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TAX HETEROGENEITY AND TRADING VOLUME AROUND THE EX-DIVIDEND DAY: ESTONIAN EVIDENCE

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TAX HETEROGENEITY AND TRADING VOLUME AROUND THE EX-DIVIDEND DAY: ESTONIAN EVIDENCE

Priit Sander[1]

Abstract

This paper examines the trading pattern around the ex-dividend day in the Estonian stock market between 2000 and 2006. An analysis of the Estonian income tax law confirmed that despite its simplicity there exists differential treatment of capital gains and dividends as well as tax heterogeneity among investors. An empirical analysis of the trading data showed a statistically significant abnormal trading volume around the ex-dividend day. By putting these two aspects together and investigating short-term changes in ownership structure around the ex-dividend day it can be concluded that in the Estonian stock market investors use dynamic tax-induced trading strategies around the ex-dividend day. The occurrence of the learning effect and avoidance of transaction costs were also revealed by an analysis of these transactions.

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INTRODUCTION

Scholes and Wolfson (1992) argue that differential tax rates provide strong incentives for taxpayers to engage in tax planning. One specific dynamic tax-induced trading strategy is the so-called ex-dividend strategy. Allen and Michealy (2002) describe this strategy as follows: "The basic idea is that investors can change their trading patterns around the ex-dividend day to capture or avoid the upcoming dividend." According to Elton *et al.* (2002), more than 100 papers have been written on the subject. Also, tests have been conducted, using stock market data from different countries around the world.

However, there is only very limited evidence from the CEE countries. The current paper tries to fill this gap by investigating trading around the ex-dividend day in one of the smallest stock markets in Europe – the Estonian stock market. The sample consists of 50 cash dividend distributions during the period of 2000–2006. The article limits itself to an in-depth analysis of the trading volume around the ex-dividend day, taking no possible price effects under investigation. There are several reasons for this limitation. First, as argued in the paper, a considerable proportion of transactions around the ex-dividend day takes place without the intermediation of brokers in the over-the-counter (OTC) market. No price data are available for these transactions. Second, relatively large bid-ask spreads characteristic of stocks with low liquidity may distort the ex-dividend day price drop analysis.

The aim of the paper is to find out whether investors use dynamic tax avoidance strategies around the ex-dividend day in the Estonian stock market. In order to achieve this goal, the author estimates the quasi-arbitrage conditions on the basis of an analysis of the Estonian income tax law, analyzes the trading volume around the ex-dividend day and investigates the short- and long-term changes in the ownership structure of the listed companies. The empirical analysis presented in this paper is based on the public trading data from the official homepages of the Central Registry of Securities and the Tallinn Stock Exchange. Annual financial statements of the listed companies are also used. The detailed trading data showing short-term ownership changes were obtained directly from the Tallinn Stock Exchange.

The paper is structured as follows. The first section provides the theoretical background and an overview of previous research. Section 2 describes the institutional aspects of the Estonian stock market, concentrating on the income tax system and trading rules of the Tallinn Stock Exchange. Section 3 describes the data and research methodology. Section 4 includes the estimation of arbitrage boundaries for different investors categories. Section 5 presents the results of the empirical study. The paper ends with managerial implications and concluding remarks.

1. THEORETICAL BACKGROUND AND PREVIOUS RESEARCH

As shown by Miller and Modigliani (1961), dividend policy does not affect share prices under the assumption of a perfect and complete capital market. In their theoretical model, a firm is capable to achieve any desirable payout level by issuing or repurchasing common shares and every shareholder can replicate any desired stream of payment by selling or purchasing common shares at the capital market (*Ibid*). However, in reality capital markets are not perfect, and one reason for that is taxation.

As the market value of shares is determined by after-tax cash flows, any differential tax treatment of capital gains relative to dividends may influence corporate dividend policy. The changes in dividend policy may include altering the dividend payout ratio and replacing cash dividends with stock repurchases or stock dividends.

In the case when all investors are taxed similarly and the effective tax rate on dividends exceeds the effective tax rate on capital gain, it is optimal to pay no dividends at all. Even if the statutory tax rates are similar, the possibility to choose the moment to realize the capital gains (i.e., tax timing option) is valuable (see e.g., Constantinides 1984, Emery and Gehr 1988) and therefore from tax perspective, unrealized capital gains are superior to dividends. If, on the other hand, the effective tax rate on dividends is lower than on capital gains and taxes are the only source of market imperfection, it would be optimal to pay out all earnings as dividends and use external financing.

Dividend policy is unaffected if the effective tax rates on dividends and capital gains are the same, but different investors (domestic *vs.* foreign, individual *vs.* corporate) are taxed differently. However, such tax discrimination may lead to permanent changes in the ownership structure of companies.

In a world without transaction and agency costs and information asymmetry, but with different tax rates on dividends and capital gain, companies should choose the dividend policy which is the most tax effective. However, in reality different investors may prefer different dividend policies due to differential tax treatment of investors (e.g., non-flat tax rates, different tax rates for domestic and foreign investors, different tax rates for individual and institutional investors, etc). As dividend income is usually taxed more highly than capital gain, this suggests that investors in high tax-brackets should hold shares with a low dividend yield and vice versa (so-called dividend clientele[2]).

In their excellent survey of literature on payout policy, Allen and Michaely (2002) distinguish between two types of clientele models: static and dynamic. The most important difference between them is that in static models investors trade just once, while in dynamic models they are allowed to trade multiple times (*Ibid*). According to Allen and Michaely (2002), a static view is appropriate when transaction costs are extremely high.

If the static form of dividend clientele really exists, companies should not change their dividend policy too often, as it would cause shareholders to switch firms and burden them with brokerage costs, and in many cases also with capital gain taxes. Brav *et al.* (2005) document that managers hesitate about introducing extreme changes in their payout policy as it might cause changes in ownership structure, thereby negatively affecting the company's stock price. Changes in dividend policy are also viewed as signals about companies' future prospects and therefore companies may be reluctant to lower their payout ratios even if it would be tax effective (see e.g., Miller and Rock (1985), John and Williams (1985)). Most of the

[2] The dividend clientele effect was originally suggested by Miller and Modigliani (1961) on the basis of investor preferences for payout ratios.

earlier studies used static models. Elton and Gruber (1970) among others found some evidence to confirm the existence of static clientele. However, direct studies of stock ownership have found no significant tendency for high-income groups to prefer stocks with a low dividend yield (Kalay 1982).

According to Allen and Michaely (2002), the realization that investors could trade dynamically to reduce their tax liability was an important development in the literature on taxes and dividends. Several dynamic tax avoidance strategies have been proposed by Miller and Scholes (1978), Stiglitz (1983), Chaplinsky and Seyhun (1990) and Scholes *et al.* (2005). It appears that the ex-dividend day strategy is a dynamic tax avoidance strategy which can be used in countries where differential tax treatment of dividends and capital gains exists in conjunction with tax heterogeneity among investors.

Peterson *et al.* (1985) argued that it is not very often that individual investors resort to dynamic tax avoidance strategies. Whether investors in fact use the ex-dividend day strategy is a question that can be answered only after examining the empirical data. The statistically significant abnormal volume around the ex-dividend day implies possible use of dynamic tax-induced trading strategies.

Ex-dividend day studies have been conducted in many countries (e.g., Kato and Loewenstein (1995) in Japan, Liljeblom et al. (2001) and Rantapuska (2005) in Finland, McDonald (2001) in Germany, Michaely and Murgia (1995) in Italy, Milonas and Travlos (2001) in Greece, Kadapakkam and Martinez (2005) in Mexico, Lasfer (1995) in the UK, Lakonishok and Vermaelen (1983) in Canada, Hu and Tseng (2004) in Taiwan, Sarig and Tolkowsky (1997) in Israel, Bartholdy and Brown (1999) in New Zealand, Castillo and Jakob (2006) in Chile, Yilmaz and Gulay (2006) in Turkey etc.). The first study in this area was conducted already in 1953 by Campbell and Beranek in the United States.

