 (Rondinelli, 1994, p.2) to 80% in 1999 (Transition Report, 1999). A pre-requisite of privatisation and transition is an institutional change. This change includes the

legislation of a suitable framework of institutional rules within which private enterprises can successfully operate, such as property rights, business law, corporate law, antitrust law and laws allowing capital markets to form and develop. The new constitutional law of April 1990 changed the economic structure of the society, that is, stated the right to set up private enterprises. A new Commercial Code was adopted in 1991 and amended in 1996. The majority of laws were adopted as early as 1991 and 1992 as a basis for the ongoing privatisation process. Accounting Act and Law on Auditing were adopted in 1991. As a result of privatisation paths, three main types of owners appeared in Czech Republic: state ownership with control exercised by insiders, domestic outside ownership and foreign investor ownership (Transition Report, 1999). The Czech corporate governance system may be classified as bank-oriented with concentrated shareholdings and rather illiquid capital markets (Shinkman & Zelenka 1998, p.3).

The pattern of corporate governance has natural implications for accounting because the information needs of different user groups and their access to the information are different. The same applies to the needs of different types of investors. The capital market is concentrated in two competing trading systems: the Prague Stock Exchange and the RM-system, an over-the-counter trading system for small investors. The Prague Stock Exchange, the PSE, was established in November 1992 and trading started on April 6, 1993. In 1996 a substantial administrative reform of the capital market was initiated and in 1997, about 80% of the companies listed were de-listed from the PSE due to poor liquidity and poor reporting standards (Jindrichovska 2001, p.109).

Table 1 compares the Prague and Stockholm Stock Exchanges. Stockholm Stock Exchange is a well-established stock exchange with more than a hundred years' tradition. It can be seen that the Prague Stock Exchange is relatively small. The number of listed companies was very high immediately after the first two privatisation waves but decreased substantially due to the 1996 reform of capital markets. The Czech Securities Commission supervising the functioning of the Czech capital markets was established on April 1, 1998 as a response to a number of severe drawbacks in the trade. The drawbacks included little experience with the functioning of a capital market, lack of professionalism of traders and brokers, imperfections in legislation, lack of clearness about prices reflecting market realities, high systematic risks and a low level of information. The continuous decrease in the number of listed companies might be correlated to higher listing and reporting requirements set up by the Commission. There is no counterpart of the Securities Commission in Sweden. The trading volume in Prague is substantially smaller than the volume traded in Stockholm. The low trading volume, small number of companies and concentrated ownership structure set limits to the assumption of efficient markets.

INSERT TABLE 1 HERE

3.1. Accounting regulation

The first part of the Accounting Act of 1991, which is the regulation of the book-keeping procedures, documentation and the charts, came into force in 1992 and the financial accounting part on the statements and consolidation was postponed until

1993 in the awaitness of a new tax law. The main objectives of the new act were to get transparent company data comparable to data obtainable in a market economy and to get data comparable over time and space. Further the Act should help to adapt Czech accounting standards to IAS and EU-directives and to respect traditional accounting principles common in market economies. The Accounting Act was amended as of January 1 1998. The regulation on financial statements, footnotes and annual reports were clarified. The focus was on the public disclosure of financial statements and its availability to public. The amendments were however perceived as insufficient and this started a process of completely new appraisal of the Czech accounting. The University of Economics in Prague has been working on a special comparative research project on IAS versus Czech GAAP since 1997 developing a conceptual framework for Czech accounting. Another large project has been driven by the standard-setter, that is the Ministry of Finance, resulting in a new Accounting Act adopted in the autumn 2001 and effective from January 1, 2002. The amendment implements a new instrument in the Czech accounting environment - national accounting standards.

Accounting entities obliged to be audited are required to publish their balance sheet and income statement information in “Obchodni vestnik” (Commercial Journal) within one month after the approval of the statements and they should also state where the annual report is available. The accounting units are obliged to keep their financial statements available at the enterprise and show them on request. In 1997, the National Information Centre was established where all financial statements must be filed and available for public. The Czech financial statements include two years’ balance sheet,

income statement, cash flow statement, and notes including accounting policies. All statements have prescribed formats. Accounting records must reflect the legal form of the transaction even if the substance is different. True and fair override is not permitted. Completeness of information is required without consideration of materiality. The main convention is that of historical cost and revaluations are not permitted. The effects of changes in accounting policies are included in extraordinary items of the current period. Rules for exceptional and extraordinary items are rather generous. There are a number of legal and hidden reserves that create accounting bias. These are due to the close connection to taxation. Czech accounting regulation so far lacks an underlying conceptual framework. However, the basic principles of the IAS conceptual framework are valid for Czech accounting regulation with more weight put on the concept of reliability rather than relevance.

3.2 Balance sheet: recognition, measurement and clean surplus relation

This section describes the basic Czech accounting rules from the balance sheet perspective. The idea behind this is the fact that if accounting could catch up the economic substance of transactions, book value of equity would equal market value of equity. Because of the basic concepts and principles, however, this is not the case and accounting is more or less biased. If accounting information is to be relevant it has to be useful and timely. It also has to represent the substance of transactions faithfully and be relatively free of error and bias. First, the basic pre-requisite of representing the substance of a transaction is the recognition of an event. If a certain event is not recognized the information given in the financial statements cannot give a true and fair view of the company. Second, the outcome of an event is measured. The

measurement and valuation practice may be more or less biased. The larger the measurement error, the larger the gap between the market value and book value would be. The gap in itself, however, does not necessarily mean that the accounting information is irrelevant. Finally, the tests used in this study assume clean surplus relation. Clean surplus relation means that change in book value of equity equals earnings minus net dividends, in other words, everything that affects book value of equity goes through income statement with exception for dividends and capital contributions. The overview of the Czech balance sheet is given in table 2 and of the Swedish balance sheet in table 3.

