Stockholm School of Economics
Department of Finance
Master's Thesis

Effects of differences in dividend and capital gains taxation on ex-dividend stock price behaviour

A study on the Stockholm Stock Exchange 1991 - 2000

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ABSTRACT

In our thesis we use the Elton & Gruber tax-clientele theory to examine the development of the stock prices on the ex-dividend day to see if the changes in Swedish tax system has had an impact on the price drop quota on the A-list on the Stockholm's Stock Exchange during the period 1991-2000. We also compare ownership of Swedish and foreign investors to investigate the impact of differences in tax bias on the price drop quota, and if this has changed with the changes in Swedish and foreign tax laws. In line with other authors we find only weak and indicative results for a tax bias effect when examining the changes in Swedish tax system. However, when testing for foreign ownership we get statistically significant results that there is indeed a tax bias effect.

1. Introduction

1.1 Background

On the 28th of June 1996 the Avesta Sheffield share was valued at 40.20 SEK. The day after the same share was valued at 40.30 SEK. This indicates a rise of 40.30/40.20=0.2%. In reality the rise was a lot more since the 28th of June 1996 was the last trading day with the right to obtain dividends in Avesta Sheffield. The dividend amount paid out was 3 SEK per share. If this is taken into consideration the actual price of the share after the dividend is paid out should be 40.20-3 = 37.2 SEK. The rise of the share is therefore not 0.2% but instead 40.30/37.2 = 8%. If stock prices do not fall by the same amount as their dividends there may be a possibility for arbitrage. However, arbitrage should not exist in a perfect market.

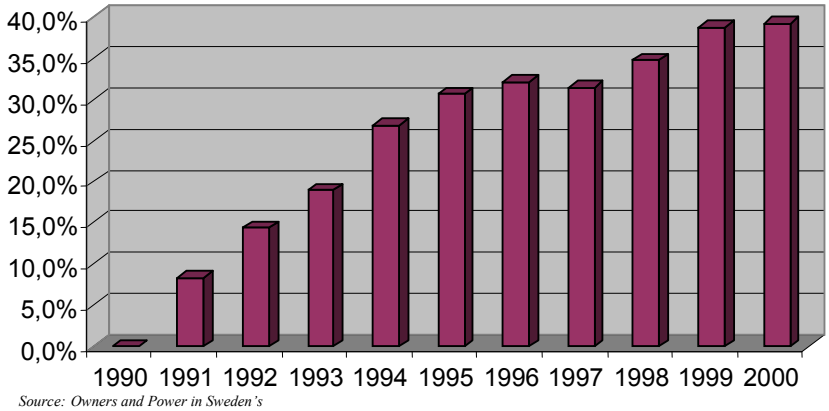
The stock markets have a key role as mediators between investors and company investments. The basic conditions say high risk – high yields. All investors naturally want secure profits – arbitrage. In a perfect market there should according to theory be no possibility of arbitrage. However potential arbitrage opportunities have still been found to exist and as markets are not completely perfect, discussions rage over these possible arbitrage opportunities. One of these market imperfections is the ex-dividend day effect.

The ex-dividend day effect concerns the question of whether or not stocks have abnormal yields around the dividend days. This is an area which has previously been extensively investigated. The ex-dividend day is the first day that the stock is traded without the right to dividends. The cum-dividend day is the last day that the stock is traded with right to dividend. Theoretically the price on the ex-dividend day should equal the value of the stock on the cum-dividend day minus the value of the dividend.[1] In practice this is not always the case.

[1] Adjusted for changes in stock index and effects of taxes. See for example Elton & Gruber (1970).

The reasons for this can differ from time to time and from stock to stock. There can be company specific reasons if for instance stock-driving news is issued on the ex-dividend day itself. But one general reason is that the money paid out through dividend may be differently taxed than capital gains. The behaviour of a stock around the ex-dividend day could therefore be affected if the legislation for taxes changes over time. During the 1990s Sweden had large changes in its tax policies concerning dividends and capital gains as well as large differences in the proportion of foreign ownership. During the 1990s foreign ownership on the Stockholm Stock Exchange has continuously risen from almost 0 to almost 40%, as seen in the graph below.

Foreign ownership on the Stockholm Stock Exchange



Source: Owners and Power in Sweden's listed companies (2006)

In our thesis we have chosen to approximate foreign ownership with US ownership to make it feasible to study the data. This approximation has been done as US investors have historically been the largest group of foreign investors. There have also been large differences in taxation in both Sweden and the US[2] during the period, partly stemming from changes in political leadership in both Sweden and the US as well as from the western trend towards internationalization. These changes create large discrepancies between the years which ease a comparison. We have therefore chosen to study the period 1991-2000.

[2] See chapter 3.

The foreign investors are subject to different tax laws than Swedish investors and this might therefore affect their investment choices and arbitrage opportunities. Both Swedish and foreign tax laws also change over time and this changes the rules of trading for the investors. If taxes on dividends and capital gains differ then there should be a general bias either towards holding the stock with right to dividends or selling it before dividends are paid out. During the period studied in this paper both Swedish and American tax laws have changed making the bias different for different periods in time.

In this thesis we study the existence of tax-related biases on the Swedish market and whether or not they influence the ex-dividend day price behavior in accordance with the Elton & Gruber tax-clientele theory. We then test if the same bias reaction can be found with respect to the proportion of foreign ownership.

The structure of this thesis will be as follows. After a shorter introduction and specification of our purpose, we will explain the Elton & Gruber tax-clientele theory, which form the basis of our study. We also explain the taxation environment forming one part of the theory and compile our empirical findings on the change in stock prices. We will then use three tests to see if we can link differences in taxation to the drop in stock prices relative to the dividends (the price drop quota), forming the other part of the theory. Besides testing for the impact of changes within the Swedish tax system we also try to find an effect from foreign ownership when the tax systems differ. The thesis will be rounded up with an analysis and conclusion concerning our findings.

1.2 Purpose

The purpose of this thesis is to examine the development of the stock prices on the ex-dividend day and thereby see if the changes in Swedish tax system has had an impact on the price drop quota on the A-list on the Stockholm's Stock Exchange during the period 1991-2000.

We will also compare ownership of Swedish and foreign investors to investigate if there has been a bias towards dividends or capital gains for any of the groups, and if

this has changed with the changes in Swedish and foreign tax laws. Many papers have focused on the first issue, one of the more recent Swedish, Alm & Arefjäll (1999), found that the price drop quota on the Stockholm Stock Exchange was lower than one indicating possibility for arbitrage. In 1970 Elton & Gruber used the price drop quota to determine the tax rates for different investor groups. In today's international environment different national tax laws could have a similar effect on the behaviour of the investors. We will therefore also investigate if there was a possible arbitrage opportunity on the Stockholm's Stock Exchange during the period 1991-2000 which can be related to differences in tax systems for the investors.

2. Theory

2.1 Ex-Day

The ex-dividend day is the first day that a stock is bought and sold without the right to obtain the current dividend. A buyer of a stock on or after the ex-dividend day does therefore not have any right to receive that year's dividend from the stock.

If value is affected by different dividend policies we can expect that the dates with dividend information and rights, such as the ex-dividend day, would give opportunities for abnormal returns.[3] If on the other hand the market is fairly close to a perfect market the Modigliani Miller theorem (with taxes)[4] would hold true and we would not expect any possibilities for abnormal returns. However, as Elton & Gruber (1970) showed, different groups of investors facing different tax rates also value dividend differently. If investor A has a lower taxation of capital gains relative to dividends than investor B, A will value the dividends lower and hence the equilibrium price-drop quote for A will be lower than for B.

[3]This would also be the case if different owner groups experience different value effects from the same dividend policy.
[4]Modigliani & Miller (1963).