While most of these papers deal with the ex-dividend price puzzle (i.e., why is the average price drop between the cum- and ex-day lower than the dividend amount?), there are also several papers investigating trading volumes around the ex-dividend day. Most of these studies have found abnormal trading volumes around the ex-

dividend day, implying the use of the tax-induced strategy. For example, Lakonishok and Vermalaen (1986) found, for the period 1975–1981 the volume around the ex-dividend day to be ca 36% higher than normal. They also confirmed the volume increase to be more pronounced for high-yield, actively traded stocks (*Ibid*). Likewise Liljeblom *et al.* (2001) found both highly significant abnormal trading volumes and the violation of non-arbitrage conditions between domestic taxable companies and foreign investors, which seems to indicate that some ex-dividend arbitrage is in fact taking place on the market. According to Dhaliwal and Li (2006), it is the differential tax treatment of dividends and capital gain in conjunction with tax heterogeneity among investors that causes the excess trading volume. Studies investigating changes in tax laws also confirm a positive relationship between tax heterogeneity and trading volume around the ex-dividend day (see e.g., Zhang *et al.* 2006).

Trading around the ex-dividend day is also affected by risk consideration and transaction costs. In static models, transaction costs can be safely ignored, but in dynamic models they are potentially much more important (Allen and Michaely 2002). Michaely and Vila (1996) demonstrated that stocks with lower transaction costs experienced a statistically significant higher abnormal volume around the ex-dividend day. Koski and Michaely (2000) reported that eliminating risk exposure and reducing transaction costs by using block trades with non-standard settlement days would increase the volume significantly. However, Graham *et al.* (2003) did not find statistically significant evidence for the claim that a decrease in bid-ask spread would influence trading activity. Michaely and Vila (1995) showed that trading volume is negatively related to risk and positively related to the degree of tax heterogeneity.

However, there is a growing body of evidence to suggest that taxes alone cannot be the reason behind the ex-day price puzzle and abnormal trading volume. An average price drop did not equal the dividends even in countries where dividends and capital gains are not taxed. It has been argued that market microstructure aspects (the existence of bid-ask spreads and changes in the trading pattern around the ex-day (see Frank and Jagannathan 1998) or disparity between the discrete tick size and continuity that exists in dividends (see Bali and Hite (1998)) may also cause the ex-day price effect.

Even though the market microstructure could explain to some extent the ex-dividend day price behavior, it does not explain excessive trading around that day, which has been found also in countries with no taxes on dividends and capital gains, such as Greece (Milonas and Travlos 2001) or Mexico (Kadapakkam and Martinez 2005). For example, Milonas and Travlos (2001) investigated the ex-dividend day behavior at the Athens Stock Exchange and found positive abnormal returns on the ex-dividend day as well as a positive abnormal trading volume around the ex-dividend day. There are no taxes on dividends or capital gains in Greece, and due to the computerized trading system and absence of market makers no bid-ask spreads, either. More recently, Graham *et al.* (2003) argued: "It seems unlikely that either price discreteness or bid-ask bounce explains the patterns in ex-day premiums and abnormal returns on the NYSE".

There may be other reasons besides taxes that induce trading around the ex-dividend day. For example, Graham and Kumar (2006) found that preference for dividend yield increases with age consistently with the life cycle or consumption preferences. They also found clear evidence that older investors buy stocks on the cum-dividend day or earlier, in order to obtain the dividend (*Ibid*). While there is much evidence to show that tax heterogeneity causes active trading around the ex-dividend day, one cannot automatically assume that the abnormal trading volume around the ex-dividend day is caused by taxes.

Theoretical advances and previous empirical research imply that the abnormal trading volume around the ex-dividend day is not sufficient evidence to confirm the use of the tax avoidance trading strategy. One must first prove that there is tax heterogeneity among investors and therefore probable cause for using the ex-dividend day strategy, and identify those groups of investors who could profit from trading around the ex-dividend day. This can be done by analyzing tax rules, trading costs, dividend yields, etc. Further assurance can be achieved by investigating whether previously identified investor groups behave in a manner which is consistent with the tax hypothesis.

2. INSTITUTIONAL ASPECTS OF THE ESTONIAN STOCK MARKET

2.1. The income tax system in 2000–2006

Estonia has been known for its bold tax reforms. The first major income tax reform took place in 1994, three years after regaining independence and two years after the introduction of the national currency. During that tax reform, the progressive tax system was replaced by the proportional tax system. Since then, both corporations and natural persons had the same nominal tax rate. Although Estonia was not the first country to introduce this system (Hong-Kong did it already in 1947), it seems that Estonia's success encouraged many Eastern European countries to follow its example. To date, such countries as Russia, Ukraine, Lithuania, Latvia, Slovakia, Serbia, and Romania have adopted the flat tax regime.

In addition to the flat tax rate, Estonia used traditional methods to attract investment (such as investment tax credit, tax exemptions for foreign direct investments, tax depreciation, loss carry-forwards for the next five years, etc.). However, as the tax competition grew stronger and several European countries lowered their tax rates, entrepreneurs no longer considered the 26% flat tax rate to be very attractive. Apart from the fact that some of our neighbouring countries had lower tax rates, the partial double taxation of corporate profits was an issue.

The second major tax reform was carried out in the year 2000. One of its main goals was to encourage investments by shifting the moment of corporate taxation from the period of earning the profit to the period of distributing it. According to the Estonian tax system, both explicit (dividends) and implicit (fringe benefits, expenses unrelated to business, etc.) distribution of profits are taxed at the same rate. Undistributed profits, on the other hand, are not taxed. Although this main feature remained the same, several minor changes concerning both the tax rate and tax base have taken place. The tax rate was 26% during the period 2000–2004, 24% in 2005 and 23% in 2006 (see Table 1). The tax rate will

gradually decrease to reach 20% for the year 2009. During the first three years (i.e., 2000–2002) companies distributing profit had to pay taxes only if the receiver of dividends was either a non-resident or a natural person. The argument was that dividends paid to another Estonian company need not be taxed, as the money is still invested within the Estonian corporate sector. Clearly, such a system was not flawless. First, a company's tax liability depended not only on its dividend policy, but also on its ownership structure, which considerably complicated financial planning. Second, there was the problem about how to ensure equal treatment of share-holders under such a system. In practice different approaches were utilized; some argued that net dividends per share must be equal, while others believed that "gross dividends per share" (dividends and corporate income tax) should be equal. Under the latter approach, net dividends per share can be different for investors with a distinct legal status.

Table 1. Changes in the income tax rules between 2000 and 2006

	Year						
	2000	2001	2002	2003	2004	2005	2006
Tax rate (%)	26					24	23
Taxes on profit distributed to resident juridical persons	no			yes			
Withholding tax on dividends paid to							
– Non-resident natural persons	yes				no		
– Non-resident juridical persons with non-substantial holdings	yes						
Definition of non-substantial holding (less than … %)	25				25*	20	
Wash sale rule for resident natural persons	no						yes

Source: Compiled by the author on the basis of the electronic database of legislative acts – Electronic Riigi Teataja (eRT).

* After the accession to the European Union, the owner with less than 20% of the company's share capital or votes was considered as investor with non-substantial holding in Estonia. Estonia became a member of the European Union on May 1, 2004.

The Listing and Surveillance Committee of the Tallinn Stock Exchange decided that listed companies should pay equal net dividends per share regardless of the legal status of investors. The profit earned by a company had to cover both net dividends paid to the shareholders and the taxes associated with the distribution of profit. Therefore non-resident investors and natural persons were better off, the higher the ownership share belonging to resident corporate bodies. To illustrate this argument, let us assume that there is a company which has earned a profit of 100 000 units and has decided to distribute all of it among its shareholders. The company's share capital is divided between 1000 shares (see Table 2). If all the shares are owned by individuals and/or non-residents, the net dividends per share are 74 units. However, if almost all the shares are owned by resident legal persons, nearly all the profit could be paid out as net dividends.

Table 2. The impact of ownership structure on net dividends per share

Percentage of shares owned by resident legal persons	100%	75%	50%	25%	0%
Percentage of shares owned by non-residents or resident individuals	0%	25%	50%	75%	100%
Net dividends per share	100.00	91.93	85.06	79.14	74.00
Corporate income tax per share	0.00	8.07	14.94	20.86	26.00

The corporate income tax is smaller if more shares belong to resident legal persons, thus increasing also the potential maximum amount of net dividends per share that the company could pay. In practice, the amount of dividends has been declared in advance and subsequent trading cannot affect net dividends in this year. Still, if the current year's tax liability is smaller, the company may afford higher net dividends in the next year. Under such a system, tax-induced trading itself can affect the investors' tax heterogeneity by changing the ownership structure and thereby also the corporate income tax.