INSERT TABLE 2 HERE

INSERT TABLE 3 HERE

The basic accounting issues are recognised and measured in the Czech accounting in a way comparable to Swedish accounting principles. The clean surplus relation holds for all the basic balance sheet items. Definitions of intangible assets are vague in both the Accounting Act and Accounting Decrees. Therefore the treatment is based primarily on the perception of the accounting practice. Czech accounting does not recognise such transactions as leasing and financial instruments because of the requirement of priority of legal form over substance. Provisions for pensions are not disclosed because in practice Czech enterprises usually do not provide any pension benefits to their employees. Deferred tax disclosure is voluntary and deferred tax is treated as a short-term liability. Overall, the realisation and prudence principles are applied, that is only unrealised expenses and losses are taken into the income

statement while unrealised revenues and gains are postponed. The last part of the tables describes some of the main features of group accounting. The main difference against the Swedish accounting principles is that assets and liabilities of the acquired entity are not fair valued in the purchase method according to the Czech GAAP. Besides, there are too many exceptions to consolidation obligation, for example if the subsidiary has a different chart of accounts, it does not have to be consolidated. Thus, principally no foreign subsidiaries are consolidated. Not surprisingly the many consolidation exceptions increase the risk for tunnelling (i.e. transferring assets out of the companies).

Table 4 summarises the most important differences between the Czech and Swedish generally accepted accounting principles. The recognition and measurement rules for long-term projects, leasing and financial instruments, provisions and deferred taxes are in favour of higher value relevance of Swedish accounting information. The rule of substance over legal form applied in Swedish accounting can generally be assumed to promote value relevance since accounting under such circumstances better reflects the underlying economic events and thus give more appropriate information about the company's activities. Consolidated financial statements increase value relevance of accounting information (Harris et al.,1994) and therefore, the insufficient consolidation rules in the Czech Republic might have a negative effect on value relevance as compared to the Swedish accounting principles.

INSERT TABLE 4 HERE

4. Data

This paper investigates value relevance of financial accounting information of companies listed at the Prague Stock Exchange and Stockholm Stock Exchange in the period 1994-2001. The Czech data are collected from the Cekia financial database Ariadna. Financial companies are excluded from the sample because the structure and the accounting practices for these companies differ substantially from non-financial firms. The first whole year for which data is available is 1994. Year 2001 is the last year when financial statements were prepared in accordance with the Accounting Act from 1991. The research period is divided into two equally long periods, 1994-1997 and 1998-2001. A comparison of the two periods is made in order to investigate the change in value relevance over time. Year 1997 may be seen as a milestone because there was a political change due to preliminary elections and the growth in the economy turned into economic recession. Besides, in 1997 most companies at the PSE were de-listed and in 1998, the Securities Commission was established, which created expectations on better control over the capital market and improvements in financial reporting environment. The Czech sample includes only those companies that have been listed at the PSE over the whole research period. This is due to the fact that most companies delisted in 1997 were non-active never traded companies. In total, the sample includes 72 companies. The Swedish data are extracted from Finlis and Trust databases. In the case of Swedish data, not only survivor companies, but all companies were included into the research. However, only companies for which data are available at least for two consecutive years are taken into the sample since some of the variables are calculated on accounting numbers and share prices for two years.

The total Swedish sample includes 310 companies in the first research sub-period and 271 companies in the second sub-period.

The different treatment of the two samples needs to be taken into account due to a potential survivor bias. It might be assumed that a survivor company sample includes more stable companies which provide better accounting information and this would increase value relevance for such a sample. It has been found for the Swedish sample that the non-survivor companies were to a large extent companies in information technology, telecommunications, biotechnology and human capital intensive industries. For these companies the value relevance of accounting numbers has been questioned in previous research and a decrease in value relevance suggested. Therefore, a control sample of survivor companies has been tested for the Swedish case. The results (not reported here) have not been significantly different from the results for the total sample which means that the changes in value relevance in Sweden apply to companies in general. The samples have also been adjusted for outliers because both databases included some extreme cases of observations. First, observations that lie outside five standard deviations from mean value of all the regression variables were eliminated, the regression was run again and observations that lie outside three standard deviations from the new mean have been excluded. This procedure eliminated between 1-8% of the observations depending on the quality of data available for the respective country, year and type of test. Generally, the number of outliers was larger for the Czech sample. The outliers' elimination is not reported here.

5. Research design

The value relevance of accounting information is empirically tested by the statistical association between market indicators of value and accounting numbers and by a hedge portfolio strategy test that investigates whether a hedge portfolio based on a perfect pre-knowledge of accounting measures can earn better than normal returns. This section presents the individual empirical tests.

Price regression. The test is based on the Ohlson (1995) valuation model which states that firm value is a linear function of book value of owners' equity and earnings and has been used among others in Harris et al (1994), Francis & Schipper (1999) and Ali & Hwang (2000). In the present study, price, earnings and book value of equity are deflated by opening book value of equity:

$$\frac{P_{jt}}{BV_{jt-1}} = \alpha_0 + \alpha_1 \frac{X_{jt}}{BV_{jt-1}} + \alpha_2 \frac{BV_{jt}}{BV_{jt-1}} + \varepsilon_{jt} \quad (1)$$

The price P_{jt} , is the total market value of firm j at time t . The book value BV_{jt} is the total accounting owners' equity and X_{jt} is the total accounting earnings for firm j at time t . Price is taken as of 31 March in order to ensure annual reports are publicly available. Earnings are calculated excluding extraordinary items adjusted for tax and adjusted for allocations to untaxed reserves. Negative earnings are excluded because the underlying linear dynamics assumes that earnings are non-negative (Ohlson, 1995). Book values are adjusted for untaxed reserves and are also limited to positive values only. If accounting information is value relevant, there will be an association between the total market value and earnings and book value and the coefficients on earnings and book value will be statistically significant.