2.2 Tax-clientele theory

This was put into a formula named "The tax-clientele theory" which was established by Elton & Gruber (1970). The basis for this theory is the assumption that there are differences in tax rates between different investors and dividends and capital gains. The investor however, should in an equilibrium market get the same result from selling a share on the ex-dividend day or on the cum-dividend day, the day before the ex-day. Therefore the following formula should hold true:

$$P_B - t_g (P_B - P_C) = P_A - t_g (P_A - P_C) + D (1 - t_0)$$

P_B = stock price on the cum ex-day
P_A = stock price on the ex-day
P_C = purchasing price of the stock
t_g = tax rate on capital gains
t_0 = tax rate on dividends
D = dividend

The left leg is showing the net gain from selling the stock on the cum-dividend day and the right leg the net gain from selling on the ex-day.

This formula can be rearranged to:

$$\frac{P_B - P_A}{D} = \frac{1 - t_0}{1 - t_g}$$

Elton & Gruber then used the quota between the decrease in stock price on the ex-day and the dividends (price drop quota) to determine the implied tax rate of the marginal investor. By determining this quota for different stocks, with adjustment for transaction costs[5] and market movements, they found that there existed a tax clientele effect, i.e. that stocks with high dividends are preferred by low-tax investors and vice versa.

[5] Transaction costs were generally higher 1970 than during our time period.

The tax-clientele theory could also be applied and tested when the Swedish tax system was changed during the 1990s. According to the tax-clientele theory the change in taxation bias i.e. right leg, from capital gains bias ($t_g > t_0$) to neutral ($t_g = t_0$) should then also lead to a change in price drop quote i.e. left leg in the formula above.
This leads us to our first question: *Can we find a correlation between the price drop quota and the change in tax bias in Sweden during the period 1991 - 2000?*

However, as foreign tax subjects hold a large proportion of the market capital on the Swedish market, we could expect this fact to have an effect on the price drop quota. When US taxes, or more accurately tax bias, change relative to Swedish we should according to the tax-clientele theory expect an impact where the US price drop quota would change both in absolute numbers and relative to the Swedish. This would then create a situation where two groups of investors in the same market and companies have different equilibrium price drop quotas (left leg) based on differences in taxation bias (right leg). This in turn would also affect the total price drop quota a company experiences on the ex-dividend day, which leads us to our second question: *Can we find a correlation between the proportion of ownership with different tax bias in a stock and the price drop quota?*

3. Data

3.1 Swedish taxation of stock returns

3.1.1 Swedish taxation of dividends

The Swedish taxation of dividends differentiates between physical persons and legal persons. In addition to this there are special laws for investment funds which permits them to, to some extent, deduct dividends which are distributed to the shareholders. This, however, only passes on the taxation on dividends and we have therefore chosen to focus on the two major taxation groups, physical and legal persons.

For physical persons dividends were in 1990 taxed as income on top of income from for example work. The tax level hence depended on the marginal income tax of the person. However, since the income year of 1991, the tax on dividends from shares in

Swedish companies was 30% until 1994. That year the dividends on shares in Swedish companies were tax-exempt up to a certain amount[6]. From 1995 and onward the tax rate has once again been 30%.

For companies, with the exception of investment companies and investment funds mentioned above, dividends have during the period been taxed as, and at the rate of, company income. From 1991 until 1993 the formal tax rate for companies was 30%, from 1994 and onward the formal tax rate for companies has been 28%.The true tax rate may vary somewhat due to possibilities for over-amortizations etc.

3.1.2 Swedish taxation of capital gains.

In taxation of capital gains, like in the taxations of dividends, the Swedish tax system differentiates between physical persons and legal persons. Investment funds were taxed on a percentage of total fund value regardless of how many trades they did. Like taxation of dividends the taxation of capital gains in funds and investment companies is passed on to the share holders in the fund or investment company and taxed when they realize their gain, or loss.

For physical persons capital gains were, like dividends, taxed together with income from work until 1990. From 1991 an onward the formal tax rate on capital gains has been 30%. The real tax rate for realized gains or losses on Swedish shares was however 25% (according to law you only had to take up 5/6 for taxation, 5/6 of 30%= 25%) during 1992-1993, and 12.5% (50% of 5/6 of 30%) in 1994. From 1995 and onward the real tax rate for physical persons has been 30%, the same as the formal tax rate.[7]

For companies, with the exception investment funds, both capital gains and dividends have during the period been taxed at the rate of company income. From 1991 until 1993 the formal tax rate for companies was 30%. As explained above the true tax rate however, varied somewhat. In 1994 the formal tax rate for companies was 28%, with

[6] This amount was different for each stock. *Historical tax summary from Hans Bengtsson, Swedish Tax Agency (Skatteverket).*
[7] *Historical tax summary from Hans Bengtsson, Swedish Tax Agency (Skatteverket).*

the exception of Asset Management companies that had a tax rate of 14% for capital gains from Swedish shares. From 1994 and onward the formal tax rate for companies has been 28%.[8]

Summing up the taxation data from Sweden during the period we can create the following table for the Swedish private taxation and the theoretical price drop quota implied, i.e. the price drop quota calculated from using the right leg in the Elton & Gruber tax-clientele theory. At this point we leave out the company taxation, as it has been bias neutral during the period, as well as other possible affects on the price drop quota.

Sweden

Year	t_g	t_0	TQ*
1991	30%	30%	1,00
1992	25%	30%	0,93
1993	25%	30%	0,93
1994	12,5%	0%	1,14
1995	30%	30%	1,00
1996	30%	30%	1,00
1997	30%	30%	1,00
1998	30%	30%	1,00
1999	30%	30%	1,00
2000	30%	30%	1,00

*Theoretical price drop quota $(1-t_0)/(1-t_g)$

As we can see in the table above, the implied price drop quota for Swedish private investors and investment funds varies between the years with values in the range of 0.93 – 1.14.

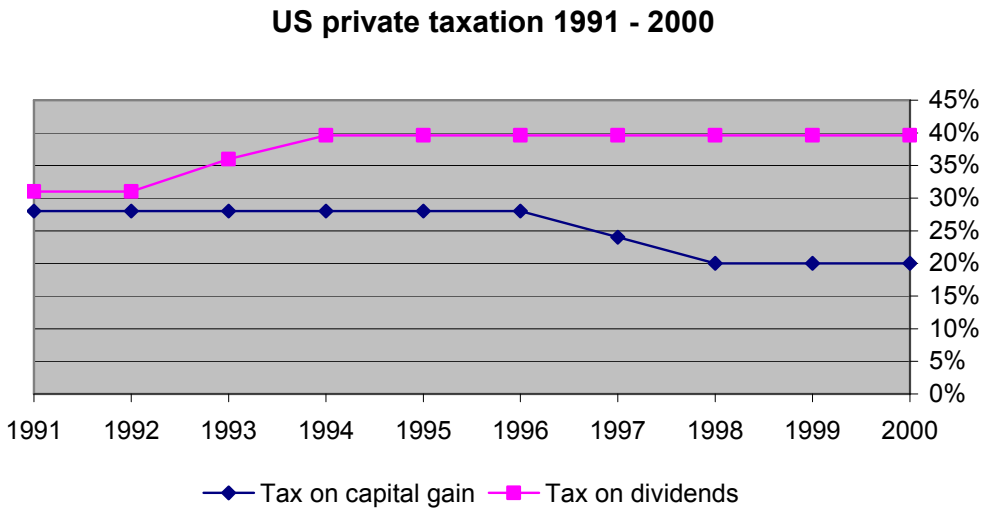
[8] Historical tax summary from Hans Bengtsson, Swedish Tax Agency (Skatteverket).

3.2 US taxation of stock returns

3.2.1 US taxation of dividends

The US taxation of dividends, like the Swedish taxation system, differentiates between physical person and legal persons. One of the more important investment types are mutual funds. As a general rule they are not taxed themselves. Instead the dividends must be passed on to the investors in the fund and are hence taxed a by the fund's investors. The mutual funds can therefore for tax comparison reasons be said to have the same tax rate as its investors. Furthermore some funds and trusts, for example pension funds, are tax exempt in the USA. They do however have to pay a tax at the source of income of 15% (5% if they hold more than 10% of the company paying out the dividends).[9]

For physical persons dividends are taxed together with other income from for example work and hence dividend income is taxed at the marginal tax rate of the person. For the top income bracket, where most assets are accumulated, this meant 28% in 1990. Tax reforms increased this to 31% in 1991 and 36% in 1993. Since 1994 and onwards physical persons has had a tax rate of 39.6% on dividends.[10]



[9] Lag (1994:1617) om dubbelbeskattningsavtal mellan Sverige och Amerikas Förenta Stater.
[10] Facts and Figures on Government Finance, 38th Edition.