This kind of interdependence should be taken into account when studying tax-induced trading around the ex-dividend date. Unfortunately, incorporating corporate-level taxes into the analysis is a complicated task, for the corporate income tax in Estonia also depends on the source of profit. For example, if a company distributes the profit earned during 1994–1999, the corporate taxes that were already paid on this profit according to the previous version of tax law should be taken into account. Therefore, in the empirical part of this paper corporate-level taxes will be ignored.

However, since 2003, the distribution of profit is taxed regardless of the legal status of the receiver of dividends. This change was implemented in order to simplify tax accounting and achieve more equal treatment of shareholders. On the negative side − for some corporate investors, this change resulted in double taxation.

On investor level, the rules regulating the taxation of capital gain from the sale of shares remained mostly the same throughout the period 2000–2006. Resident individuals' capital gain is taxed with the same flat tax rate as ordinary income. However, in case of individuals, the system strictly distinguishes between capital gain and income from other sources. Realized losses from the sale of securities can be carried forward without any explicit time limits, but an individual cannot use this loss to reduce taxes on other forms of income. For resident legal persons, capital gain forms one part of their profit and will be taxed at the moment of its distribution. Estonia does not levy any tax on capital gain from the sale of securities earned by non-resident investors[3]. In 2006, the first so-called wash-sale rule was introduced. According to this rule, if a resident individual buys shares within 30 days before the list of shareholders entitled to the dividend is identified and sells them within 30 days after that date, and if these transactions result in a loss, this loss will not be taken into account when determining the taxes on capital gain.

[3] Only if real estate constitutes more than 75% of a company's assets, the capital gain from the sale of this company's shares by a non-resident will be taxed in Estonia.

Taxation of dividend income depends on the legal status of the investor. Dividends paid by resident companies to resident individuals are not taxed at the investor level. Dividends paid by a resident company to resident legal persons constitute a part of their profit. Whether the distribution of such profit is taxed or not depends on the size of ownership share. If this legal person holds more than 20% of the dividend-paying company, no taxes are levied on subsequent distributions of the received dividends. Otherwise, the general rules of corporate taxation will apply. In 2000–2006, several changes occurred in the taxation of dividends received by non-resident investors (see Table 1). Between 2000 and 2003, dividends paid by Estonian companies to non-resident investors were taxed with additional withholding tax. This tax rate was specified in the tax treaty between Estonia and the investor's home country. In most cases the tax rate did not exceed 15%. In the absence of such a treaty, the ordinary income tax rate was used. Withholding tax was only applied if the foreign investor owned no more than 25% of the shares. These rules were changed in 2004. Withholding tax was no longer applied to non-resident individuals and to legal persons owing more than 20% of the company's shares. Special rules regulate the taxation of dividends paid to off-shore companies.

Even though the period under consideration was relatively short, several amendments in the income tax law were passed that must be taken into account when analyzing the usefulness of the ex-dividend day strategy. An analysis of the Estonian income tax system showed differences in taxation of income from different sources as well as tax heterogeneity among investors having different legal status. Thus, the main condition for the use of a tax-induced dynamic trading strategy is fulfilled. But as previous research has shown, in case of dynamic trading strategies, trading costs also play an important role.

2.2. Trading at the Tallinn Stock Exchange

The Tallinn Stock Exchange (TSE) is the only regulated secondary securities market in Estonia. Founded in 1995, the Tallinn Stock Exchange is now part of OMX Nordic Exchange owned by OMX AB. The actual trading started in May 1996. Trading at the TSE takes place electronically and therefore all listed securities must be registered at the Estonian Central Register of Securities. Since September 2004, the Tallinn Stock Exchange uses the Saxess trading model, which allows matching investor's transaction orders automatically. It is important to note that in addition to automatically matched transactions, which are always settled on the third day after the transaction (T+3), there also exist negotiated deals, which may have a settlement day between T+1 (inclusive) and T+6 (inclusive), and Free of Payment types of transaction, with settlement day between T+0 (incl.) and T+30 (incl.). It is important to take these aspects into account when analyzing the volume data.

The Tallinn Stock Exchange is one of the smallest stock exchanges in Europe in terms of the number of listed companies and effected transactions, as well as by its market capitalization and turnover. The number of listed companies grew rapidly after trading started 1996, but the stock market crash in autumn 1997 caused a serious slowdown. Although there have been several initial public offerings (IPO) in recent years, the number of listed companies is still lower than six years ago (see Table 3).

The small size of the Estonian stock market poses the problem of illiquidity. Rather low liquidity may also be the result of high ownership concentration. More than half of the listed companies have an explicit majority shareholder, who owns over 50% of shares. In the remaining cases, the ownership is more dispersed, but the ultimate share of the major shareholder can still exceed the 50% threshold due to indirect holdings.

Table 3. Descriptive statistics of the TSE

	Year						
	2000	2001	2002	2003	2004	2005	2006*
Number of listed companies	23	19	17	14	14	15	16
Number of transactions (thousands)	32	27	20	22	20	41	34.5
Stock market index (OMXT)[1]	125.5	138.2	144.7	212.5	285.7	451.1	663.6
Stock index return (%)	10.1	4.7	46.8	34.4	57.9	47.1	2.1
ROE (%)[2]	9.3	10.2	12.8	9.6	10.2	9.0	n.a.
Market capitalization (MEUR)[1]	2012	1933	1634	2322	3024	4590	2961
Turnover (MEUR)	326	248	257	488	662	1936	511
Average bid/ask spread (%)[3]	6.01	5.25	4.65	4.77	5.11	2.67	1.87

Source: Compiled and calculated by the author using data from the homepage of the Tallinn Stock Exchange.

[1] The value of the stock market index and market capitalization at the beginning of the year.

[*] For 2006, the results for the first 9 months are presented.

[2] The return on equity (ROE) is calculated by dividing the total net profit of the listed firms by total market capitalization at the beginning of each year.

[3] The average bid-ask spread is calculated as a simple average of the spreads of listed stocks, which in turn are calculated on the basis of the best bid and ask prices at the end of every trading day.

The direct effect of low liquidity is an increase in transaction costs. The direct transaction costs (i.e., broker fees, etc.) are relatively low (usually around 0.2%–0.5% with a minimal threshold of 3.2 EUR) in Estonia due to the fact that trading takes place electronically. However, indirect transaction costs (e.g., bid-ask spreads) can be quite substantial (see Table 3). Large transactions in a market with low liquidity also have an impact on prices, but it is difficult to measure this effect empirically without detailed trading data. It is important to note that these transaction costs do not matter if the investor finds the other party of the transaction by himself/herself.

In order to enhance the liquidity and thus attractiveness of the stock market, the TSE has introduced a liquidity provider program. Liquidity providers provide extra assurance to investors, their task

being to maintain the supply and demand of specified shares in the continuous trading segment within a certain price spread. Bid-ask spreads have decreased substantially during the last seven years as a result of delisting of stocks with low liquidity and initiating the liquidity provider program (see Table 3).

In theory, higher tax heterogeneity and lower transaction costs would motivate investors to use dynamic tax-induced trading strategies. While tax heterogeneity has decreased since 2000 (see Section 2), the same happened with the transaction costs. Therefore it is not clear how these changes taken together affect trading around the ex-dividend day. Although the indirect trading costs have been quite high, especially at the beginning of the period, and thus may hinder the use of dynamic trading strategies, it is possible that companies that pay dividends (sample companies) have very different characteristics compared to other listed companies. This will be analyzed in the next section that describes the data and methodology.

3. DATA AND METHODOLOGY

The initial dataset consisted of all companies that were listed in the Tallinn Stock Exchange and paid cash dividends during 2000–2006. From this dataset, one company with extremely low liquidity was excluded. Three other cash dividend distributions, for which detailed trading data (ownership changes) were not available to the author, were left out, too. So the final sample consists of 50 cash dividend distributions. While the size of the sample is small, the amount of dividends paid by sample companies is remarkable. For example in 2000, the total amount of dividends paid by all Estonian companies was around 275 million EUR (Trumm 2004). The listed companies included in the sample paid approximately 24% of this amount.