The dependent variable in equation (1) is a kind of market-to-book ratio where the price is compared to book value one period behind. Market-to-book ratio shows the market's expectations on the firm's long-term future profitability and depends on three factors: profitability, dividend payout policy and required rate of return. The independent variable $\frac{X_{jt}}{BV_{jt-1}}$ is a measure of return on equity. The second variable

$\frac{BV_{jt}}{BV_{jt-1}}$ reflects the change in book value the size of which is determined by profitability of the firm and net dividends.

Logarithmic regression. The logarithmic regression has been developed in this paper as an alternative way of how to tackle the scale problem of an underlying undeflated price regression. The scale problem is traditionally solved by deflating the regression as has been done in equation (1). The logarithmic regression, however, allows for a non-linear relationship between the market and accounting measures and can thus be assumed to lead to a more general modelling of the relationship between these measures.

$$\ln P_{jt} = \alpha_0 + \alpha_1 \ln X_{jt} + \alpha_2 \ln BV_{jt} \quad (2)$$

The underlying function for the logarithmic model above is:

$$P_{jt} = e^{\alpha_0} * X_{jt}^{\alpha_1} * BV_{jt}^{\alpha_2} \quad (3)$$

Whether the relationship above holds or not remains to investigate theoretically and is not the purpose of the present study. The relationship has been tested empirically and the results (not reported here) show that the prices calculated according to equation

(3) explain 30-43% of the observed prices in the Czech Republic and 66-70% in Sweden.

Returns regression. An alternative approach to study the association between stock market prices and accounting numbers is based on Easton & Harris (1991). It analyses the association between annual share returns and levels of earnings and changes in earnings:

$$\frac{P_{jt} + d_{jt} - P_{jt-1}}{P_{jt-1}} = \alpha_0 + \alpha_{1t} \frac{X_{jt}}{P_{jt-1}} + \alpha_{2t} \frac{X_{jt} - X_{jt-1}}{P_{jt-1}} + \varepsilon_{jt} \quad (4)$$

The price P_{jt} is the total market value of the firm j at time t . X_{jt} is the total accounting earnings for firm j at time t that is net income before extraordinary items. d_{jt} is net dividends for the period. The window length is 12-months beginning on April 1 in order to secure that the financial statements are available to the market. Sensitivity tests have been made which included future earnings ($\frac{X_{jt+1}}{P_{jt-1}}$). Future earnings increased the explanatory power of the returns regression slightly; however, they influenced neither the comparison between the two countries nor the change of value relevance over time and therefore are not reported here.

Hedge portfolio tests. The hedge portfolio methodology is based on Alford et al. (1993) and Francis & Schipper (1999). First, earnings based hedge portfolio is created. Firm specific return $\frac{P_{jt} + DIV_{jt} - P_{jt-1}}{P_{jt-1}}$ is calculated for all firms over 15-month period ending on March 31 and is calculated on year basis, i.e. allowing re-

investment every year. All companies in the total sample are ranked according to the change in accounting earnings $(\frac{X_{jt} - X_{jt-1}}{P_{jt-1}})$. The change in accounting earnings is calculated on a year basis. A hedge portfolio is formed by going long in shares with the highest 40% of earnings changes and short in shares with the lowest 40% of earnings changes. Return is afterwards calculated for both the long position and short position as an average of returns for all companies included in the long respectively short position:

$$R_L = \sum_{j=1}^{N_L} \frac{R_j}{N_L} \quad \text{and} \quad R_S = \sum_{j=1}^{N_S} \frac{R_j}{N_S}$$

where R_j is the return for an individual company and N_L and N_S is the number of companies in the long position respectively in the short position. Note that N_L and N_S are equal. The hedge portfolio return is defined as the difference between the return on the long position and the return on the short position, that is the return that we can earn on the long position and the return that we loose on the short position:

$$R_H = R_L - R_S$$

Second, a hedge portfolio based on a perfect pre-knowledge of returns is created. Return is calculated for all firms and years in the same way as in the earnings based hedge portfolio but the companies are now ranked according to the level of returns. Long position is taken in shares with 40% of highest returns and short position is taken in shares with 40% of lowest returns. Average returns are calculated for the long and short positions and finally, return on the returns based hedge portfolio is calculated as the difference between the long and short position returns. Afterwards,

the return on earnings based hedge portfolio (*EHR*) is scaled by the return on returns based hedge (*RHR*). The ratio $\frac{EHR}{RHR}$ measures how much of the return earned based on a perfect pre-knowledge of returns can be explained by the return earned based on a perfect pre-knowledge of accounting earnings change. The larger the explained proportion, the higher value relevance of accounting earnings may be assumed.