For companies, with the exception of mutual funds mentioned above, dividends have during the period been taxed as, and at the rate of, company income. Companies in the US are taxed with 35% federal tax and a differentiated state tax. On average the total tax reaches around 40%. There has, however been allowed a deduction of normally 70%, making the real company tax rate for dividends (1-70%)*40%=12%.

3.2.2 US taxation of capital gains

In taxation of capital gains, like taxation of dividends Mutual funds are, as a general rule not subject to taxation. Instead the capital gains must be passed on to the investors in the fund who then are subject to taxation. The mutual funds can therefore for tax comparison reasons concerning capital gains as well, be said to have the same tax rate as its investors. Some other funds and trusts in the USA, for example pension funds, are however tax exempt for capital gains. There is also no tax at the source of income for capital gains.

Physical persons in the US were taxed with 28% on long term capital gains during the period from 1990 up until 1996. In 1997 a tax reform lowered the tax rate on capital gains from long term assets i.e. assets held for at least 18 months to 20%. Since then the tax rate has remained unchanged throughout our sample period.[11]

USA

Year	t_g	t_0	TQ*
1991	28%	31,0%	0,96
1992	28%	31,0%	0,96
1993	28%	36,0%	0,89
1994	28%	39,6%	0,84
1995	28%	39,6%	0,84
1996	28%	39,6%	0,84
1997	24%	39,6%	0,79
1998	20%	39,6%	0,76
1999	20%	39,6%	0,76
2000	20%	39,6%	0,76

*Theoretical price drop quota $(1-t_0)/(1-t_g)$

[11] Facts and Figures on Government Finance, 38th Edition.

For companies, still with the exception of the mutual funds mentioned above, capital gains have, like dividends, during the period been taxed as company income at 35% federal tax and a differentiated state tax. Unlike for dividends however, there has been no deduction making the average total tax around 40%.[12]

A compiled table for US private taxation and the theoretical price drop quota implied is shown below. For US private investors and mutual funds the implied price drop quota ranges between 0.76 and 0.96.

3.3 Taxation summary

To simplify, we will use only private taxation for comparison. The reasons for this are that the largest investor groups are, direct or indirect through mutual funds, exposed to private taxation. On top of that Swedish corporate taxation has been tax neutral. Based on the taxation data we can derive the following table for the biases in Sweden and the US and the important comparison which gives us the relative biases (US-SW). These differences in bias would according to the tax-clientele theory formula correspond to differences in the price drop quota as the right leg (tax biases) must equal the left leg (price drop quota).

Capital gains biases for physical persons 1991-2000

	Sweden	*US*	*US - Sw*
	$t_0 - t_g$	$t_0 - t_g$	
1991	*0%*	*3,0%*	*3,0%*
1992	*5%*	*3,0%*	*-2,0%*
1993	*5%*	*8,0%*	*3,0%*
1994	*-12,5%*	*11,6%*	*24,1%*
1995	*0%*	*11,6%*	*11,6%*
1996	*0%*	*11,6%*	*11,6%*
1997	*0%*	*15,6%*	*15,6%*
1998	*0%*	*19,6%*	*19,6%*
1999	*0%*	*19,6%*	*19,6%*
2000	*0%*	*19,6%*	*19,6%*

[12] Facts and Figures on Government Finance, 38th Edition.

As we can see, bias in Sweden exists during 1992, 1993 and 1994. For testing purposes we are grouping 1992-1993 and then 1995-2000 to test the tax effect on the price drop quota in Sweden. We then focus on the foreign ownership proportion and thereby test for international tax bias effects. There are only marginal differences in biases between the countries during 1991-1993. We therefore group these years together and correspondingly the years 1995-2000 when the differences are more significant.

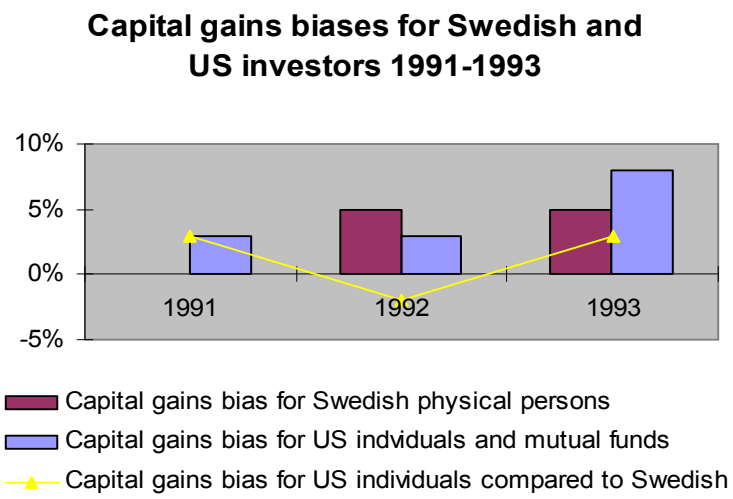
Based on the data we could expect that there would be a minor difference between the Swedish price drop quota in the years 1992-1993 compared to 1995-2000. We could also expect that there would be no significant difference between companies with a higher proportion foreign ownership and those with a lower proportion for the years 1991-1993. For the years 1995-2000 we find a larger difference in tax biases towards capital gains (11.6 – 19.6%). Consequently according to the tax-clientele theory we expect a significantly lower price drop quota for the companies with higher proportion foreign ownership than for those with lower foreign proportion.

3.4 Sample data

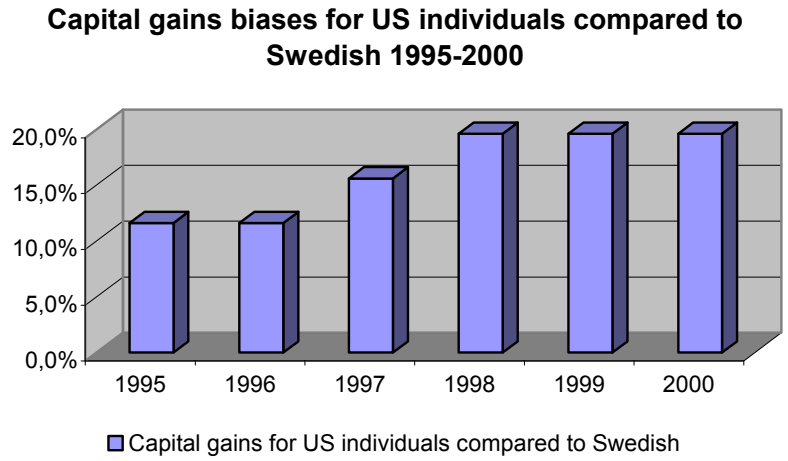
Our data consist of a selection of stocks on the Stockholm Stock Exchange A-list "Mest Omsatta", that paid dividend during the period 1991-2000. Price quotes (last paid) were gathered for the cum-dividend day and the ex-dividend day. Foreign ownership was collected for all the stocks.

Our original sample includes 283 share price quotes on the Stockholm Stock Exchange in the years 1991 – 2000. After deduction of the shares that did not pay out any dividend or where information concerning ownership data or dividends was missing we ended up with a sample of 238 share price quotes.

The gathered data has been grouped depending on differences in Swedish, and later differences between Swedish and American taxes. Our sample has been divided in different periods where the tax structure shows similarities. As the tax rate for Swedish companies has been equal for dividends and capital gains their bias has been zero (neutral).



In the US physical persons hold the majority of the capital on the market, especially through mutual funds which are taxed at the level of the physical persons. In addition to this, parts of the US company investments are direct rather than financial investments, further reducing their impact on the trading of stocks. We have therefore chosen to focus on the effects of differences in private taxation.



