

ANTICIPATING TAX CHANGES: EVIDENCE FROM THE FINNISH CORPORATE INCOME TAX REFORM OF 2005

SEPPO KARI
HANNA KARIKALLIO
JUKKA PIRTTILÄ

CESIFO WORKING PAPER NO. 2201
CATEGORY 1: PUBLIC FINANCE
JANUARY 2008

An electronic version of the paper may be downloaded

- *from the SSRN website:* www.SSRN.com
- *from the RePEc website:* www.RePEc.org
- *from the CESifo website:* www.CESifo-group.org/wp

ANTICIPATING TAX CHANGES: EVIDENCE FROM THE FINNISH CORPORATE INCOME TAX REFORM OF 2005

Abstract

Using register-based panel data covering all Finnish firms in 1999-2004, we examine how corporations anticipated the 2005 dividend tax increase via changes in their dividend and investment policies. The Finnish capital and corporate income tax reform of 2005 creates a useful opportunity to measure this behaviour, since it involves exogenous variation in the tax treatment of different types of firms. The estimation results reveal that those firms that anticipated a dividend tax hike increased their dividend payouts by 10-50 per cent. This increase was not accompanied by a reduction in investment activities, but rather was associated with increased indebtedness in non-listed firms. The results also suggest that the timing of dividend distributions probably offsets much of the potential for increased dividend tax revenue following the reform.

JEL Code: H25, H32.

Keywords: corporate income taxation, dividends, tax reform, anticipation effects.

Seppo Kari
Government Institute for Economic
Research (VATT)
Arkadiankatu 7 (PO Box 1279)
Finland – 00101 Helsinki
seppo.kari@vatt.fi

Hanna Karikallio
Pellervo Economic Research Institute PTT
Eerikinkatu 28 A
00180 Helsinki
Finland
hanna.karikallio@ptt.fi

Jukka Pirttilä
Labour Institute for Economic Research
Pitkäsillanranta 3 A
00530 Helsinki
Finland
jukka.pirttilä@labour.fi

This version: 17 January 2008

We are grateful to Petri Böckerman, Tomi Kyyrä, Teemu Lyytikäinen, Matti Sarvimäki and Takis Venetoklis as well as seminar participants at the University of Uppsala, the Tax Forum of the Norwegian Research Council, the Annual Conference of the Finnish Economic Association and the Government Institute for Economic Research for helpful comments. Financial support from Nordic Tax Research Council is gratefully acknowledged.

1. Introduction

While the theoretical analysis of the impacts of taxing corporate income on dividend and investment behaviour is well developed, there is still considerable uncertainty about the empirical magnitudes of these effects. Recent studies have, nonetheless, successfully utilised policy reforms to isolate the causal impacts of tax changes. Such evidence is available, in particular, for the Anglo-Saxon countries (see, for instance, Bond et al. (2007) for UK evidence and Chetty and Saez (2005) and Auerbach and Hassett (2007) for the US).

This paper makes use of the Finnish corporate and capital income tax reform of 2005 to examine the impacts of dividend tax changes on dividend distributions and investments. The reform was the first major attempt to revise the tax rules for capital income since the tax reforms in the early 1990s, which introduced the dual income tax and the system of imputation credit. The 2005 reform especially lead to increased taxation of dividends received by individual investors from domestic firms listed on the stock exchange.¹ The taxation of dividends paid to institutional investors or foreign owners was not changed. In closely held corporations, dividends up to a certain threshold level were kept tax free.² The 2005 reform therefore increased the dividend taxation of some, but not all enterprises, and the tax treatment was based on determinants, such as ownership structure, that were to a large extent exogenous to the firm at the time of the reform. All this suggests that the reform involved sufficient exogenous variation in tax treatment, and it therefore opens up a promising avenue for empirical work. The reform can also be used to shed light on effects of dividend taxation under the dual income tax. This can serve as a guide to proper design of institutional details of the dual tax system, something that may be useful outside the Nordic countries as well.

In more detail, we investigate how firms – both listed and non-listed corporations with domicile in Finland – changed their behaviour in anticipation of the 2005 tax reform in 2003–2004. We examine the changes in dividend distributions, real investment and debt financing making use of register-based panel data, covering all Finnish firms from 1999 to 2004.