6. Empirical results

Table 5a describes the Czech and Swedish samples. Many of the companies listed at the Prague Stock Exchange are small local suppliers of energy and municipal and health services. The Swedish sample includes many large multinational companies like Ericsson and Electrolux. This can be expected to have implications for the size of the companies as well as the growth potential. The local orientation of the Czech companies allows only for a modest growth. Also, energy supply is a regulated industry, which sets further limitations. Swedish firms grow generally more than the Czech counterparts. In the first period Swedish firms are more profitable. However, Sweden was hit by the economic recession around year 2000 much more than the Czech Republic. This might be partly because of the international character of the business of the Swedish companies and because of the different industry structure of the companies. The Swedish sample includes more companies in the so called new economy as shown in table 5b; that is companies rich in human capital, R&D and other unrecorded assets. The profitability of the Czech sample seems to be low, but stable over time. There seems to be higher expectations on future profitability in Sweden than in the Czech Republic as expressed in price-earnings ratio and market-to-book ratio. The higher market-to-book ratio in Sweden is influenced also by the

industry structure due to the large unrecorded assets. The average market-to-book ratio in the Czech Republic lies under one in both periods. The book value of equity was to a great extent based on estimation from the time before listing at the Prague Stock Exchange. It is generally known that the book value was often overvalued in the privatisation process. This would suggest a lower relevance of book value as an indicator for share price. The price-earnings ratio for the first period is principally the same in both samples but is higher for the Swedish firms in the second period due to the existence of an extremely low profitability in Sweden in that period. Finally, it can be seen that there is a large difference between the payout policies in the two countries. It is not common to pay dividends in the Czech Republic even though the trend is towards dividend payout. A closer look into the data material shows that it is especially the local companies which principally never pay out dividends.

INSERT TABLES 5a AND 5b

6.1. Regression results

As can be seen in table 6, the explanatory power of price regression (1) is lower for the Czech data than for the Swedish data in both periods. However, the explanatory power increases in the period 1998-2001 for the Czech sample suggesting an increase of value relevance. The return on equity is significant in for all samples and periods. The change in book value coefficient is not significant for the first Czech period but becomes significant at 10 percent level for the second period. The explanation to this may be the “ad hoc” book values of equity set in the privatisation process. In the second period, the book value starts to catch up as a consequence of the new

accounting regulation. The findings for the price regression are comparable to previous studies (Harris et al., 1994; Joos & Lang, 1994; Ali & Hwang, 2000). The results for the individual years are rather unstable for the Czech data mainly due to the low number of observations. An interesting observation is the decrease in value relevance for the Swedish sample which can probably be explained by the stock exchange bubble in Sweden around the millennium shift.

INSERT TABLE 6 HERE

The logarithmic regression (2) shows more robust results and an overall high explanatory power. The R^2 is higher for the Swedish data in both periods. However, the difference between the explanatory powers for the second period is rather small suggesting that the value relevance of the Czech accounting information has improved to levels comparable to the value relevance of Swedish accounting information. A test of differences between explanatory powers based on residual variances has been conducted and is reported in table 6. It suggests that the difference between the explanatory power of the logarithmic regression for the Czech and the Swedish sample in 1998-2001 is not significant. An interesting observation is that the weight switches from earnings to book value. It must be, though, kept in mind that the logarithmic model suggests a non-linear relationship between the dependent market variable and independent accounting variables. Finally, the results of the logarithmic regression made on a yearly basis are generally more stable.

The results of the returns regression (4) differ from the previous results. They show an increase in the explanatory power for the Czech sample, the R^2 being actually higher in the second period for the Czech data than for the Swedish data. Any conclusions should be, though, in this case drawn with caution. Francis & Schipper (1999, p.321) argue that returns regressions are less suitable tests of value relevance in turbulent times and that hedge portfolio tests should better be used in order to control for the volatility of market returns over time. If the amount of value relevant accounting information is constant over time, but the volatility of market returns increases because of reasons external to accounting information, linear regression tests will show a decrease in explanatory power over time because a greater proportion of variability in the dependent variable will be explained by other information than accounting information. Indeed, the market volatility might have increased in the second Swedish period and external non-accounting factors like market bubble might have affected market returns and values leading to a lower explanatory power of the linear regressions.

It can be stated that overall, the explanatory power of the earnings regression is substantially lower than of the previous regression tests (similar results can be found in Aford et al., 1993; Joos & Lang, 1994; Harris et al, 1994; Ali & Hwang, 2000; Ball et al, 2000) . The coefficient on earnings changes is not significant and is mostly negative. Earnings changes seem thus not to be value relevant; it is the actual level of earnings that matters. The negative coefficient suggests, assuming random walk in earnings, that the market can see whether the change is transitory and that the earnings will revert to a normal level in the next accounting period.

6.2. Hedge portfolio results

Table 7 summarises annual average returns of the Czech and Swedish samples and table 8 summarises the results of the earnings based hedge portfolio test. The returns for the long position (R_L) and the returns for the short position are presented (R_S) and the total return on the hedge portfolio is calculated. If the knowledge of the change in accounting earnings did not add any value, the return on long and short position respectively would not differ and the hedge portfolio return would be zero. In three cases out of four the return on the hedge portfolio is higher than zero; that is knowing which companies perform best and which companies perform worst, we can identify a strategy that pays off. Accounting earnings seem to yield higher returns for the Swedish sample than for the Czech sample suggesting lower value relevance of the Czech accounting earnings. The results also show an improvement in the value relevance of accounting earnings in the Czech Republic. The proportion EHR/RHR measures how much of the total returns hedge portfolio return can be earned by the pre-knowledge of earnings changes. If the proportion is large (small), the accounting earnings seem to be more (less) value relevant. The results for the first Czech period indicate problems with value relevance. In the second period, 18,6% of the Czech total returns are earned thanks to the pre-knowledge of accounting earnings changes. For Sweden, the proportion is 19,34% for the first period and 29,13% for the second period. These results are comparable to previous findings (Alford et al, 1993; Francis & Schipper, 1999). For the Swedish sample, the hedge portfolio test shows an increase in accounting earnings value relevance which is not in line with the findings of linear regression tests. The reason might be as suggested before the volatility of market returns over time.