The sample of companies was based on several criteria. We choose the most traded companies on the Stockholm Stock Exchange A-list during the dividend period, as the market is more efficient when volumes are higher resulting in more market actors and more correct pricing. Stocks with restrictions for foreign ownership and stocks that did not pay dividends were excluded. We also approximate foreign ownership with US ownership as US owners have historically held the largest foreign interests during

the period. The stock quotes used are the closing prices of each stock on the day before the ex-dividend day and the closing prices on the ex-dividend day. Therefore the changes in stock prices are not only an effect of the dividend but also of normal daily stock variations. In the table below we have calculated the average price drop quota for each year. When calculating the price drop quota for 1994, we got an average of 0.46. For this one extreme year, with an isolated sample, the price drop quota distinguishes itself by going in the opposite direction from all other years during the time period as well as expectations. This could stem from the fact that during this year increasing company profits and renewed confidence for the stock market, helped further by large privatizations of state-owned companies, increased the interest in the stock market and the liquidity inflow.[13] This could help keeping the quotas unnaturally low as new investors did not want to take their money out of the market through dividends. It was an election year where the dominating Social Democrats had vowed to change tax legislation concerning dividends. Grouping 1994 alone would make the data sample for this group very small when looking at most traded stocks. We have therefore chosen to focus our testing on the other periods.

Year	No. of Observations	Price drop quota Mean	Price drop quota Max	Price drop quota Min	Foreign Ownership	Reduction	Original Observations
1991	15	0,27	2,07	-5,80	3,76%	1	16
1992	18	0,47	1,98	-5,17	12,81%	4	22
1993	16	0,69	2,26	-3,62	15,00%	8	24
1994	22	0,46	5,54	-2,01	17,55%	5	27
1995	26	0,30	1,66	-2,81	26,59%	2	28
1996	31	0,84	1,96	-0,56	27,81%	2	33
1997	29	0,91	3,46	-1,61	29,43%	5	34
1998	29	0,48	2,17	-6,07	32,43%	4	33
1999	29	0,98	5,67	-1,72	29,39%	6	35
2000	23	1,21	6,97	-2,29	32,88%	8	31
	238					**45**	**283**

The stock prices were collected from the OMX-database. On many occasions the information needed was not available in the database. In these cases the stock prices were collected from copies of Dagens Industri and Finanstidningen at the Library at Stockholm School of Economics. Dividend-data were collected from the Swedish tax authority (Skatteverket). The data of the foreign ownership have been collected from SIS Ownership Data Corp (SIS Ägarservice AB) and from NCSD group (VPC AB).

[13] Lennart Palm, Chief of Political Staff 1991-1994, Department of Trade and Commerce.

We use the tax-clientele theory established by Elton & Gruber (1970). From this theory we use the price drop quota:

$$\frac{P_B - P_A}{D} = \frac{1 - t_0}{1 - t_g}$$

P_B = stock price on the cum ex-day
P_A = stock price on the ex-day
P_C = purchasing price of the stock
t_g = tax rate on capital gains
t_0 = tax rate on dividends
D = dividend

To achieve a more correct value of the price drop quota we adjust it for the index change. We have chosen the OMXS30 for adjustment as we study the most traded companies on the largest cap list thereby corresponding best to our sample. It has also the advantage that price driving news to a large extent also drives Index and with a large number of observations, the total noise becomes relatively small as most of the stocks in the index are also in the investigation, thereby accounting for a partially cancelling group effect.

To see if the price drop quota is affected by changes in tax laws we conduct several hypothesis tests. The hypotheses will be tested at a significance level of 5%, i.e. the risk of certifying a non-existing difference is 5%. We have excluded 10% of the sample observations on each side of the two groups as extreme values in order to reduce the effect of price driving news coming out on the annual meeting, which in Sweden generally takes place the day before the ex-dividend day.

4. Results

4.1 Hypothesis tests

4.1.1 Test 1: effects of changes in Swedish tax legislation

First we study the price-drop quota solely adjusting for changes in Swedish tax legislation. According to our theory the price drop quota should change with changes in tax-related bias. In our data we could se that there was Swedish tax-related bias for capital gain during the period 1992-1993. During the period 1995-2000 there were no such bias. We have therefore divided our sample into the periods 1992-1993 and 1995-2000. In the first period there is a Swedish tax-related bias for capital gains. During the second period there is no Swedish tax-related bias. To see if this can be shown in our collected data we conduct a hypothesis test of the difference in means for the two periods. The Hypothesis will be made at a significance level of 5%, i.e. the risk of certifying a non-existing difference is 5%.

X = Price-drop quota for the period 1992-1993.
Y = Price-drop quota for the period 1995-2000.

$\hat{P}_x = 0.805$ $\qquad$ $n_x = 28$

$\hat{P}_y = 0.815$ $\qquad$ $n_y = 135$

$H_0 : p_x - p_y = 0$ $\qquad$ $\alpha = 0.05$

$H_1 : p_x - p_y < 0$

When n_x and n_y are large:

$$z = \frac{(\hat{p}_x - \hat{p}_y) - (p_x - p_y)}{\sqrt{\frac{p_x(1-p_x)}{n_x} + \frac{p_y(1-p_y)}{n_y}}} \overset{a}{\sim} N(0,1)$$

$$z = \frac{(\hat{p}_x - \hat{p}_y)}{\sqrt{\frac{p_0(1-p_0)}{n_x} + \frac{p_0(1-p_0)}{n_y}}} \quad \textit{where we approximate } p_0 \textit{ with } \hat{p}_0$$

$$\hat{p}_0 = \frac{n_x \hat{p}_x + n_y \hat{p}_y}{n_x + n_y} = 0.8133$$

H_0 can be rejected if $Z_{Obs} < Z_{Krit} = -1.645$

$$z = \frac{(0.805 - 0.815)}{\sqrt{\frac{0.8133(1-0.8133)}{28} + \frac{0.8133(1-0.8133)}{135}}} \approx -0.1236$$

Since -0.1236 > -1.645, H_0 cannot be rejected at $\alpha = 0.05$.

In our first hypothesis test we only took changes in Swedish tax legislation into consideration. The changes in Swedish taxes provided a tax-related bias for capital gains during the period 1992-1993. We tested if we could see a significant difference between the price-drop-quota for this period and the period 1995-2000 which should have no tax-related bias. For the first period we had an average price drop quota of 0.805 and for the second period 0.815. The hypothesis that the price drop quota is similar for the two periods could not be rejected. The mean for the first period is slightly smaller than the mean for the second, but the difference is not large enough to statistically prove a difference. This means that we can not prove that the price drop quota changes with changes in tax-related bias. This is not in line with what we had expected to find, however it is in line with similar previous research.

4.1.2 Test 2 and 3, adjustment for foreign ownership

According to our theory the price drop quota should change with changes in tax-related bias for foreign ownership. Our sample has been divided into two periods 1991-1993 and 1995-2000 according to differences in tax-related bias for Swedish or foreign ownership. In the first period there is no significant such tax-related bias. During the second period there should be a tax-related bias for capital gains for foreign ownership. To see if this can be shown in our collected data we conduct hypothesis tests comparing the means of the half of the stocks with the highest foreign ownership and the half of the stocks with the lowest foreign ownership, for the two periods to see if there is a significant difference between the two. The Hypothesis will be made with a significance level of 5%, i.e. the risk of certifying a non-existing difference is 5%

Test 2: 1991-1993 adjustment for foreign ownership

During the period from 1991 to 1993 there is no significant tax-related bias for Swedish or foreign ownership. Therefore we conduct a hypothesis test between the groups with highest foreign ownership and the stocks with the lowest foreign ownership to see if there is a significant difference between the two. Since the sample is small we have chosen to do a Mann Whitney U-test.[14]

X = Price-drop quota for the period 1991-1993 for the stocks with the highest foreign ownership.

Y = Price-drop quota for the period 1991-1993 for the stocks with the lowest foreign ownership

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$$H_0 : p_x - p_y = 0$$
$$H_1 : p_x - p_y \neq 0$$

$$n_x = 19$$
$$n_y = 19$$
$$R_1 = 364$$
$$\alpha = 0.05$$

[14] See for example Newbold (2003).