The reasons why we focus on the announcement effects are threefold. First, it is of interest per se to learn to what extent firms minimise their tax burden over time. This behaviour is likely to be especially pronounced within corporate and capital income taxation, since the timing of

¹ The combined tax rate on distributed profit rose from 29 to 40.5 per cent.

investment decisions and dividend distributions can be altered more easily than, for example, individuals' labour supply. Based on experiences from the US 1986 tax reform, Slemrod (1992) proposes a three-tier hierarchy of behavioural responses to taxation, where the timing of tax payments is at the top (the biggest impacts), while real behavioural changes are at the bottom. Second, anticipatory responses may be problematic from the policy maker's point of view. They can reduce revenues and thus make the scope for efficiency-improving tax reforms narrower. Anticipatory responses can also differ in sign and size from the long-term effects, and this could be in contradiction to the original goals of the reforms.³ Third, in order to estimate the true impacts of the tax reform, it is important to obtain a proxy of to what extent the reform was anticipated. If this were not to be taken into account, one could mistakenly compare e.g. post-reform dividend levels to pre-reform values that are abnormally high because of anticipation behaviour.

How should we expect dividend tax changes to affect firm's decisions? Auerbach (2003) and Gordon and Dietz (2006) survey the still unsettled theoretical literature on the subject. The so called 'old view' of dividend taxation assumes that dividends are sticky and the marginal source of financing of investment is new share issues. It predicts that a tax change affects both investments and dividends. The 'new view' argues instead that dividend tax capitalizes into the share values and is neutral with respect to investment and dividend decisions. This view relies on the assumption that the marginal source of financing is profits and dividends are determined as a residual item after investments. However, a temporary dividend tax change induces a timing effect to dividends and investments, hence affects firm behaviour also under the 'new view' model (Auerbach and Hassett 2007). This case was discussed during the US 2003 tax reform debate,⁴ but the idea should be applicable also when a tax change is announced long before its actual implementation; the Finnish 2005 tax reform could be a case in point. In addition, under non-linear dividend tax schemes, the firm's cost of capital may be dependent of dividend taxation even under the 'new view' assumptions. Lindhe et al. (2004) and Hietala and Kari (2006) analyse such features of the Finnish dividend tax system.

² For more information on the exemption, see sec. 2.1.

³ Problems of anticipated tax policies have been addressed among others by Auerbach (1989), who argues that they may be of opposite direction to the long-run effects of reforms. Alvarez et al. (1999) show analytically how an anticipated tax rate cut can lead to a sharp short-run increase in investments during the transitional period.

⁴ The US dividend tax cut was legislated to expire at the end of 2008.

The determinants of dividend distributions have been studied empirically especially in the US and the UK. A large number of papers examine the impacts of tax reforms on firms' policies, in particular the tax reforms passed in the US in 1986 and 2003. In the Tax Reform Act of 1986 (TRA) the tax rates on ordinary income and capital gains were set at the same level. There was still a tax disadvantage with dividends because capital gains were only taxed on realization. Several studies argue that the TRA affected firms and that firms adjusted dividend payout ratios subsequent to the passage of the TRA.⁵ In mid-2003 the tax rates on both dividends and capital gains were reduced for individual investors, thereby simplifying and greatly reducing the level of equity taxation (The Jobs and Growth Tax Relief Reconciliation Act of 2003). Chetty and Saez (2005) establish a causal link between the tax cut and increased dividend activity. They conclude that the tax cut led to increased dividend initiations. They also report that dividend increases are positively related to share ownership by managers.⁶ Bond, Devereux and Klemm (2007), in turn, examine the impacts of the dividend tax change in the UK in 1997. They find that the tax change led to a predictable change in the type of dividends but otherwise it had limited impacts on the overall level of dividends and investments, thus supporting the new view.

We proceed as follows. Section 2 presents the key features of the two proposals for the Finnish 2005 tax reform and derives theoretical hypotheses of how different firms would react to the reform. Section 3 describes the dataset and our empirical approach. The estimation results regarding whether dividend distributions of firms in different tax categories reacted in different ways are presented in Section 4. Section 5 examines how dividend changes were reflected in investment policies and debt decisions. Section 6 concludes.

2. Theoretical predictions based on the 2005 tax reform

2.1 The reform

Dividend taxation before the 2005 reform

⁵ Examples of studies of the US 1986 tax reform include Ben-Horim et al. (1987), Bolster and Janjigian (1991) and Casey et al. (1999).