INSERT TABLE 7 HERE

INSERT TABLE 8 HERE

7. Concluding remarks

The first objective of the study was to find whether the Czech accounting information is less or more value relevant than the Swedish accounting information. The test results are consistent with the hypothesis that value relevance of accounting information is lower in the Czech Republic than in Sweden. The second objective was to find whether the value relevance of Czech accounting information has changed over time. The results are in line with the hypothesis that the value relevance of Czech accounting has improved over the research period. The results show at the same time a probable decrease in value relevance of accounting information in Sweden. The same significant independent variables are identified for both countries and both periods with the exception of the change in book value for the Czech data. The results of hedge portfolio tests confirm the regression results.

The degree of value relevance is a function of the development of accounting regulation, control mechanisms, business climate change, internationalisation and business cycle, economic development and industry structure. Although it is not possible to separate the effect of the individual factors within the scope of this study, the results of the tests show that the direction of value relevance change is consistent with the expectations based on these factors. During first research period, 1994-1997,

the market economy in the Czech Republic was relatively new, the accounting profession and regulation under development, control mechanisms insufficient and business climate secretive. Contacts with foreign environment were beginning to be established. It was also a time of accelerated economic development. All these factors support the finding that the value relevance of this period was low. The weak association between market and accounting numbers suggests that pricing was done on the basis of other premises than a fundamental analysis of accounting information. In the second research period 1998-2001, the country experienced an improvement in virtually all the five factors considered to influence value relevance. Accounting standards and regulation improved and more efficient control mechanisms were established which had a positive effect on the capital market. Czech managers also started to demonstrate a change in their attitude and became more positive towards providing access to information. This might be partly explained as a result of the Stock Exchange Commission requirements, but the positive will of the managers should not be underestimated. This is especially true of the largest companies and companies with foreign participation. There is an apparent relation between the size of the company and the quality of information disclosure in the Czech Republic. The largest companies disclose more information than necessary; they reconcile their statements according to international standards and they introduce new accounting issues. These changes support the evidence of an increase in the value relevance of Czech accounting information in the second period.

Some additional comments and suggestions for future research are appropriate in this place. First, value relevance is only one of the attributes of accounting quality which

gives space for further research into the area of accounting quality in the Czech Republic or other transition economies. Second, value relevance tests do not distinguish between accounting regulation and the actual implementation of accounting standards. This dichotomy should be addressed in the future. Third, the research design of this study did not control for industry structure, which has implications for the comparison between the different samples. Last but not least, the tests used assume a linear relationship between the dependent market variable and independent accounting variables. The suggested logarithmic model shows robust results and thus questions the linearity assumption.

Despite the suggested improvements, the following may be learned from the results of this study. The value relevance of accounting information is a complex and ambiguous issue and its improvement can hardly be achieved overnight. Just as institutional, economic and social changes take time in the transition from a centrally planned economy to a market economy, changes in the quality of accounting information and financial reporting also take time. The Czech experience shows, however, that the change can occur relatively quickly, the value relevance of accounting information increased to a level comparable to that of a market economy after 5-8 years of trading activity at the Prague Stock Exchange.

In order to increase value relevance of accounting information, however, a number of factors must interact in the same positive direction. In other words, it is not enough to adopt high quality accounting standards – whether domestic or international accounting standards – unless control mechanisms are functioning, society is open

and able to compete internationally. Thus, the issue for accounting standard setters and accounting professionals in transitional countries should not only be the question of accounting legislation and harmonisation, but perhaps more importantly an understanding of the interaction between the institutional factors and their importance for the value relevance of accounting information.

The Czech Republic is an example of a country in transition process. Its experience of developing a completely new accounting system cannot be transferred directly to any other country because every country has its own specific development and unique mixture of political, economic and social conditions. However, knowledge of the value relevance of Czech accounting and its development might contribute to a better understanding of both the notion of value relevance of accounting information and of the process of a transformation of accounting regulation and environment in a transitional economy. The results have important implications for the Czech companies and capital markets because the increase in value relevance and possibility of reliance on the information promotes investors' interest in the economy, strengthens the country's credibility and has effects on the cost of capital. Last but not least, the issue of well functioning accounting environment has been actualised by the country's entry into the European Union in May 2004.

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Table 1. Prague and Stockholm Stock Exchange (equities only)

Czech and Swedish currencies are converted into U.S. dollars at the exchange rate that applied at the end of each year. The numbers for both the Prague Stock Exchange and for the Stockholm Stock Exchange are given in both domestic currency and in USD in order to enable a comparison between the two stock exchanges.

	1994	1995	1996	1997	1998	1999	2000	2001
<i>Prague Stock Exchange</i>								
No of listed companies	1 028	1 716	1 670	320	304	195	151	102
Capitalisation (bn CZK)	353,1	478,6	539,2	495,6	416,2	479,6	442,8	340,2
Capitalisation (bn \$)	12,3	18,1	19,8	15,4	12,9	14,8	11,4	8,9
Total turnover (bn CZK)	42,5	125,6	249,9	246,3	172,5	163,4	264,1	128,7
Total turnover (bn \$)	1,4	4,7	9,1	7,6	5,3	5,0	6,8	3,3
<i>Stockholm Stock Exchange</i>								
No of listed companies	228	223	229	261	276	300	311	305
Capitalisation (bn SEK)	976,2	1179,1	1687,7	2164	2413	3717	3583,4	2855,7
Capitalisation (bn \$)	126,6	165,14	251,9	283,6	303,5	450	390,8	276,7
Total turnover (bn SEK)	658	664	918	1 345	1 829	2 608	4 455	3 994
Total turnover (bn \$)	85,3	93	137	176,2	230	315,7	485,8	387

Source: Prague Stock Exchange Statistical Yearbook, www.pse.cz, Stockholm Stock Exchange, www.stockholmsborsen.se

Table 2. Balance sheet according to the Czech GAAP – overview

The table shows the three dimensions of accounting: recognition, measurement and the clean surplus relation. The first part of the table concerns such basic accounting issues that are relatively uncontroversial, that constitute the basis for balance sheets of almost all companies and that are assumed to cause the least differences on international basis. The second part deals with more complex issues that have appeared in the latest decades due to the changes in business environment as such. The third part looks into the issue of group accounting and consolidation which has been identified by most academics as well as practitioners as an extremely problematic area in the Czech Republic.