Data on dividend distributions, ex-dividend dates, closing prices, best bid and ask prices, and daily trading volumes were obtained from the official homepage of the Tallinn Stock Exchange. In addition, daily trading volumes at the OTC market were drawn from the official homepage of the Central Registry of Securities. Detailed trading data showing ownership changes accompanying

each transaction were obtained directly from the Tallinn Stock Exchange. The data illustrating the financial state of companies (net profits, book values, etc.) were provided by the annual statements of those companies.

Table 4. Descriptive statistics of sample companies

	Year						
	2000	2001	2002	2003	2004	2005	2006*
Number of dividend-paying firms	9	9	8	7	6	6	10
– % of total number of listed firms	39.1	47.4	47.1	50.0	42.9	40.0	62.5
Number of companies in the sample	7	7	7	7	6	6	10
Market value of equity (MEUR)	1697	1574	1565	2271	2879	1344	2144
– % of total market capitalization	84.3	81.4	95.8	97.8	95.2	29.3	72.4
ROE (%)	10.39	11.95	13.14	10.02	10.01	8.21	n.a.
Dividends paid (MEUR)	66.7	62.0	83.2	92.3	116.4	90.7	108.7
Median dividend yield (%)	3.40	3.63	6.91	3.24	3.64	3.04	2.40
Minimum dividend yield (%)	2.19	0.72	1.79	1.76	1.73	0.99	0.66
Maximum dividend yield (%)	7.35	9.26	16.35	7.36	7.08	6.25	7.42
Averages of payout ratios (%)	50.3	32.9	70.6	42.7	48.7	67.4	63.0
Weighted average payout ratio (%)	75.0	35.2	44.2	44.9	52.1	84.9	81.1
Average bid/ask spread (%)	1.62	1.78	1.90	1.86	1.53	1.15	1.03

Source: Compiled and calculated by the author using data from the homepage of the Tallinn Stock Exchange.

* For 2006, the results for the first 9 month are presented. The ROE is calculated by dividing the total net profit of the listed firms by total market capitalization at the beginning of each year. The average bid-ask spread is calculated as a simple average of the spreads of listed stocks, which in turn are calculated on the basis of the best bid and ask prices at the end of every trading day. Dividend yield is calculated by dividing net dividends per share by the closing price on the cum-dividend date.

Although the popularity of share repurchases as an alternative to cash dividends has increased considerably in the United States (Grullon, Michaely 2002), most European listed companies pay cash dividends. In 2003, only 10% of 300 biggest European companies did not pay dividends (Vernimmen *et al.* 2005). Most Estonian companies are still at a relatively early stage of development and need funds to finance their rapid growth. This is also true for the listed companies. 2006 was the first year when more than half of the listed companies paid dividends. There is a growing trend in the size of dividends as well as in the payout ratios. The dividend yield, on the other hand, shows no clear trend as one could expect, taking into account the rapid growth in share prices and increasing dividends (see Tables 3 and 4).

It is interesting to note that the companies paying dividends are mostly listed on the main list. These companies are bigger, have relatively high liquidity and low bid-ask spread (see Tables 3 and 4). The differences in market-value-based ROEs are negligible.

In order to find an answer to the research question raised in the introduction, the abnormal volume around the ex-dividend date is calculated. The event window (i.e., the period under consideration) covers five trading days before the cum-dividend date, the cum-dividend date, the ex-dividend date, and five trading days after the ex-dividend date. Since most of the listed companies in Estonia pay dividends in the second quarter of the year, there is a clustering of events. Such a clustering of events may elevate the daily total volume in the overall market. Therefore the abnormal volume is calculated by the following formula:

$$AV_{it} = V_{it} - \overline{V_i}, \qquad (1)$$

where AV_{it} is the abnormal trading volume for security *i* on day *t*, V_{it} is the actual volume of security *i* on the day *t*, and $\overline{V_i}$ is the average daily volume of security *i* during the rest of the year (i.e., outside the event window).

The existence of the abnormal volume itself does not give enough evidence for arguing that this trading is indeed tax-induced. The existence of abnormal trading around the ex-dividend date has been found also in markets where taxation is not an issue (see e.g., Milonas and Travlos 2001, Kadapakkam and Martinez 2005). Therefore, the next section introduces the arbitrage boundaries for different investor categories and analyzes whether there could potentially be tax-based motives to trade around the ex-dividend day in Estonia. These results are then combined with the analysis of short-term changes in the ownership structure around the ex-dividend day to provide additional confirmation to the hypothesis.

4. ARBITRAGE BOUNDARIES FOR DIFFERENT INVESTOR CATEGORIES

This section analyzes whether the Estonian tax system creates opportunities for tax-based trading by deriving approximate (quasi-)arbitrage boundaries for short-term investors from main investor categories[4]. As argued by Liljeblom *et al.* (2001), such boundaries are not likely to be strongly binding due to the ex-ante uncertainty of the actual dividend drop.

For risk-neutral investors planning to sell their stock in any case, the timing decision [5] is not crucial when under the assumptions of zero discount rate and zero transaction costs:

$$\left(1-t_g\right)\cdot\left(P_{cum}-P_0\right)=D\cdot\left(1-t_d\right)+\left(1-t_g\right)\cdot\left(\overline{P_{ex}}-P_0\right), \qquad (2)$$

where t_g is the tax rate on capital gain, t_d is the tax rate on dividends, D is the amount of dividends per share, P_0 is the stock price at the initial purchase, P_{cum} is the stock price cum dividends, and $\overline{P_{ex}}$ is the expected stock price on the ex-dividend day.

[4] Similar derivations can be found in Liljeblom *et al.* (2001).
[5] Cum-dividend date is the decision day.

By rearranging, we get the expected ex-dividend day ratio:

$$\alpha = \frac{P_{cum} - \overline{P_{ex}}}{D} = \frac{1 - t_d}{1 - t_g} \quad . \tag{3}$$

If this ratio is different for different groups of investors, the heterogeneity of the tax system potentially creates opportunities for tax-based trading and whether these opportunities could be seized in practice depends on the size of transaction costs. An investor trying to exploit the heterogeneity of the tax system is willing to buy shares before the ex-dividend day if the following condition holds:

$$\left(1 - t_g\right) \cdot \left[\overline{P_{ex}} \cdot \left(1 - c_{tr}\right) - P_{cum} \cdot \left(1 + c_{tr}\right)\right] + \left(1 - t_d\right) \cdot D > 0 \,, \tag{4}$$

where c_{tr} is the one-way proportional transaction cost. By rearranging, we get the following:

$$\alpha = \frac{P_{cum} - \overline{P_{ex}}}{D} < \frac{1 - t_d}{1 - t_g} - 2 \cdot c_{rt} \cdot \frac{\overline{P}}{D}, \tag{5}$$

where $\overline{P}$ is the average stock price (average over expected ex-dividend and actual cum-dividend price) and $\frac{\overline{P}}{D}$ is the inverse of the approximate dividend yield.

A long-term investor owning the shares is willing to take part in short-term speculative tax-induced arbitrage if the following condition holds:

$$\left(1 - t_g\right) \cdot \left[P_{cum} \cdot \left(1 - c_{tr}\right) - \overline{P_{ex}} \cdot \left(1 + c_{tr}\right)\right] > \left(1 - t_d\right) \cdot D \,, \tag{6}$$

i.e., if the ex-dividend day ratio satisfies the condition:

$$\alpha = \frac{P_{cum} - \overline{P_{ex}}}{D} > \frac{1 - t_d}{1 - t_g} + 2 \cdot c_{rt} \cdot \frac{\overline{P}}{D} \qquad (7)$$

Table 5 summarizes the quasi-arbitrage boundaries for various tax clienteles on the Estonian market[5]. Quasi-arbitrage boundaries are calculated by assuming a fixed proportional transaction cost of 1% and a dividend yield of 4%. Although the data presented in Table 3 would imply a higher level of transaction costs (average bid-ask spread was over 4%), most companies actually paying dividends are listed on the main list and have considerably lower bid-ask spreads (see Table 4). The average bid-ask spread for sample companies was around 1.5% and the brokerage fee 0.25%, which makes one-way transaction costs to be around 1%. While the average dividend yield in sample companies was slightly over 4.3% (and the median 3.6%), the actual dividend yields ranged from 0.66% to 16.35% (see Table 4).