Test statistic:

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

$$U = 19*19 + \frac{19(19+1)}{2} - 364 = 187$$

Under the null hypothesis the distribution of the statistic has mean and variance:

$$\mu_U = \frac{n_1 n_2}{2} = \frac{19*19}{2} = 180.5$$

$$\sigma_U{}^2 = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12} = \frac{(19)(19)(19+19+1)}{12} = 1173.25$$

The decision rule is to reject the null hypothesis if:

$$\frac{U - \mu_U}{\sigma_U} < -Z_{\alpha/2} \qquad \text{or} \qquad \frac{U - \mu_U}{\sigma_U} > Z_{\alpha/2}$$

Here:

$$\frac{U - \mu_U}{\sigma_U} = \frac{187 - 187{,}5}{\sqrt{1173.25}} = 0.1898$$

-1.96 < 0.1898 < 1.96

In our second test, we looked at the periods where Swedish and foreign taxes differed. For the period 1991-1993 there were no or small tax-related bias for Swedish or foreign ownership. The hypothesis that the price drop quota is similar independent of foreign ownership could not be rejected against a two sided alternative at $\alpha = 0.05$. This supports our theory since during this time period there were no big tax-related bias for either Swedish or foreign ownership. In our test, the companies with larger foreign ownership do not show a significant different price drop quota than companies with smaller foreign ownership.

Test 3: 1995-2000 adjustment for foreign ownership

During the period from 1995 to 2000 there should be a tax-related bias for capital gains for foreign ownership. Therefore we conduct a hypothesis test hypothesis tests between the means from the 50 stocks with highest foreign ownership and the 50 stocks with the lowest foreign ownership to see if there is a significant difference between the two.

X = Price-drop quota for the period 1995-2000 for the 50 stocks with the highest foreign ownership.

Y = Price-drop quota for the period 1995-2000 for the 50 stocks with the lowest foreign ownership.

$\hat{P}_x = 0.76$ $\qquad$ $n_x = 50$

$\hat{P}_y = 0.89$ $\qquad$ $n_y = 50$

$H_0 : p_x - p_y = 0$ $\qquad$ $\alpha = 0.05$

$H_1 : p_x - p_y < 0$

When n_x and n_y are large:

$$z = \frac{(\hat{p}_x - \hat{p}_y) - (p_x - p_y)}{\sqrt{\frac{p_x(1-p_x)}{n_x} + \frac{p_y(1-p_y)}{n_y}}} \overset{a}{\sim} N(0,1)$$

$$z = \frac{(\hat{p}_x - \hat{p}_y)}{\sqrt{\frac{p_0(1-p_0)}{n_x} + \frac{p_0(1-p_0)}{n_y}}} \quad \textit{where we approximate } p_0 \textit{ with } \hat{p}_0$$

$$\hat{p}_0 = \frac{n_x \hat{p}_x + n_y \hat{p}_y}{n_x + n_y} = 0.825$$

H_0 can be rejected if $Z_{Obs} < Z_{Krit} = -1.645$

$$z = \frac{(0.76 - 0.89)}{\sqrt{\frac{0.825(1-0.825)}{50} + \frac{0.825(1-0.825)}{50}}} \approx -1.7107$$

Since -1.7107 < -1.645 H_0 can be rejected at $\alpha = 0.05$.

In the third and final test we looked at the period 1995 – 2000. A period where there should be a tax-related bias for capital gains for foreign ownership. In our data, the companies with larger foreign ownership show a lower price drop quota than companies with smaller foreign ownership. This was supported in our hypothesis test where we could reject that the price drop quotas were similar. These findings support our theory that different tax preferences influence the stock prices at the ex-dividend day.

5. Analysis

Looking at the effects of the changes in Swedish tax legislation, we had an average price drop quota of 0.815 for the period 1995-2000. For the period 1992-1993 we had an average price drop quota of 0.805. The theoretical value[15] is in both cases closer to one, indicating that the tax clientele theory is not the whole explanation. Alm & Arefjäll (1999) also conducted an empirical study on the Stockholm Stock Exchange. The study covered the years 1994 – 1998 on the A-, O- and OTC markets and found a quota average of 0.62. The difference in price drop quota could be due to the fact that Alm & Arefjäll also included the less liquid and more volatile O- and OTC markets.

In our first test, we tested for the difference between the price drop quota for the Stockholm Stock Exchange for the period 1992-1993 and the period 1995-2000. Applying the Elton & Gruber tax-clientele theory we expected the disappearance in tax-bias for capital gain to increase the price drop quota from the first period to the second. In our hypothesis test we could not reject the hypothesis that the price drop quota is similar. The means of the two periods were in the right direction for our theory, but the difference between them was not large enough to statistically prove a difference. Our findings can be compared to previous similar research. De Ridder – Sörensson (1995) studied the effect of the Swedish tax reform 1991, which considerably reduced the tax difference between dividends and capital gains. They found, like us, that in Sweden the elimination, almost, of tax difference did not affect the ex-dividend stock behaviour, i.e. there was no statistically significant change in price drop quota in their tests. Daunfeldt (2002) also studied how the changes in the Swedish tax system during the 1990s have influenced stock prices and volumes around the ex-dividend day. For this he used the daily data from the Swedish stock market 1988-95. He could not either, like us, reject the hypothesis that the ex-dividend price ratio is unaffected by the tax changes. This would mean that the ex-dividend price ratio is not solely driven by differential tax treatment, contradicting the Elton & Gruber (1970) model. Clarke (1992) tested tax clientele theory on Australian conditions around the "new tax regime" in Australia in September 1985 but could also not find any statistical evidence.

[15] Compare with the table over Swedish taxation in chapter 3.

On some markets, and for other time periods, researchers have however found statistical support for the tax clientele theory. Skinner & Gilster (1990) tested the same group sample as Elton & Gruber for the years 1980-85. They on the other hand confirmed the tax-clientele theory on the whole sample but found great variations between industries. These contradictory results could be due to the fact that the USA traditionally has a higher proportion personal ownership, where the tax differences are the largest. Sweden on the other hand has had a higher proportion of stock market ownership from tax neutral companies which would reduce the impact of personal tax differences and the deviation of the price drop quota from one. Espitia & Ruiz (1997) investigated the relative valuation of dividends and capital gains on the Spanish stock market (Madrid Stock Exchange) 1980-92. They also found a significantly lower average fall in ex-dividend prices compared to the dividends signalling a preference for capital gains relative to dividends, in line with the tax-clientele hypothesis.

As can be seen from the previous description, research in this field is ambiguous. Although our findings are according to theory and in line with some research they are also in contrast to other research. The fact that studies have come to different conclusions can depend on the fact that the time periods differ. It could also depend on the way the investigations are conducted or the local markets and market culture.

Including foreign ownership in the tax-clientele theory we expected the companies with the highest proportion of foreign ownership to be most influenced by the bias in foreign tax law. Both the results from our second and third tests concerning foreign ownership were in line with our expectations. In the first period 1991 – 1993 we found no indication of foreign ownership affecting the price drop quota, in line with the tax systems, which also had very small differences in biases. Our test of the second period 1995 – 2000 gave statistical support to the theory that the differences in tax biases during this period should influence the price drop quota. In effect; companies with large foreign ownership with tax bias for capital gains seem to enjoy a lower price drop quota.

According to Elton & Gruber the price drop quota can be related to the differences in tax rates for different investor groups. Our largest contribution to the research in the

field is that we use the empirical findings concerning the price drop quota on the Swedish market, which we adapt to our preferred time period 1991 – 2000, combined with the theoretical frame work from the tax-clientele theory to show that there could be an arbitrage opportunity on the boundary of tax systems that differ, provided that capital flows freely.