The table is organised as follows. The column “Item” states the accounting issue (balance sheet item). The column “Recognition” states whether the item is recognised or not (Yes/No). “Measurement” describes briefly the basic valuation and measurement method. In the case of the item not being recognised the cell is empty. “CSR” means clean surplus relation. The column states whether or not the clean surplus relation holds (Yes/No). When the item is not recognised, the cell is empty.

Item	Recognition	Measurement	CSR
<i>Basic items</i>			
Cash	Yes	Nominal value, foreign currency at closing rate	Yes
Short-term assets	Yes	Acquisition cost plus transaction cost, foreign currency at closing rate	Yes
Accounts receivable	Yes	Nominal value, write-down if necessary (even if only expected)	Yes
Inventory	Yes	Lower of cost and net realisable value. FIFO or weighted average	Yes
Long-term contracts	Yes	Completed contract method	Yes
Property, plant & machinery	Yes	Historical cost, replacement cost in certain limited cases. Depreciation over useful economic life. Write-down if necessary. Revaluations not permitted.	Yes
Accounts payable	Yes	Nominal value, foreign currency at closing rate	Yes
Short- and long-term financial liabilities	Yes	Nominal value, foreign currency at closing rate	Yes
Short and long term operating liabilities	Yes	Nominal value, foreign currency at closing rate	Yes
Provisions	Yes	Record present obligations from past events. Legal provisions are set aside for future expenditure for repairs of property, plant and equipment. Provisions divided into tax deductible and others.	Yes
Purchase of own shares	Yes	Direct against equity	No
<i>More complex issues</i>			
Intangible assets – acquired	Yes	Capitalised, amortised over maximum 5 year (useful economic life). Revaluations not permitted.	Yes
- internally generated	Yes	Valued at the costs incurred or the replacement cost if lower, amortised over 5 years – impairment tests.	Yes
R&D	Yes	Capitalised, amortised over useful economic life	Yes
Start-up costs	Yes	Same rules as for other intangibles, required if value over 60 000 CZK /previously 20 000/	Yes
Software	Yes	If costs higher than CZK 60 000	Yes
Investment	Yes	Long-term investments valued at amortised cost less impairment, current investments at lower of amortised cost and net realisable value. Unrealised losses go to IS.	Yes
Leasing	No		
Derivatives and other instruments	No		
Deferred tax	Yes	Differences on amortisation and depreciation. Only	Yes

		voluntarily.	
Provisions for pensions	No		
Convertibles	Yes	Recorded as a liability.	Yes
Foreign currency translation	Yes	Monetary items at balance sheet rate, non-monetary at historical rate. Cash and short-term investments revaluated through IS; differences on other monetary items deferred on separate accounts until realisation.	Yes/no
Off-balance accounting	Yes	However, unclear guidance as to what is off-balance	No
<i>Group accounting</i>			
Consolidation	Yes	Based on majority of shares or on either direct or indirect actual dominant influence. Exclusion of subsidiaries from consolidation large.	-
Joint ventures	Yes	Equity method	-
Purchase method	Yes	Assets and liabilities of acquired entity not fair valued. Subsequent revaluation permitted in the period of transaction.	-
Pooling method	No	-----	
Goodwill	Yes	Charge in IS in the year of consolidation or capitalise and amortise over 0-20years. Impairment tests.	Yes
Negative goodwill	Yes	Same treatment as above	Yes

Table 3. Balance sheet according to the Swedish GAAP - overview

Item	Recognition	Measurement	CSR
<i>Basic items</i>			
Cash	Yes	Nominal value, foreign currency at closing rate	Yes
Short-term assets	Yes	Nominal value, foreign currency at closing rate, fair value	Yes
Accounts receivable	Yes	Nominal value, write-down if necessary, fair value	Yes
Inventory	Yes	Lower of cost and net realisable value, FIFO, weighted average, fair value	Yes
Long-term contracts	Yes	Percentage of completion method	Yes
Property, plant & machinery	Yes	Historical cost. Depreciation according to useful economic life. Impairment. Revaluation permitted	Yes No
Accounts payable	Yes	Nominal value, foreign currency at closing rate	Yes
Short and long term financial liabilities	Yes	Nominal value, foreign currency at closing rate	Yes
Short and long term operating liabilities	Yes	Nominal value, foreign currency at closing rate	Yes
Provisions	Yes	Record provisions for present obligations from past events. General provisions not allowed.	Yes
Purchase of own shares	Yes	Direct against equity	No
<i>More complex issues</i>			
Intangible assets – acquired	Yes	Capitalized, amortised over 5 years or more if it can be proved. Revaluations not permitted. Impairment tests.	Yes
- internally generated	No		
R&D	No	<i>Expensed as occur unless certain criteria fulfilled</i>	
Start-up costs	No	Expensed as occur	
Software	No	Expense as occur	
Investment	Yes	Acquisition cost, impairment tests, current investments at lower of acquisition cost and net realisable value, unrealised gains and losses go to income statement	Yes
Leasing	Yes	Record financial lease as an asset and future rental payments as an obligation. Amortize.	Yes
Derivatives and other instruments	Yes	No standards. Treatment depends on the purpose of the financial instrument (trading – non-trading)	Yes/ No
Deferred tax	Yes	Recognition of deferred tax liabilities for all temporary differences. Deferred taxes follow the measurement of the underlying transactions.	Yes/ No
Provision for pensions	Yes	Pension contribution plans or pension benefit plans. Present value of future benefit obligations disclosed.	Yes
Convertibles	Yes	Record as a liability	
Foreign currency translation	Yes	Current/closing rate method or monetary- non-monetary method	No Yes
Off-balance accounting	Yes	Contingent liabilities, pledge, mortgage	No
<i>Group accounting</i>			
Consolidation	Yes	Based on voting control or actual dominant influence.	
Joint ventures	Yes	Equity method	
Purchase method	Yes	Assets and liabilities of acquired entity fair valued.	
Pooling method	Yes	Usage limited	
Goodwill	Yes	Capitalise, amortise over 5 – 20 years or longer, impairment tests	Yes
Negative goodwill	Yes	Same treatment as above	Yes