In Estonia, the expected ex-dividend day ratios differ substantially for different groups of investors (see Table 5). This could potentially lead to profitable trading between them. For example, if c_{tr}= 0, and the actual price drop equals the dividends, domestic individual investors would like to buy the stock (or postpone the selling) before the ex-dividend day and sell it after the ex-dividend day. Foreign corporate investors with non-substantial holding, on the other hand, would be willing to sell their shares before the ex-dividend day and buy them back afterwards. There are no incentives for foreign strategic investors to engage in trading if the price drop equals the dividends.

[5] The quasi-arbitrage boundaries in Table 5 were calculated using tax rates from the period 2000–2004. In 2005 and 2006, the tax rates were respectively 24% and 23%.

Table 5. Quasi-arbitrage boundaries for different investor clienteles (2000–2004)

Clientele		t_d (%)	t_g (%)	Quasi-arbitrage boundary with $c_{tr} = 0$	Quasi-arbitrage boundary with $c_{tr} = 1\%$ and average dividend yield = 4%
Domestic individual investors		0	26	1.35	$0.851 < \alpha < 1.851$
Domestic corporate investors with substantial holding, distributing all their net profit as cash dividends*		0	26	1.35	$0.851 < \alpha < 1.851$
Domestic corporate investors with non-substantial holding, distributing all their net profits as dividends*		26	26	1	$0.5 < \alpha < 1.5$
Foreign corporate investors with substantial holding		0	0	1	$0.5 < \alpha < 1.5$
Foreign corporate investors with non-substantial holding from a country with tax treaty		15	0	0.85	$0.350 < \alpha < 1.350$
Foreign corporate investors with non-substantial holding from a country with no tax treaty		26	0	0.74	$0.240 < \alpha < 1.240$
Foreign individual investors	2000–2003	26	0	0.74	$0.240 < \alpha < 1.240$
	2004	0	0	1	$0.5 < \alpha < 1.5$

* In case of domestic corporate investors, it is important to note that they have to pay taxes at the moment of distributing their profits. To avoid double (or even triple) taxation of profit, a kind of imputation system is allowed. If company A received dividends from company B and distributes them to its shareholders, it can take into account the taxes paid by company B on these dividends. This right is granted, if company A owns a substantial part of company B.

However, if we take into account the average size of transaction costs and the dividends yield, there seems to be no opportunity for tax-induced trading around the ex-dividend day. For no investor clientele is the lower arbitrage bound higher than the lowest upper arbitrage bound of another investor group. While the analysis based on the average figures showed no arbitrage opportunities, the

high variation in dividend yields and transaction costs indicates that there could be cases where trading around the ex-dividend date is potentially profitable. A thorough analysis based on the actual dividend yields, tax rates, and bid-ask spreads showed that non-arbitrage conditions did not hold in 17 observations out of 50. With a few exceptions, these are the cases when high dividend yield is combined with high liquidity.

The analysis of the quasi-arbitrage conditions by using actual dividend yields, tax rates, and bid-ask spreads showed that in 17 cases it would be profitable for foreign investors (and is some rare occasions also for domestic corporate investors with non-substantial holding) to sell their shares before the ex-dividend day to the domestic individual investor or domestic corporate investor with a substantial holding (after the introduction of wash-sale rule in 2006, only the latter could profit from being the buyer). The classification of potential sellers is presented in the following table:

Table 6. Classification of investors who would benefit from selling their stocks before the ex-dividend day

Potential seller	Number of cases (total 17)
Small non-resident corporate investor from a country that has no tax treaty with Estonia	17
Non-resident individual investor	14
Small non-resident corporate investor from a country that has signed a tax treaty with Estonia	12
Non-resident corporate investor with substantial holding	6
Domestic corporate investors with unsubstantial holding	6

It is interesting to note that the introduction of the wash-sale rule in 2006 clearly reduced the opportunities to profit from tax-induced trading around the ex-dividend date for some groups of investors. But for small non-resident corporate investors and resident corporate investors with substantial holding, arbitrage opportunities still exist.

Although sample stocks were more liquid than other listed stocks, the average bid-ask spread was still too high and the dividend yield too low to create trading opportunities around the ex-dividend day. But due to the high variation in dividend yields and transaction costs, in one third of observations the quasi-arbitrage conditions were actually violated and real trading opportunities did exist. At least in those cases, one could expect to see abnormal trading activities. It is also possible that the ex-dividend strategy was also used in other cases, because, as mentioned before, not only are these quasi-arbitrage boundaries only loosely binding, but more importantly, transactions can be made without a broker's intermediation, in which case transaction costs are insignificant.

5. RESULTS

Empirical data from the period of 2000–2006 clearly indicate a substantial increase in the trading volume during the event window. The abnormal volume was calculated by using formula 1.

Table 7. Abnormal trading volume in the Estonian stock market during the event window

Day	Abnormal volume (MEUR)	t-statistic
+5	0.687	1.025
+4	3.069	3.261***
+3	6.505	3.487***
+2	3.283	3.962***
+1	7.936	4.289***
Ex-day	1.510	3.664***
Cum-day	5.997	4.685***
–1	1.149	1.971**
–2	0.024	0.324
–3	0.001	0.015
–4	0.123	0.887
–5	–0.076	1.199

It can be argued at a very high level of confidence (more than 99.5%) that there is a positive abnormal trading volume on both the cum- and ex-dividend day as well as during four days after the ex-dividend date (see Table 7). At a somewhat lower, but still acceptable level of confidence (95%), one can say that there is a positive abnormal trading volume also a day before the cum-dividend date. Table 7 includes transactions that took place both in the regulated as well as in the OTC market. The data show that most of the abnormal trading takes place after the ex-dividend day, thus contesting the hypothesis about tax-induced trading. But these doubts may well have no ground. As mentioned already in Section 2.2, automatically matched deals are settled on the third day after the transaction. This rule is used to determine the cum- and ex-dividend dates according to the dividend record-date. However, in the case of OTC transactions and negotiated deals in the TSE, different settlement rules apply. Therefore it is well possible that a transaction made on the ex-dividend day has the settlement date before the dividend record-date, i.e., the buyer of these shares has the right to receive dividends for the current year. If we look only at the data from the regulated market (TSE), it appears that statistically significant abnormal volumes occurred on the cum- and ex-dividend day with t-statistics respectively 4.73^{***} and 3.71^{***}.

Additional information can be gained by looking at the distribution of the abnormal volume index calculated as follows:

$$AVI_{it} = \frac{V_{it} - \overline{V_i}}{\overline{V_i}} \tag{8}$$

The distribution of the values of this index is depicted in the next figure.

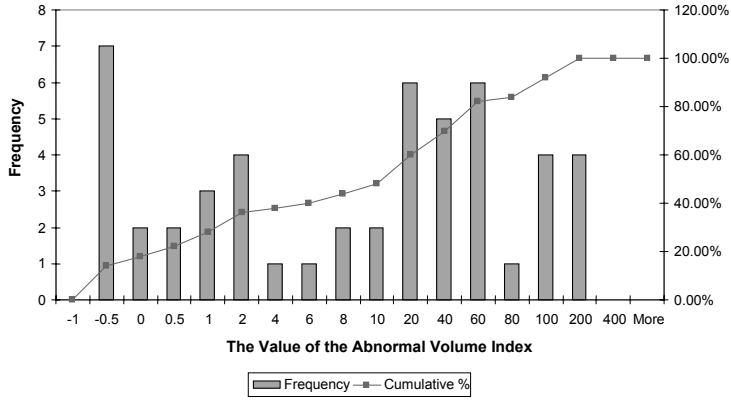

Figure 1. Distribution of the values of the abnormal volume index.

According to Figure 1, in 9 cases out of 50 the average abnormal daily volume was negative, but in 36 cases the value of the abnormal volume index exceeded 1 (which indicates that the daily volume during the event window was at least twice the average daily trading volume during the rest of the year). In 15 cases the trading volume was more than 50-fold higher and in the most extreme case the average daily abnormal volume during the event window was 162-fold higher than the average daily trading volume during the rest of the year. This massive increase in the trading volume is partly caused by the use of third parties (e.g. financial intermediaries) in these transactions. On many occasions, foreign shareholders first sold their shares to some other corporate investor in their home country, who in turn sold them to some Estonian investor. Afterward (e.g., after the ex-dividend day) the scheme was reversed in order to buy these shares back.