⁶ Examples of other studies of the US tax reform of 2003 include Brown et al. (2004), Blouin et al. (2004), Nam et al. (2004).

A notable feature of the Finnish income taxation is that it follows the Nordic dual income tax (DIT). In that system, personal capital income such as dividends, capital gains and rental income are taxed at a flat-rate tax. All other income is classified as earned income and taxed according to a progressive tax rate schedule.⁷ Prior to the 2005 tax reform the tax rate on capital income and corporate profits was 29 per cent⁸, while the top marginal tax rate (MTR) on earned income was around 55 per cent.

As to the taxation for dividends, Finland applied a full imputation system to relieve the double taxation of distributed profits. The system led to a zero effective tax rate on dividends at the shareholder level, due to equal tax rates on corporate profits and personal capital income. Dividends from non-listed corporations received special treatment, however. These dividends were split into capital income and earned income to curb income shifting caused by the wide tax rate gap between these income types. The proportion of dividends taxable as capital income was calculated as a 9.585 per cent return on the firm's net assets. The residual part was taxed as earned income. This dividend split concerned all domestic corporations not quoted on the main list of the Helsinki Stock Exchange (HSE).

The 2002 Arvela report

In October 2002 a tax reform panel appointed by the Ministry of Finance and chaired by Mr. Lasse Arvela handed down its report on reforming the Finnish capital income taxation. Among its main proposals were reductions in capital income and corporate tax rates from 29 to 25 per cent and a move from the imputation system to full double taxation of dividends. The splitting of non-listed dividends would also have been abolished. The proposal would have meant a substantial increase in the taxation of dividends taxable as capital income from 29 per cent to 43.5 per cent. For those dividends, then taxed as earned income, the proposal would have caused a potential reduction in the tax burden. (Table 2.1)

The 2005 reform

The panel's tax reform model did not meet with the support of the Finnish government, which came up with its own blueprint in November 2003. The final bill passed by parliament in June

⁷ The total tax liability on earned income consists of several parts. Church tax, local income tax and sickness insurance contributions are paid at flat rates, while the central government income tax is progressive. There is an additional social security contribution paid by wage earners on wage income.

⁸ The flat capital income tax rate was 25 per cent in 1993–1995 and 28 per cent in 1996–1999.

2004 and implemented as from 2005 closely followed the 2003 blueprint, especially in terms of dividend taxation.

The government bill included the following features. The corporate tax rate was cut to 26 and the capital income tax rate to 28 per cent. Instead of full double taxation of dividends, the government chose a system of partial relief under which 70 per cent of dividends were included in the recipient's taxable capital income. The splitting system was maintained. A major exception from the main lines of the new dividend tax system was that the capital income part of dividends from non-listed corporations was made tax-exempt up to a fixed amount of 90,000 euros. Any amount beyond that was taxed according to the main rule. The 70 per-cent rule was also applied to the earned income part of the dividend. (Table 2.1)

Table 2.1 Dividend taxation before and after the 2005 reform

	Previous tax system	The Arvela proposal (announced 2002)	The 2005 reform (announced 2003)
Tax rate on corporate profits	29	25	26
Personal tax rate on capital income	29	25	28
Top MTR on earned income ⁹	55	55	55
Method of dividend taxation	full imputation	double taxation	partial relief
- taxable share of dividends	..	100	70
Splitting parameter (effective)	9.585	-	9
ETR (nominal) on capital gains	12	13	14
Combined tax rate on dividends:			
Listed firms :			
HSE main list	29	43.5	40.5
HSE OTC list	29/55 ¹⁰	43.5	40.5
Non-listed firms			
Capital income ≤ 90 t€	29	43.5	26
Capital income > 90 t€			40.5
Earned income (Top MTR)	55	55	55

2.2 Theoretical predictions

Dividend tax and the timing of dividends

It is widely agreed on in tax literature that a constant dividend tax should not affect the timing of dividends of a mature corporation (Hartman 1985, Sinn 1987, Auerbach-Hasset 2007). This can be demonstrated by writing the expression for the value of the firm:

⁹ Top MTR of 2004. Observe that neither the Arvela report nor the Government proposal included cuts in the MTR on earned income. Some smaller cuts were eventually implemented, however.