Table 4. Main differences between Czech GAAP and Swedish GAAP.

<i>Item</i>	<i>Czech GAAP</i>	<i>Swedish GAAP</i>
Intangible assets	Internally acquired intangibles often capitalised	Capitalisation of internally acquired intangibles not allowed
R&D	Capitalised	Mostly expensed
Long-term projects	Completed contract method	Percentage-of completion method
Leasing and financial instruments	Not recognised due to the requirement of priority of legal form over substance	Recognised
Provisions	Legal provisions common, for example for future repair expenditures	No legal or general provisions allowed. Provisions for pensions, deferred taxes and others exist.
Deferred tax	Voluntary	Compulsory
Group accounting	Many exceptions to consolidation requirement	More strict rules
Goodwill	Can be expensed directly or capitalised	Expensing prohibited, only capitalisation
Purchase method	Assets not valued at their fair value	Assets valued at their fair value
Substance versus legal form	Accounting should reflect legal form even if the substance is different.	Accounting must reflect the economic substance even if it is different from legal form.
Materiality	Completeness of information is required regardless of materiality.	The materiality of information should be considered.

Table 5a. Comparison of the Czech and Swedish samples (million CZK, USD in brackets)

<i>Variable</i>	<i>Czech Republic</i>		<i>Sweden</i>	
	<i>1994 - 1997</i>	<i>1998 - 2001</i>	<i>1994 - 1997</i>	<i>1998 - 2001</i>
Number of companies	258	259	876	993
Structure of the balance sheet				
Total assets	5 503 (192,2)	7 403 (208,9)	6 862 (942,6)	7 568 (845,6)
Book value	2 769 (96,7)	4 064 (114,7)	2 799 (384,5)	3 521 (393,4)
Profitability measures				
Earnings	94 (3,3)	173 (4,9)	385 (52,9)	276 (30,8)
Return on equity	5,08%	5,97%	13,5%	8,3%
Return on assets	9,10%	12,60%	11,3%	3,8%
Cost of liabilities	17,60%	25,83%	4,66 %	3,54%
Financial position				
Equity-asset ratio	63,60%	55,52%	44,07%	51,24%
Debt-equity ratio	0,7	0,94	1,85	1,29
Growth				
Change in total assets	12,41%	3,58%	16,68%	17,51%
Change in equity	6,00%	3,22%	26,30%	19%
Dividends/Equity	0,80%	1,24%	4,16%	3,6%
New issue/equity	0%	0	5,23%	11,05%
Dividends/Earnings	14,42	15,39%	38,9%	29,4%
Market related measures				
Price	2 375 (83,0)	2 377 (67,1)	7 548 (1 036,8)	5 901 (659,3)
Price-earnings ratio	20,10	11,99	20,3	27,5
Market- to- book ratio	0,74	0,57	2,35	2,67

Table 5b. Industry groups in the Czech and Swedish sample (Classification taken from the Prague and Stockholm Stock Exchanges)

Industry	Czech Republic	Sweden period 1	Sweden period 2
Energy	23	4	3
Chemistry	4	2	2
Construction	5	8	6
Manufacturing	6	47	38
Mining & natural resources	5	7	7
Services	5	12	9
Telecommunication	2	9	15
Transportation	1	9	5
Consumer goods	8	33	23
Paper and forestry	1	7	8
Investment and holding		17	20
Real estate		10	8
Media		4	6
Consultancy		5	4
IT		27	30
Medicals and biotechnology		25	27
Others	12	78	60
Total	65	302	271

Table 6. Results of the regression tests

$$\text{Price regression } \frac{P_{jt}}{BV_{jt-1}} = \alpha_0 + \alpha_1 \frac{X_{jt}}{BV_{jt-1}} + \alpha_2 \frac{BV_{jt}}{BV_{jt-1}} + \varepsilon_{jt}$$

$$\text{Logarithmic regression } \ln P_t = \alpha_0 + \alpha_1 \ln X_{jt} + \alpha_2 \ln BV_{jt}$$

$$\text{Returns regression } \frac{P_{jt} + d_{jt} - P_{jt-1}}{P_{jt-1}} = \alpha_0 + \alpha_{1t} \frac{X_{jt}}{P_{jt-1}} + \alpha_{2t} \frac{X_{jt} - X_{jt-1}}{P_{jt-1}} + \varepsilon_{jt}$$

*** significance at 1 percent level, ** significance at 5 percent level, * significance at 10 percent level, overall, adjusted R² values are reported.