The analysis also revealed some kind of a learning effect. While the tax system created trading opportunities already in the year 2000, only a few investors realized this potential back then.

If in 2000 the average daily trading volume during the event window was approximately twice as high as during the rest of the year, then in 2003 the trading activity around the ex-dividend day was already more than 50 times higher (see Figure 2).

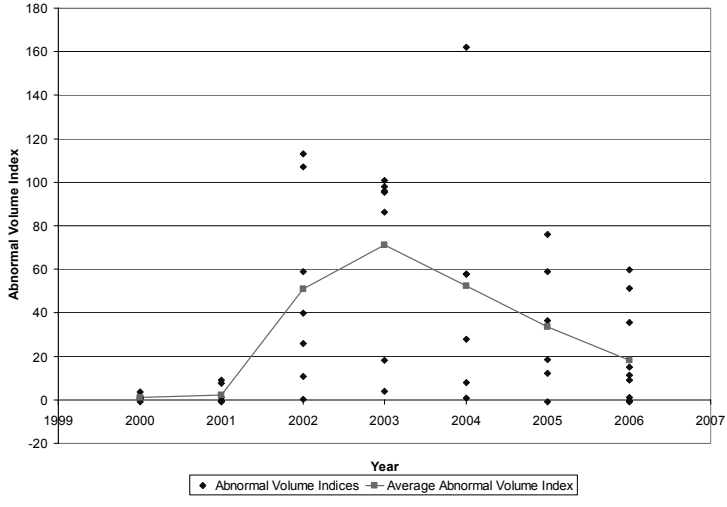

Figure 2. The size of the abnormal volume index in different years.

According to the result from Section 4, non-arbitrage conditions do not hold in 17 observations out of 50. But the abnormal volume data indicate that heavy trading around the ex-dividend date took place more often. There could be several explanations to this controversy. First, it is possible that estimates of the bid-ask spread calculated by using the best close bid and ask overestimate the actual bid-ask spread. It is also possible that during the event window, transaction costs fall due to sharply increasing trading activity. But a more plausible explanation would be that some investors do not use the help of brokers in tax-induced deals, which means no bid-ask spread at all. The trading data show that this is actually the case (see Table 8). If usually the percentage of transactions made via brokers is around 58%, then during the event window it is considerably less (35%).

Table 8. Use of brokers during the event window and the rest of the year

Year	Percentage of transactions made via brokers during the event window	Percentage of transactions made via brokers in the rest of the year
2000	60%	63%
2001	76%	57%
2002	16%	62%
2003	26%	51%
2004	27%	57%
2005	31%	58%
2006	35%	54%
Average	35%	58%

The abnormal volume around the ex-dividend date is usually interpreted as a sign of tax-induced trading (see e.g., Michaely and Vila 1996). However, there may be other explanations. Therefore an additional analysis was performed to confirm the hypothesis.

First, empirical trading data were combined with the results from the analysis of the non-arbitrage condition (see Section 4). In Section 4, we identified 17 cases in which non-arbitrage conditions did not hold. In all those cases the abnormal volume index was positive with the average size around 20 (the median value around 11). Although in the remaining cases the average size of the abnormal volume index was 37 (the median value was around 15), those cases also included nine observations with negative abnormal volume.

Second, short-term changes in ownership structure around the ex-dividend day were investigated. The analysis of quasi-arbitrage conditions in Section 4 indicated that in order to reduce their tax burden, foreign investors should reduce their holding before the ex-dividend day. The analysis of detailed trading data showed that many foreign investors sold their shares before the ex-dividend day and bought them back afterwards, thereby avoiding the double taxation of dividends (see Table 9).

Table 9. Average short-term changes in ownership structure before and after the dividend record-date in the Estonian stock market (2000–2006)

Year	Non-residents		Resident legal persons		Resident natural persons	
	before[1]	after[2]	before	after	before	after
2000	–0.36%	0.19%	–0.07%	–0.16%	0.43%	–0.15%
2001	–1.08%	0.16%	0.61%	0.33%	0.47%	–0.49%
2002	–8.54%	8.56%	5.13%	–5.18%	3.41%	–3.38%
2003	–6.76%	7.07%	2.70%	–1.55%	4.05%	–5.47%
2004	–7.04%	7.30%	5.29%	–6.55%	1.36%	–0.75%
2005	–8.09%	7.93%	8.04%	–8.07%	0.05%	0.14%
2006	–5.09%	4.54%	4.32%	–4.22%	0.27%	–0.32%
Average	–5.18%	4.97%	3.64%	–3.52%	1.39%	–1.47%
Standard deviation	5.39%	5.38%	4.73%	4.69%	2.70%	2.97%
t-statistic	–6.79***	6.54***	5.44***	–5.306***	3.65***	–3.497***

[1] Covers the period between the ex-dividend day and the record-date (excl.).
[2] Covers the period including the record-date and three following days.
Note: This table is based on transactions settlement dates (i.e.,in case of automatically matched transactions the deal which has the ex-dividend day as the settlement date took place three trading days before the ex-dividend day; the deal which has the record-date as the settlement date took place on the ex-dividend day).

According to Table 9, the average amount of shares sold by foreign investors with the settlement date before the dividend record-date (during a three-day window) was 5.18% of all the company's shares outstanding with a standard deviation of 5.39%. The high value of *t*-statistic (6.79) lets us conclude that the amount of shares sold by foreign investors differs significantly from zero. The average amount of shares bought by foreign investors with the settlement date on the dividend record-date or during three following days was 4.97% of all the company's shares outstanding, which differs significantly from zero (t-statistic 6.54).

The proposition that non-resident investors sold their shares merely to avoid taxes on dividends and not to exit the market altogether can also be confirmed by analyzing the long-term changes in ownership structure.

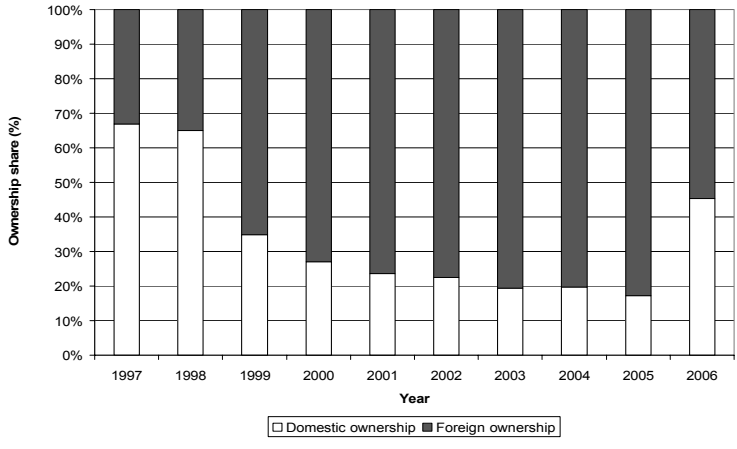

Figure 3. Ownership of listed companies in Estonia.

Foreign ownership has been rising since the stock market crash in 1997 until mid 2005 (see Figure 3). Most foreign investors come from Sweden, Luxemburg, the United States, the United Kingdom and Finland. The trend was reversed in 2006, but one should not draw any serious conclusions from that[6].

The analysis of ex-dividend day ratios and quasi-arbitrage conditions showed that there is an opportunity for tax-induced trading and the empirical data showed very high trading activity around the ex-dividend day. The analysis of detailed trading data showed that many foreign investors sold their shares before the ex-dividend day and bought them back afterwards, thereby avoiding double taxation of dividends. By putting all these pieces of evidence together, one can conclude that tax heterogeneity among investors has caused abnormal trading volumes around the ex-dividend day in the Estonian market.

[6] The tragedy of a small market is that what happens with one company can have a very big effect on the whole market. The drastic increase in domestic ownership in mid 2005 was caused by delisting just one company – Hansapank. Hansapank is the biggest commercial bank in Estonia and all of its shares were taken over by Swedbank from Sweden.