This possibility to transfer capital freely between different tax systems is a relatively new opportunity since the market liberalisation predominately during the 1980s. This liberalisation of capital flows has, however been achieved faster than the slow homogenisation of the different countries tax systems. These different national tax systems are though slowly approaching each other, but as long as the discrepancy between free capital flows and different tax systems consist there could be an opportunity for arbitrage due to investors with different tax preferences being active on the same markets. More specifically a Swedish investor, with a dividend taxation (t_0) equal to his capital gains taxation (t_g), the neutral price drop formula would then look:

$$\frac{P_B - P_A}{D} = \frac{1 - t_0}{1 - t_g} \Rightarrow P_B - P_A = 1 * D$$

At the same time a US investor, with dividend taxation of 0.396 and a capital gains taxation of 0.20, would have the following neutral relationship between price drop quota and taxation:

$$\frac{P_B - P_A}{D} = \frac{1 - t_0}{1 - t_g} \Rightarrow P_B - P_A = 0.76 * D.$$

For every price drop quota lower than 1 the Swedish investor could make a profit through buying the share cum-dividend and selling it ex-dividend since the price drop then would be smaller than the dividend. The US investor would at the same time make a profit through selling the share cum-dividend and buying it back ex-dividend as long as the price drop quota was higher than 0.76.

For a price drop quota between 1 and 0.76 the Swedish investor could then make profit through buying the share cum-dividend and selling it ex-dividend. At the same time the US investor would make a profit through selling the share cum-dividend and

buying it back ex-dividend. This opens up for possible arbitrage. The arbitrage made in this, for investor's win-win situation, would then reduce government taxes accordingly.

As long as the size of the foreign market forces compared to the Swedish market forces[16] remains relatively stable, among other things due to an unchanged scope of taxation[17], the possible arbitrage would be stable even if generally known.

Our findings, that there could be an arbitrage opportunity on the boundary of tax systems that differ provided that capital flows freely, have the advantage of being based on the relatively easily identifiable foreign ownership proportion in companies and the differences in publicly available national tax systems. These factors increases the practical use of our findings significantly. The fact that the discrepancy is largely between different national tax systems also complicates the speedy removal of the mentioned differences. Cultural differences, local common practise and national pride traditionally slow down the unification of different systems.

Even with these rather easily found input data concerning the foreign ownership proportion in companies and the differences in tax systems, there are of course noise factors complicating the possible arbitrage opportunity.

The tax-clientele theory should according to Elton & Gruber be adjusted for transaction costs. Many other authors, for example Grinblatt, Masulis, & Titman (1984), Dubofsky (1992) and Koski (1996), emphasizes the importance of transaction costs even more. However, for application of our findings today, transaction costs are very modest even for international trades, especially when considering larger transactions.

Our interesting findings stem from information concerning trade and ownership on the Stockholm Stock Exchange during a certain time period. They could however be valid for other markets as well provided that the criteria of free movement of capital,

[16] Here the investment power of the group within a certain tax scope.
[17] I.e. that persons generally remain taxed in their home country even if their capital are invested abroad.

restricted movement of tax bases, and discrepancies between the tax systems are fulfilled. Concerning different time periods, we have chosen one with differences in taxation systems to state our case, but a larger foreign ownership and reduced transaction costs would of course further strengthen the possibilities to use our findings.

6. Conclusion

We use the empirical findings concerning the price drop quota on the Swedish market, for our preferred time period 1991 – 2000, combined with the theoretical frame work from the tax-clientele theory to search for a correlation between the price drop quota and the change in tax bias. Our results give only a very weak indication of such a correlation and we could not statistically prove the correlation. When taking foreign ownership into consideration we could statistically show a correlation between the proportion of ownership with different tax bias in a stock and the price drop quota.

These findings could open a possibility for arbitrage. This possibility would remain as long as tax systems differ, capital flows freely, there is restricted movement of tax bases, and discrepancies between the tax systems. The slow convergence of tax systems could conserve this situation for many years to come.

7. Further research

For further research it could be advisable to test if our findings are consistent with those for other periods of time on the Stockholm Stock Exchange. It could also be interesting to test for other markets where tax legislation as well as market culture differentiates from the Stockholm Stock Exchange.

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Appendix

Observations

Year	Stock		Ex Day Date	Jan foreign ownership	June foreign ownership	Dividend	Share price Cum-day	Share price Ex-day
1991	AGA	B fr.	910528	0,0%	6,7%	8	305	304
1991	ASEA	B fr.	910429	0,0%	5,9%	13	577	565
1991	Astra	B fr.	910514	0,0%	15,9%	3,25	575	596
1991	Atlas Copco	B fr.	910426	0,0%	14,6%	8	196	193
1991	Electrolux	B fr.	910523	0,0%	15,8%*	12,5	245	246
1991	Ericsson	B fr.	910508	0,0%	18,9%	3,5	189	181
1991	Investor	A	910423	0,0%	2,3%*	4,3	153	152
1991	Procordia	A	910515	0,0%	1,1%*	2,85	171	170
1991	S-E-Banken	(a)	910425	0,0%	3,5%	3,3	70,5	68
1991	SHB	A	910418	0,0%	0,0%*	4,5	127	122
1991	Skanska	B	910530	0,0%	1,7%*	6,25	373	370
1991	SKF	B fr.	910424	0,0%	0,0%*	4,25	92,5	88,5
1991	Stora	A	910516	0,0%	1,6%*	13	341	325
1991	Trelleborg	B	910531	0,0%	9,2%	6,5	143	138
1991	Volvo	B	910425	0,0%	13,6%	15,5	321	306
1992	AGA	B	920527	8,5%	8,5%	8,5	308	300
1992	Asea	B fr.	920427	5,9%	4,9%	7	372	369
1992	Astra	A	920520	15,9%	22,7%	3,25	528	547
1992	Atlas Copco	A fr.	920511	14,6%	15,8%	8	320	315
1992	Electrolux	B fr.	920527	22,7%	22,7%	12,5	283	269
1992	Ericsson	B fr.	920508	24,3%	26,5%	3,5	132	134
1992	Incentive	B fr.	920428	5,80%	3,5%*	6	187	179
1992	Industrivärden	A	920515	2,60%	1,1%*	8	193	185
1992	Investor	B fr.	920512	2,30%	4,7%*	5,25	149	144
1992	Sandvik	B fr.	920525	7,5%	7,5%	9	399	388
1992	SCA	B	920612	2,2%	2,3%	3,2	113	106
1992	S-E-Banken		920429	3,1%	3,0%	3,35	50	47
1992	Skandia	fr	920527	53,4%	63,3%	4	127	122
1992	Skanska	B	920521	1,4%	1,4%	3,25	117	119
1992	Stora	A	920508	3,0%	3,0%	13	324	321
1992	Sydkraft	C	920605	10,50%	16,9%*	2,8	132	128
1992	Trelleborg	B	920526	12,0%	15,9%	6,5	135	121
1992	Volvo	B	920430	17,5%	24,3%	15,5	438	420
1993	AGA	B	930526	10,3%	19,8%	9	374	366
1993	ASEA	A	930421	10,4%	15,1%	9	456	457
1993	Astra	A	930519	37,5%	37,5%	5	742	730
1993	Atlas Copco	A	930430	20,8%	21,5%	8	324	324
1993	Electrolux	B	930519	27,4%	26,3%	6,25	228	223
1993	Ericsson	B	930512	31,4%	32,9%	3,5	291	310
1993	Gambro	B	930514	8,2%	6,6%	4,5	198	198
1993	Incentive	B	930525	3,5%	4,0%	6	196	191
1993	Industrivärden	A	930514	1,1%	1,1%	8	167	158
1993	Investor	B	930518	4,7%	7%*	5,25	123	116
1993	Sandvik	B	930514	9,7%	9,7%	9,5	476	470
1993	SCA	B	930527	6,4%	8,4%	3,2	127	126
1993	Skanska	B	930528	3,3%	3,3%	1,5	97,5	94
1993	Stora	B	930507	8,2%	8,2%	6,5	330	326
1993	Sydkraft	A	930611	16,9%	19,6%	3	137	135
1993	Volvo	B	930422	26,4%	26,4%	7,75	391	382
1994	AGA	B	940506	20,9%	20,1%	10	405	388
1994	Asea	A	940415	15,1%	16,7%	10	617	616
1994	Astra	A	940518	37,9%	37,9%	1,6	166	161