Period	Czech Republic				Sweden			
	n	Adj. R ²	X _t /BV _{t-1}	BV _t /BV _{t-1}	n	R ²	X _t /BV _{t-1}	BV _t /BV _{t-1}
Price regression								
1994-1997	195	8,8%	3,358***	0,190	617	27,5%	7,091***	1,661***
1998-2001	245	10,7%	2,433***	0,320*	374	15,2%	10,245***	3,632***
1994	42	34,8%	5,706***	0,233	152	34,3%	4,06***	0,611**
1995	50	6,4%	-0,132	2,67*	152	25,2%	5,028***	0,868
1996	49	6,2%	5,375**	-0,855	156	60,4%	11,265***	2,562***
1997	49	0%	-0,053	1,411	157	19%	7,826***	1,874**
1998	48	15,2%	3,858***	-0,0426	105	30,7%	13,948***	1,853**
1999	43	15,3%	2,994**	0,987	106	10,8%	8,019	7,915**
2000	53	44,1%	4,626**	0,15	90	5,3%	1,803	2,168**
2001	58	1,1%	1.482	0,070	66	42,2%	11,574***	1,389*
Logarithmic regression								
	n	Adj.R ²	lnX _t	lnBV _t	n	R ²	lnX _t	lnBV _t
1994-1997	204	63,7%	0,491***	0,665***	680	88,5%	0,304***	0,643***
1998-2001	271	72,9%	0,502***	0,577***	447	73,8%	0,208***	0,636***
1994	53	68,5%	0,573***	0,397***	163	93,4%	0,316***	0,677***
1995	53	61,8%	0,510***	0,624***	161	89,9%	0,345***	0,635***
1996	52	64,9%	0,490***	0,660***	164	91,9%	0,388***	0,547***
1997	53	75,9%	0,460***	0,772***	185	86,7%	0,302***	0,606***
1998	51	71,2%	0,394***	0,820***	137	83,3%	0,360***	0,545***
1999	48	74,8%	0,609***	0,600***	132	55,5%	0,152	0,540***
2000	57	79,1%	0,690***	0,259**	106	76,6%	0,088	0,786***
2001	61	67,4%	0,382***	0,642***	72	87,8%	0,251***	0,719***
Returns regression								
	n	Adj. R ²	levels	changes	n	R ²	levels	changes
1994-1997	161	2,4%	1,273**	-0,756	727	6,4%	1,608***	-0,329
1998-2001	226	14,1%	1,877***	-0,651**	347	4,3%	2,901***	1,199
1994	4	-	-	-	162	15,5%	1,561***	0,182
1995	51	0%	-0,169	0,299	170	4,6%	0,753*	0,585
1996	48	0%	0,247	-1,064	175	14,5%	2,639***	0,245
1997	42	3,5%	1,195*	-0,901	206	8,9%	2,144***	-0,260
1998	46	10,8%	1,404***	0,009	101	9,2%	3,331***	-0,123
1999	41	41,7%	3,623***	-1,83**	99	3,3%	-3,701	6,774**
2000	42	13,1%	1,535***	-0,989*	80	11,6%	3,365***	-1,964**
2001	52	16,8%	1,744***	-0,498	61	18,2%	3,948***	0,205

Table 6 continued. Comparison of two different samples

Period 1994-1997	MSR1/ MSR2	F-value 1%	F-value 5%	F-value 10%	Period 1998-2001	MSR1/ MSR2	F-value 1%	F-value 5%	F-value 10%
Scaled regression	16,7	1,28	1,19	1,14	Scaled regression	90,2	1.39	1.26	1.20
Logarithmic regression	2,19	1,28	1,19	1,14	Logarithmic regression	1,064	1.33	1.22	1.17
Returns regression	1,25	1.38	1.25	1.19	Returns regression	2,54	1.39	1.26	1.20

Note: MSR1/ MSR2 is the quotient of the mean square residuals for the Czech and Swedish samples. The MSR1/ MSR2 is F-distributed. The test is double-sided and the hypotheses are H_0 : if the variance is similar, the quotient will be approximately 1 and H_1 : if the variance is not similar, the quotient will

be higher or lower than 1. The decision rule is to reject H_0 if $\frac{V_1}{V_2} > 1 + \varepsilon$ or $\frac{V_1}{V_2} < 1 - \varepsilon$ where V_1 and

V_2 are the mean squares of the residuals from the regression for sample 1 and 2 and $n_1 - k_1$ and $n_2 - k_2$ are degrees of freedom for sample 1 and 2.

Table 7. Annual average returns of the total samples

Year	Czech Republic		Sweden	
	n		n	
1994	27	10,25 %	137	19,34 %
1995	30	2,05 %	173	16,06 %
1996	64	29,76 %	178	70,83 %
1997	64	- 10,43 %	187	29,77 %
1998	64	5,90 %	162	18,65 %
1999	62	31,67%	160	73,90 %
2000	65	24,49 %	135	4,73 %
2001	64	18,51 %	129	2,69 %

Table 8. Results of the hedge portfolio test.

$$R_L = \sum_{j=1}^{N_L} \frac{R_j}{N_L} \quad \text{and} \quad R_S = \sum_{j=1}^{N_S} \frac{R_j}{N_S} \quad \text{where} \quad R_j = \frac{P_t + DIV_t - P_{t-1}}{P_{t-1}}$$

Hedge portfolio return $R_H = R_L - R_S$

EHR = earnings based hedge portfolio return, RHR = returns based hedge portfolio return

	Czech Republic		Sweden	
	n	Return	n	Return
1994 - 1997				
R_L	74	3,00%	270	45,16 %
R_S	74	11,35 %	270	23,09 %
Hedge portfolio return		- 8, 35 %		22,07 %
1998 - 2001				
R_L	102	36,19 %	234	47,54 %
R_S	102	14,07 %	234	6, 53 %
Hedge portfolio return		22,12 %		41,01 %
	Proportion EHR / RHR		Proportion EHR / RHR	
1994 - 1997		-7,22%		19,34%
1998 - 2001		18,6%		29,13%