CONCLUSIONS AND IMPLICATIONS

Despite the simplicity of the Estonian income tax system, there is still tax heterogeneity among investors and sources of income. For resident individual investors, dividends paid by resident companies are not taxed, while the capital gain is. For non-resident investors, dividends are in some cases doubly taxed due to the withholding tax, but capital gains from the sale of common stocks are not taxed by the Estonian Government. This heterogeneity creates an opportunity for tax-induced trading between resident and non-resident investors around the ex-dividend day.

Average indirect transaction costs have been relatively high in the Estonian stock market (average bid-ask spread of listed companies in 2000–2006 was around 4%). This implies that trading opportunities around the ex-dividend day are mostly theoretical and would vanish in practice due to the high transaction costs. But as dividends were paid mostly by companies listed on the main list and characterized by relatively high liquidity (average bid-ask spread only around 1.5%), the quasi-arbitrage conditions were violated in some cases and trading opportunities existed in practice, too.

An empirical analysis detected statistically significant abnormal volumes on the cum- and ex-dividend day as well as during one day before the cum-dividend and four days after the ex-dividend date. In 30% of observations the abnormal trading volume was really massive – the average daily trading volume during the event window was more than fifty-fold higher than during the rest of the year. The analysis also showed that during the event window only 1/3 of all transactions were made via brokers, while during the rest of the year this percentage reached almost 60%, indicating that there are alternative ways to use tax-avoidance strategies even if transaction costs in the regulated market are high. The short-term changes in ownership structure during the event window coincide with the forecast movements that resulted from the analysis of the income tax structure in Estonia. Therefore the final conclusion is that investors indeed use dynamic tax avoidance strategies around the ex-dividend day in Estonia.

This result is important as it can explain why the Estonian Parliament introduced our first wash-sale rule in 2006 as well as some other

changes that have been made into the income tax law (such as removal of withholding tax on dividend income earned by non-resident individual investors in 2004). These changes signify that the government does not tolerate investors who actively take advantage of holes in tax laws. Sooner or later those holes will be removed.

Some recent studies investigating the relationship between dividend taxes and cost of equity have found a strong positive relationship (see e.g., Dhaliwal *et al.* 2005). In this respect, the results of the current study also contribute to solving the puzzle why Estonian companies still pay dividends, although most of the listed companies have a high proportion of foreign shareholders and for those investors dividend income is sometimes more heavily taxed compared to the capital gain. The current study showed that those investors can effectively reduce their tax burden by active trading and therefore companies should not worry too much about possible double taxation of dividends when choosing their payout policy.

More broadly speaking, this example illustrates the proposition that one cannot use solely statutory tax rates to calculate the tax advantage of debt and recommend the capital structure or dividend policy that the firm should follow. If tax heterogeneity can be reduced by changing the trading patterns, this fact must also be taken into account.

The future research in this area could take several directions. As was argued in Section 2.1, corporate-level taxes might have affected the trading patterns around the ex-dividend day under the tax regulations that prevailed in Estonia during 2000–2002. Due to limited data, the current research did not investigate this possible impact. The small size of the sample prevented building an econometrical model to investigate the factors influencing trading activity around the ex-dividend day in Estonia. Hopefully, this task along with an in-depth analysis of the impact of wash-sale rules introduced in 2006 on trading patterns around the ex-dividend day can be completed in a couple of years. The current study did not analyze possible price effects around the ex-dividend day in the Estonian stock market. This will also remain a subject for future research.

REFERENCES

Allen, F., Michaely, R. Payout Policy. Wharton Working Paper 01–21-B, 2002, 150 p.
[http://accounting.wharton.upenn.edu/Spring2006/acct920/class%209%20allen%20&%20michaely%202002.pdf]

Bali, R., Hite, G. L. Ex-Dividend Day Stock Price Behavior: Discreteness or Tax-Induced Clienteles – Journal of Financial Economics 1998, Vol. 47, No. 2, pp. 127–159.

Bartholdy, J. Brown, K. Ex-Dividend Day Pricing in New Zealand – Accounting and Finance 1999, Vol. 39, No. 2, pp 111–129.

Brav, A., Graham, J. R., Harvey, C. R., Michaely, R. Payout policy in the 21st century – Journal of Financial Economics 2005, Vol. 77, No. 3, pp. 483–527.

Campbell, J. Beranek, W. Stock Price Behavior on Ex-Dividend Dates – Journal of Finance 1953, Vol. 10, No. 4, pp. 425–429.

Castillo, A., Jakob, K. The Chilean Ex-Dividend Day – Global Finance Journal 2006, Vol. 17, No.1, pp. 105–118.

Chaplinsky, S., Neyhun, H. N. Dividends and Taxes: Evidence on Tax-Reduction Strategies – Journal of Business 1990, Vol. 63, No. 2, pp. 239–260.

Constantinides, G. M. Optimal Stock Trading with Personal Taxes: Implications for Prices and the Abnormal January Returns – Journal of Financial Economics 1984, Vol. 13, No. 1, pp. 65–89.

Dhaliwal, D., Krull, L., Li, O. Z., Moser, W. Dividend Taxes and Implied Cost of Equity Capital – Journal of Accounting Research 2005, Vol. 43, No. 5, pp. 675–708

Dhaliwal, D., Li, O. Z. Investor Tax Heterogeneity and Ex-Dividend Day Trading Volume – Journal of Finance 2006, Vol. 61, No. 1, pp. 463–490.

Elton, E. J., Gruber, M. J., Blake, C. T. Marginal Stockholder Tax Effects and Ex-Dividend Day Behavior – Thirty-Two Years Later. 2002, 29 p.
[http://www.bnet.fordham.edu/public/finance/cblake/marginal_effects.pdf]

Elton, E.J., Gruber, M.J. Marginal Stockholder Tax Rates and the Clientele Effect – Review of Economics and Statistics 1970, Vol. 52, No. 1, pp. 68–74.

Emery, D. R., Gehr, A. K. Tax Options, Capital Structure and Miller Equilibrium: A Numerical Illustration – Financial Management 1988, Vol. 17, No. 2, pp 30–40.

Frank, M., Jagannathan, R. Why Do Stock Prices Drop by less than the Value of the Dividend? Evidence from the Country without Taxes – Journal of Financial Economics 1998, Vol. 47, No. 2, pp. 161–188.

Graham, J. R., Kumar, A. Do Dividend Clienteles Exist? Evidence on Dividend Preferences of Retail Investors – Journal of Finance 2006, Vol. 61, No. 3, pp. 1305–1336.

Graham, J. R., Michaely, R., Roberts, M. R. Do Price Discreteness and Transactions Costs Affect Stock Returns? Comparing Ex-Dividend Pricing Before and After Decimalization – Journal of Finance 2003, Vol. 58, No. 6. pp. 2611–2635.

Grullon, G., Michaely, R. Dividends, Share Repurchases, and the Substitution Hypothesis – Journal of Finance 2002, Vol. 57, No. 4. pp. 1649–1684.

Hu, S., **Tseng, Y.** Who Wants to Trade around Ex-Dividend Day, SSRN Working Paper 2004, 44 p. [http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID675243_code15134.pdf?abstractid=675243&mirid=1]

John, K., Williams, J. Dividends, Dilution, and Taxes: A Signaling Equilibrium – Journal of Finance 1985, Vol. 40, No. 4, pp. 1053–1070.

Kadapakkam, P., Martinez, V. Ex-dividend returns: the Mexican puzzle. University of Texas, Working Paper, 2005, 38 p.
[http://www.fma.org/Chicago/Papers/Kadapakkam_Martinez_FMA05.pdf]

Kalay, A. The Ex-Dividend Day Behavior of Stock Prices: A Reexamination of the Clientele Effect – Journal of Finance 1982, Vol. 37, No. 4, pp. 1059–1070.

Kato, K., Lowenstein, U. The Ex-Dividend day Behavior of Stock Prices: The Case of Japan – The Review of Financial Studies, 1995, Vol. 8, No. 3, pp. 817–847.

Koski, J. L., Michaely, R. Prices, Liquidity, and the Information Content of Trades – The Review of Financial Studies 2000, Vol. 13, No. 3, pp. 659–696.

Lakonishok, J., Vermalaen, R. Tax Induced Trading around Ex-Dividends Days – Journal of Financial Economics 1986, Vol. 16, No. 3, pp. 287–320.