¹⁰ Prior to the 2005 reform, dividends from companies quoted on the OTC list were split into capital income and earned income.

$$V_t = \int_t^{\infty} (1 - \tau) D(s) e^{-\rho(s-t)} ds = (1 - \tau) \int_t^{\infty} D(s) e^{-\rho(s-t)} ds ,$$

where τ is the rate of dividend tax, $D(s)$ is the dividend distribution at time s and ρ is the owner's discount rate. We observe that the firm's value depends on the tax term $(1 - \tau)$ and the present value of dividends. Hence, the valuation of the firm is invariant to the timing of dividends.

If the tax rate unexpectedly changes, increases for example, the firm's value changes accordingly. This change has still no effect on the time pattern of dividends if the present value of dividends does not change.

One crucial assumption of this simple example is that the tax rate is expected to stay constant in the future. If we relax this assumption and consider an expected future increase in the dividend tax rate, occurring at time $t' > t$, we observe that the value of the firm is not any more independent of the timing of dividends. Assuming that the present value of dividends is unchanged, the firm's value can be raised by increasing distributions before and reducing them after the tax change. Thus, the value-maximizing firm's response to the announced later dividend tax hike is to advance dividend payments.

Based on this short discussion it seems reasonable to expect that the Finnish 2005 tax reform caused anticipatory responses in the firms' pay-out behaviour during the transitory period before the implementation date.

Effects of the splitting system on dividends

The split of dividends from non-listed firms, a special feature of the Nordic DIT, has received some attention among tax economists. Lindhe et al. (2004) and Hietala and Kari (2006) show that the split affects investment incentives and may reduce the cost of capital to a low level. Kari and Karikallio (2007) discuss the implications of the splitting system for dividend distributions. They show that a non-listed corporation's optimal pay-out policy may well be to distribute exactly the maximum amount of dividends taxable as capital income. This policy rule combined with investment of the remainder of after-tax profits in financial assets is argued to be a value-maximizing way to avoid high taxes on earned income. Thus the pay-out policy of these firms is considerably affected by the tax rules.

Hypotheses

To establish a causal role of the Finnish 2005 dividend tax increase, we exploit the fact that the tax changes only affected dividend income distributed to individuals. There was, however, considerable variation in the tax changes also within this dividend category (see sec. 2.1). The prime example of these is dividends from non-listed corporations taxable as capital income, which remained tax exempt up to the amount of 90,000 euros. One further aspect affecting our hypotheses is that the ceiling for dividends taxable as capital income makes dividend decisions very rigid for those non-listed firms for which this ceiling is binding. Thus we do not expect to see any anticipatory response among these firms.

In establishing our hypotheses we divide firms into 5 different groups depending on their stock market status, ownership structure and the amount of dividend distributions; that is, the classification is based on factors that are relevant to the expected effect of the tax change.

1. Corporations quoted on the main list of the HSE with the majority of shares owned by foreign or domestic institutional investors
2. Corporations quoted on the main list of the HSE with a large share of domestic ownership
3. Non-listed corporations with dividends taxed as earned income at the margin¹¹
4. Non-listed corporations with dividends taxed at the margin as capital income, maximum dividend payment below 90,000 euros
5. Non-listed corporations with dividends taxed at the margin as capital income, maximum dividend payment above 90,000 euros

The non-listed corporations above include firms quoted on the OTC list. The classification of companies into groups 1 and 2 was made on the basis of whether Finnish natural persons owned over 50 per cent of the company in 2004.¹² Our approach relies on the assumption that firms do not change groups frequently. This assumption seems plausible, since firm owner-

¹¹ Put differently, the ceiling for dividends taxable as capital income is binding.

¹² We also tested the use of a proportional share of ownership by domestic individuals as a continuous variable in our estimation models. Those results did not differ significantly from those generated by using the share of ownership as a category variable.

ship and pay-out policy tend to include much inertia. To assess this issue, we show in Appendix 1 the proportional shares of the firms which have switched groups. The appendix also provides sensitivity analysis under different definitions of the corporate group number 5.

The information of the Arvela proposal became public in October 2002 and that of the government proposal in November 2003. Considering that these two proposals differed very much in how they were expected to affect different groups of taxpayers, we build two different hypotheses. The first one reflects a response to the Arvela report and should be seen in dividends paid out of the 2002 profits; the other relates to the response to the 2003 government proposal and should be seen in dividend payments out of the 2003 profits.