1994	Atlas Copco	A	940428	22,0%	25,4%	9	530	532
1994	Electrolux	B	940506	26,3%	33,4%	6,25	429	426
1994	Ericsson	B	940511	44,0%	43,8%	4,5	340	336
1994	Gambro	B	940520	6,6%	6,8%	5,5	290	290
1994	H&M	B	940506	19,4%	22,3%	6	388	396
1994	Incentive	B	940517	4,0%	5,2%	7	297	291
1994	Industrivärden	A	940510	1,0%	2,4%	9	236	232
1994	Investor	B	940520	7,0%	9,0%	5,25	214	205
1994	Pharmacia	B	940602	2,9%	3,4%	2,2	125	122
1994	Sandvik	A	940517	13,80%	14,8%*	2,25	129	131
1994	SCA	B	940520	6,40%	12,7%*	3,4	130	127
1994	SHB	A	940427	13,90%	17,8%*	2	118	121
1994	Skandia		940415	34,60%	40,6%*	2	147	135
1994	Skanska	B	940601	7,20%	11,4%*	3,25	187	181
1994	SSAB	A	940505	7,30%	21,8%*	7	333	335
1994	Stora	A	940505	16,40%	23,2%*	6,5	419	421
1994	Sydkraft	A	940603	20,50%	31,4%*	3	97,5	98
1994	Trygg-H SPP	B	940609	3,90%	6,8%*	3	104	98
1994	Volvo	B	940421	3,40%	30,9%*	7,75	680	669
1995	AGA	B	950510	30,9%	31,6%	2,25	83	82,5
1995	Asea	A	950502	28,4%	31,2%	11,5	612	607
1995	Astra	A	950516	41,0%	41,3%	2,25	211	217
1995	Atlas Copco	B	950427	35,8%	35,8%	2,3	100,5	98,5
1995	Avesta		950519	67,5%	67,5%	1,6	77,5	75
1995	Electrolux	B	950505	40,5%	41,3%	12,5	371	350
1995	Ericsson	B	950511	47,0%	47,0%	5,5	483	501
1995	Gambro	B	950512	6,8%	7,9%*	1,65	287	288
1995	H&M	B	950508	24,0%	26,9%*	7,75	421	423
1995	Incentive	B	950524	5,9%	11,2%*	8	284	279
1995	Industrivärden	A	950512	3,3%	3,3%	10	210	200
1995	Investor	B	950517	12,3%	14,4%	8	214,5	203,5
1995	Kinnevik	B	950522	37,2%	33,2%*	5	232	230
1995	MoDo	B	950518	12,4%	12,1%	11	382	378
1995	Sandvik	B	950511	14,8%	14,8%	3,75	133,5	128
1995	SCA	B	950519	12,7%	12,5%	3,75	129,5	129,5
1995	S-E-Banken	A	950426	17,4%	17,4%	1,5	35,6	33,5
1995	SHB	A	950427	17,8%	17,8%	3	90	90
1995	Skandia		950426	40,6%	43,1%	2	117,5	120
1995	Skanska	B	950524	11,4%	11,4%	3,75	167,5	164,5
1995	SKF	B	950428	43,1%	43,1%	4,25	145	146,5
1995	SSAB	A	950425	21,8%	21,8%	10	325	329
1995	Stora	A	950510	23,2%	28,0%	10	478	463
1995	Sydkraft	A	950606	31,4%	31,9%	3,25	115	114,5
1995	Trelleborg	B	950515	28,5%	20,1%	1	88	89,5
1995	Volvo	B	950420	30,9%	29,6%	3,4	135	132
1996	ABB	B	960422	32,6%	34,3%	16	691	688
1996	AGA	B	960510	33,6%	38,0%	2,7	107,5	104,5
1996	Assidomän		960521	9,4%	11,4%	5	158	154,5
1996	Astra	A	960514	47,0%	45,4%	3	303	304
1996	Atlas Copco	B	960424	35,4%	35,9%	3	130,5	130
1996	Autoliv		960424	71,6%	64,6%	4,5	385	380
1996	Avesta Sheffield		960628	65,5%	64,5%	3	40,2	40,3
1996	Electrolux	B	960508	42,1%	48,4%	12,5	342,5	327
1996	Ericsson	B	960509	51,4%	50,0%	1,75	144	140,5
1996	H&M	B	960507	26,9%	23,4%*	7,75	475	463
1996	Incentive	A	960522	11,2%	14,9%*	9	374	358
1996	Industrivärden	A	960507	6,7%	7,6%	11	247	233
1996	Investor	B	960530	18,0%	18,3%	29	285,5	246
1996	Kinnevik	B	960508	33,2%	36,4%*	86	261	180

1996	MoDo	B	960430	24,7%	26,1%	17	369	361
1996	Nordbanken		960329	12,7%	13,0%	7,5	118	110,5
1996	Sandvik	B	960513	14,1%	15,4%	6	148	143
1996	SCA	B	960522	13,3%	15,3%	4,75	130,5	127
1996	Scania	A	960524	32,5%	23,1%	5,5	197	191,5
1996	S-E-Banken	A	960430	18,2%	20,5%	1,5	52	51
1996	SHB	A	960424	17,5%	19,2%	3,75	143	140,5
1996	Skanska	B	960430	8,1%	7,5%	5	221	214,5
1996	SKF	B	960426	38,3%	42,1%	5,25	157	154,5
1996	Sparbanken		960425	21,6%	19,8%	3,5	84,5	77,5
1996	SSAB	A	960422	16,0%	21,4%	4	88,5	87,5
1996	Stadshypotek	A	960509	17,3%	17,4%	9	149	140
1996	Stora	A	960417	27,7%	31,9%	3,75	95,5	97,5
1996	Sydkraft	A	960529	31,5%	36,7%	3,75	153	150
1996	Trelleborg	B	960507	18,1%	19,9%	5	96,5	91
1996	Trygg-Hansa	B	960508	19,9%	5,0%	2	105,5	104
1996	Volvo	B	960425	37,6%	42,9%	4	159	155,5
1997	ABB	A	970411	35,6%	35,6%	17,5	870	849
1997	AGA	B	970425	38,5%	17,7%	2,7	107	102
1997	Assidomän		970410	10,7%	15,0%	5,25	198,5	192
1997	Astra	A	970422	44,5%	41,8%	4	320,5	306,5
1997	Atlas Copco	B	970423	38,2%	34,8%	3,75	199	188
1997	Avesta Sheffield		970627	66,4%	70,5%	1	88	90
1997	Electrolux	B	970430	48,8%	55,7%	12,5	458	450
1997	Ericsson	B	970428	51,6%	52,7%	2,5	249,5	237,5
1997	H&M	B	970411	23,4%	20,8%*	11	1048	1054
1997	Incentive	A	970418	14,9%	16,2%*	10	511	496
1997	Industrivärden	A	970430	7,3%	7,2%	13	387	380
1997	Investor	B	970415	18,0%	19,1%	10	343	343
1997	Kinnevik	B	970526	36,4%	24,1%*	5	218	214
1997	MoDo	B	970410	24,7%	22,8%	9	225,5	213,5
1997	Sandvik	B	970507	17,9%	20,1%	6,5	210	204
1997	SCA	B	970429	16,8%	18,0%	5,25	167,5	163
1997	Scania	B	970425	16,0%	16,2%	5,5	192	193,5
1997	S-E-Banken	A	970430	18,4%	15,7%	2,75	82,5	80
1997	SHB	A	970423	21,0%	21,9%	5	228	224
1997	Skandia		970507	62,2%	68,9%	2,75	240	241
1997	Skanska	B	970506	9,2%	11,4%	10	346	340
1997	SKF	B	970416	39,7%	43,1%	5,25	175,5	166,5
1997	Sparbanken		970424	34,2%	27,7%	5,5	142,5	143,5
1997	SSAB	A	970425	21,4%	21,3%	4	142	137
1997	Stora	A	970321	31,7%	28,8%	3,75	104	100
1997	Sydkraft	A	970602	35,8%	55,0%	4	200	200
1997	Trelleborg	B	970428	24,0%	19,7%	3	124,5	122
1997	Trygg-Hansa	B	970507	6,8%	11,5%	2,5	144	141,5
1997	Volvo	B	970424	42,0%	37,4%	4,3	192,5	194,5
1998	ABB	A	980408	31,7%	36,8%	2,1	118,5	116,5
1998	AGA	B	980421	36,4%	41,7%	3	109,5	107,5
1998	Assidomän		980408	14,0%	15,5%	5,5	219	215
1998	Astra	A	980428	40,4%	41,5%	1,8	157	158,5
1998	Atlas Copco	A	980417	32,9%	27,5%	4,25	237	230
1998	Avesta Sheffield		980626	66,1%	64,4%	1	41,5	40,2
1998	Electrolux	B	980430	59,9%	60,9%	12,5	702	720
1998	Ericsson	B	980331	50,0%	53,8%	3,5	376	380
1998	FS-banken		980427	29,4%	31,2%	6	267	248
1998	Industrivärden	A	980506	7,6%	7,7%	15	551	550
1998	Investor	B	980421	19,9%	23,4%	10	446	436
1998	Kinnevik	B	980518	24,1%	24,1%*	5	282	285
1998	MoDo	B	980326	20,7%	23,0%	9	247,5	231,5