Lakonishok, J., Vermalaen, R. Tax Reform and Ex-Dividend Day Behavior – Journal of Finance, 1983, Vol. 38, No. 4, pp. 1157–1179.

Lasfer, M. A. Ex-Day Behavior: Tax or Short-Term Trading Effect – Journal of Finance 1995, Vol. 50, No. 3, pp. 369–399.

Lijeblom, E., Löflund, A., Hedvall, K. Foreign and Domestic Investors and Tax Induced Ex-Dividend Day Trading – Journal of Banking and Finance, 2001, Vol. 25, 1687–1716.

McDonald, R. L. Cross-Border Investing with Tax Arbitrage: The Case of German Dividend Tax Credits – The Review of Financial Studies, 2001, Vol. 14, No. 3, pp. 617–657.

Michaely, R., Murgia, M. The Effect of Tax Heterogeneity on Prices and Volume around Ex-Dividend Day: Evidence from the Milan Stock Exchange – The Review of Financial Studies, 1995, Vol. 8, No. 2, pp. 369–399.

Michaely, R., Vila, J. Trading Volume with Private Valuations: Evidence from Ex-Dividend Day – Review of Financial Studies 1996, Vol. 9, No. 2, pp. 471–510.

Miller, M., Modigliani, F. Dividend Policy, Growth, and the Valuation of Shares – Journal of Business 1961, Vol. 34, No. 4, pp. 411–433.

Miller, M., Rock, K. Dividend Policy under Asymmetric Information – Journal of Finance 1985, Vol. 40, No. 4, pp. 1031–1051.

Miller, M., Scholes, M. Dividend and Taxes – Journal of Financial Economics 1978, Vol. 6, No. 4, pp. 332–364.

Milonas, N. T., Travlos, N. G. The Ex-Dividend Day Stock Price Behavior in Athens Stock Exchange, SSRN Working Paper 2001, 16 p.
[http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID274080_code010618600.pdf?abstractid=274080&mirid=1]

Peterson, P., Peterson, D., Ang, J. Direct Evidence on the Marginal Rate of Taxation on Dividend Income – Journal of Financial Economics 1985, Vol. 14, No. 2, pp. 267–282.

Rantapuska, E. Ex-Dividend Day Trading: who, how, and why? Unpublished Working Paper, Helsinki School of Economics 2006, 49 p.
[http://project.hkkk.fi/finfaculty/files/Rantapuska_Ex_Day_Trading_Feb_2006.pdf]

Sarig, O., Tolkowsky, E. Dividend Effects in Israel: A Puzzle – Economics Letters 1997, Vol. 54, No. 2, pp. 169–174.

Scholes, M. S., Wolfson, M. A. Taxes and Business Strategy: A Planning Approach, Prentice-Hall Inc. 1992, 616 p.

Scholes, M. S., Wolfson, M. A., Erickson, M., Maydew, E. L., Shevlin, T. Taxes and Business Strategy, 3rd ed. Prentice-Hall Inc. 2005, 556 p.

Stiglitz, J. E. Some Aspects of the Taxation of Capital Gains – Journal of Public Economics 1983, Vol. 21, No. 2, pp. 257–296.

Trumm, K. Dividendipoliitika Eesti ettevõtetes ja seda mõjutavad tegurid. Unpublished Master Thesis, Tartu University 2005, 100 p.

Vernimmen, P., Quiry, P., Dallocchio, M., Le Fur, Y., Salvi, A. Corporate Finance. Theory and Practice, John Wiley & Sons 2005, 1030 p.

Yilmaz, M. K., Gulay, G. Dividend Policies and Price-Volume Reactions to Cash Dividends on the Stock Market: Evidence from the Istanbul Stock Exchange – Emerging Markets Finance and Trade 2006, Vol. 42, No. 4, pp. 19–49.

Zhang, Y., Brown, T. A., Farrell, K. A. Ex-Dividend Day Price and Volume: The Case of 2003 Dividend Tax Cut, Working Paper 2006, 35 p.
[http://www.fma.org/SLC/Papers/ex_dividend_day_price_behavior.pdf]

KOKKUVÕTE

Heterogeensed maksud ja kauplemisaktiivsus dividendideta aktsiatega kauplemise päeva ümbritseval perioodil: Eesti andmete analüüs

Maksude heterogeensus toob endaga kaasa selliste kauplemisstrateegiate kasutamise, mis on suunatud maksukohustuse vähendamisele. Üheks selliseks dünaamiliseks strateegiaks on ka nn *ex-dividend* strateegia, mille puhul investorid, kelle jaoks dividenditulu on kõrgemalt maksustatud võrreldes kapitali kasvutuluga, müüvad oma aktsiad enne dividendideta aktsiatega kauplemise päeva (ingl. *ex-dividend date*) investorile, kelle jaoks on olukord vastupidine ja mainitud päeval või pärast seda toimub esialgsete positsioonide taastamine.

Käesoleva artikli eesmärgiks on kontrollida, kas Eesti aktsiaturul sooritatakse dividendideta aktsiatega kauplemise päeva ümbritseval ajaperioodil tehinguid eesmärgiga vähendada investorite maksukohustust. Eesmärgi saavutamiseks võetakse artiklis vaatluse alla 50 dividendide maksmise juhtumit ajavahemikust 2000–2006. Artikkel vaatleb üksnes käibemahtudes toimuvat ning ei analüüsi hinnamuutusi dividendideta aktsiatega kauplemise päeval.

Võttes kokku sellealaste teoreetiliste uurimuste tulemused, saab järeldada, et *ex-dividend* strateegia kasutamiseks ei piisa sellest et eri liiki tulusid maksustatakse erinevate maksumääradega. Vajalik on ka erineva juriidilise staatusega investorite erinev maksustamine. Eesti tulumaksusüsteemi analüüs tõi välja mitmeid erinevusi erinevate tululiikide ja investorite maksustamises. Asjaolu, et Eesti riik ei maksusta üldjuhul mitteresidendist investorite poolt saadavat kasu väärtpaberite võõrandamisest, kuid maksustab mõningatel juhtudel dividenditulu ning samas ei maksusta teatud juhtudel residendist investorite dividenditulu, kuid maksustab nende poolt realiseeritud kasu väärtpaberite võõrandamisest, loob soodsa pinnase *ex-dividend* strateegia kasutamiseks. Kuna Eesti börsiettevõtetest on senini maksnud dividende eelkõige likviidsemad põhi-

nimekirjas noteeritud ettevõtted, eksisteerisid teoreetilised võimalused kvaasi-arbitraažiks isegi tehingukulusid arvestades.

Kauplemismahtude analüüs näitas statistiliselt olulist tehingumahu tõusu nii päeval enne viimast dividendidega aktsiate kauplemise päeva, viimasel dividendidega aktsiate kauplemise päeval kui ka dividendideta aktsiatega kauplemise päeval ning neljal sellele järgneval päeval. 30% vaatlustest oli kauplemismahu tõus ülisuur: käive ületas tavapärase päevakäibe rohkem kui 50 korda. Samuti oli täheldatav õppimisefekti olemasolu – kui 2000. ja 2001. aastal toimus kauplemismahu oluline tõus üksnes mõne dividende maksva börsiettevõtte puhul, siis hilisematel ajaperioodidel võis seda märgata juba peaaegu kõikidel juhtudel. Enamik tehingutest toimus ilma maakleri vahenduseta, mistõttu tehingukulud olid arvatavalt oluliselt väiksemad kui tavaliselt. Tehingute detailne analüüs näitas, et enne dividendideta aktsiatega kauplemise päeva olid aktsiate müüjateks peamiselt mitteresidendist investorid ja ostjateks residendist investorid (eelkõige juriidilised isikud). Täpselt selliseid lühiajalisi muutusi omanikestruktuuris võiski prognoosida maksuseaduste analüüsi alusel. Seega võib järeldada, et Eestis toimub tõepoolest dividendideta aktsiatega kauplemise päeva ümbritseval ajaperioodil maksukohustuse vähendamisele suunatud kauplemine. See on juba viinud maksuseaduse muudatusteni, mille eesmärgiks on vähendada maksude heterogeensust või tõkestada selle ärakasutamist investorite poolt.