1998	Nordbank Hldg		980424	36,1%	33,2%	1,5	60,5	60
1998	Sandvik	A	980507	21,3%	17,2%	7	243,5	240,5
1998	SCA	B	980401	19,4%	22,6%	5,75	220	214,5
1998	Scania	B	980423	8,9%	12,4%	5,5	181,5	181
1998	S-E-Banken	A	980429	16,5%	23,5%	3	130	127
1998	Securitas		980508	16,9%	47,1%	2,75	290	307
1998	SHB	A	980429	24,5%	27,8%	6,5	359	348
1998	Skandia		980428	70,4%	69,8%	3,75	541	555
1998	Skanska	B	980430	10,7%	13,0%	11	369	361
1998	SKF	B	980427	39,4%	42,9%	5,25	172	160,5
1998	SSAB	A	980424	18,6%	20,2%	4,5	157,5	149
1998	Stora	A	980313	26,3%	29,9%	3,75	123,5	124
1998	Swedish Match		980430	47,8%	46,9%	1,1	27,6	26,8
1998	Sydkraft	A	980602	54,8%	55,9%	6	238	231
1998	Trelleborg	B	980427	20,6%	24,2%	5	115	102
1998	Volvo	B	980423	36,3%	41,0%	5	240	232
1999	AGA	A	990423	46,6%	49,1%	3	114,5	110,5
1999	Assa Abloy		990506	60,7%	57,2%	2,5	385	374
1999	Assidomän		990615	14,3%	17,9%	5,5	183	139
1999	Atlas Copco	A	990421	25,2%	31,2%	4,5	220	216,5
1999	Custos	B	990415	19,2%	19,4%	11,5	172,5	163
1999	Electrolux	B	990428	56,9%	53,6%	3	170	167
1999	Ericsson	B	990324	49,7%	52,3%	2	190	175,5
1999	FS-banken		990430	27,2%	27,9%	7	189,5	185
1999	Gambro	B	990325	10,6%	8,7%	1	77	81
1999	Industrivärden	A	990422	3,2%	2,3%	4,5	130	123
1999	Investor	B	990415	22,5%	23,8%	11	392,5	376
1999	Kinnevik	B	990525	24,1%	16,6%*	6,35	198,5	189
1999	MoDo	B	990326	21,8%	22,7%	45	239	191
1999	Nordbank Hldg		990326	27,5%	25,7%	1,64	48,5	47,1
1999	OM Gruppen		990309	27,7%	27,3%	4,5	116,5	114,5
1999	Sandvik	A	990430	17,3%	21,5%	7	186	190
1999	SCA	B	990325	23,6%	24,0%	6,5	172	173
1999	Scania	B	990429	14,2%	9,2%	6,5	221	230
1999	SEB	A	990430	17,5%	20,4%	3,5	113,5	110
1999	Securitas		990416	52,7%	55,1%	0,85	132	132,5
1999	SHB	A	990428	27,5%	28,8%	8	332	322
1999	Skandia		990409	61,9%	61,7%	0,9	154	151,5
1999	Skanska	B	990504	11,7%	13,4%	12	330	305
1999	SKF	B	990423	36,6%	39,0%	2	145	147
1999	SSAB	A	990426	13,0%	15,2%	4,5	103,5	97
1999	Swedish Match		990427	52,6%	53,2%	1,1	28,5	28,1
1999	Trelleborg	B	990423	26,8%	23,2%	2	86	80
1999	WM-data	B	990427	21,7%	19,5%	2,25	310	314
1999	Volvo	B	990429	37,9%	32,4%	6	223,5	218,5
2000	Assa Abloy		20000504	57,0%	57,2%	0,75	183,4	183
2000	Assidomän		20000418	17,5%	21,0%	6	147,5	142
2000	Atlas Copco	B	20000428	31,0%	32,4%	4,75	215	209,5
2000	Electrolux	B	20000426	49,5%	42,8%	3,5	160,5	153,5
2000	Ericsson	B	20000403	55,4%	59,0%	2	759	737
2000	FS-banken		20000413	29,3%	32,0%	5	125	127
2000	Gambro	A	20000328	10,2%	22,1%	1,1	62	60
2000	Holmen	B	20000413	22,5%	19,6%	11	241,5	234
2000	Industrivärden	A	20000508	2,2%	3,0%	6,2	235	229
2000	Investor	B	20000329	25,7%	29,4%	3,4	141,5	137,5
2000	Kinnevik	B	20000529	16,6%	17,2%*	1	261,5	256
2000	Nordea		20000412	58,0%	64,5%	1,75	50	53
2000	SCA	B	20000411	24,3%	23,3%	6,8	190,5	181,5
2000	SEB	A	20000412	17,8%	23,7%	3,5	97,5	95,5

2000	Securitas		20000503	59,2%	62,0%	1	223,5	218
2000	SHB	A	20000417	26,9%	27,7%	3	123	118
2000	Skandia		20000406	61,4%	59,7%	1	389	405
2000	Skanska	B	20000503	11,3%	15,7%	16	329	312,5
2000	SKF	B	20000426	44,2%	52,9%	4	194,5	197
2000	SSAB	A	20000428	14,0%	12,2%	4,5	105	103
2000	Swedish Match		20000428	49,6%	46,5%	1,25	27,1	26,7
2000	Trelleborg	B	20000414	19,3%	16,8%	3,25	67	62
2000	Volvo	B	20000427	28,1%	40,7%	7	227,5	219

* Foreign ownership data have not been found for June present year, January the year after has been used instead.

Reduction

Year	Stock	
1991	Saab-Scania	A
1992	Nobel Industrier	
1992	Procordia	B fr.
1992	SHB	A
1992	SKF	B fr.
1993	MoDo	B
1993	Nobel Industrier	A
1993	Procordia	B
1993	S-E-Banken	A
1993	SHB	A
1993	Skandia	
1993	SKF	B
1993	Trelleborg	B
1994	Avesta	
1994	MoDo	B
1994	S-E-Banken	A
1994	SKF	B
1994	Trelleborg	B
1995	Pharmacia	A
1995	Trygg-Hansa	B
1996	Pharmacia & Up SDB	
1996	Skandia	
1997	Autoliv	
1997	Nokia	A
1997	Nordbanken	
1997	Pharmacia & Up SDB	
1997	Stadshypotek	A
1998	Autoliv SDB	
1998	Incentive	B
1998	Nokia	A
1998	Pharmacia & Up SDB	
1999	ABB	A
1999	Astra	A
1999	Autoliv SDB	
1999	Nokia	A
1999	Pharmacia & Up SDB	
1999	Stora Enso	R
2000	ABB	
2000	Astra Zeneca	
2000	Autoliv SDB	
2000	Nokia	
2000	Pharmacia Corp	
2000	Sandvik	B
2000	Stora Enso	R
2000	WM-data	B