Concerning the Arvela report, Table 2.1 suggests that in almost all cases, dividend taxation of individual shareholders would have increased. The exceptions are dividends taxable at the margin as earned income by a natural person (group 3) and dividends received by a foreign investor or a Finnish institutional investor (group 1). Thus we hypothesize that the Arvela 2002 report induced an anticipating increase in dividend payments in companies in groups 2, 4 and 5. These groups are our treatment groups in 2003, measured by our Treatment03 variable. This variable takes value 1 for firms in the treatment groups in 2003 and 0 otherwise, for all other years and all other groups.

Again as seen from Table 2.1, the 2003 government proposal raised the level of dividend taxation for listed companies and for those non-listed companies which paid out dividends of an amount exceeding the 90,000 euro threshold. For the rest, the level of the tax burden was broadly unchanged. These latter cases include non-listed companies with dividends below the threshold and non-listed companies with dividends taxed at the margin as earned income. Hence we hypothesize that the 2003 government proposal induced an increase in dividends in firms in groups 2 and 5. These are our treatment groups in 2004, measured by our Treatment04 variable and coded 1 for firms in these groups in 2004 and 0 otherwise, for all other years and all other groups.

3. Data and the empirical approach

The panel data employed contains information on the financial statements and taxation of Finnish corporations in the period 1999–2004. It was collected by the Finnish Tax Administration and is based on firms' tax declarations. The dataset also includes tax return information on the principal shareholders of all dividend-distributing corporations.

In comparison to similar studies that use smaller data sets, an important quality of our data is that there is no restriction on the size of the firm or the sector it operates in. It covers all Finnish firms that are subject to taxation and thus small firms make up the vast majority of the data. Table 3.1 presents some descriptive statistics of the key variables we have used in our estimations. We have classified firms into listed and non-listed firms. We have also divided firms into treatment and control groups according to the final reform proposal. On average, listed firms that were affected by the tax reform were smaller than firms in the control group, whereas non-listed treated firms were bigger than the control firms. However, as will be seen below, the trends in their dividend distributions before announcing the reforms were very similar.

In Figures 3.1 and 3.2 we compare the pattern of median dividends between the treatment and control groups in the period of 1999–2004. Until 2003 the changes in median dividends have been quite similar in both groups. The most interesting observation is a considerable increase in treatment group dividends compared to control group dividends in 2003 and 2004: both listed and non-listed corporations anticipated the 2005 dividend tax increase via changes in their dividend policies.

Table 3.1 Descriptive statistics 1999-2004

Listed corporations	Obs	Mean	Std. Dev.	Min	Max
Treatment group					
Dividend / Assets	209	0.03	0.05	0.00	0.38
Profit / Assets	283	0.06	0.10	-0.55	0.65
Investment / Assets	272	0.05	0.11	<0.001	1.32
Equity / Debt	271	2.08	7.80	0.011	23.62
Growth rate	201	0.08	1.16	-0.31	0.97
Ln(Employment)	292	5.61	1.24	1.10	8.88
Debt / Assets	236	0.20	0.16	<0.001	0.98
Control group					
Dividend / Assets	314	0.08	0.14	0.00	1.57
Profit / Assets	327	0.09	0.13	-0.24	0.82
Investment / Assets	427	0.06	0.22	<0.001	5.65
Equity / Debt	397	1.21	9.18	0.001	37.40
Growth rate	422	0.02	1.19	-0.76	1.00
Ln(Employment)	345	6.03	1.19	0.69	10.28
Debt / Assets	392	0.20	0.16	<0.001	0.98
Non-listed corporations					
Treatment group (2004)					
Dividend / Assets	7156	0.07	0.08	0.00	0.99
Profit / Assets	7702	0.09	0.12	-0.49	0.90
Investment / Assets	7120	0.04	0.09	<0.001	1.46
Equity / Debt	7478	1.37	8.06	0.002	46.78
Growth rate	7048	-0.001	0.36	-1.95	1.00
Ln(Employment)	7449	2.86	1.19	0.69	6.95
Debt / Assets	7474	0.16	0.15	<0.001	0.99
Control group					
Dividend / Assets	154623	0.06	0.08	0.00	1.00
Profit / Assets	478321	0.07	0.11	-0.50	0.90
Investment / Assets	247177	0.09	0.27	<0.001	1.50
Equity / Debt	413235	2.30	11.16	<0.001	99.98
Growth rate	336055	-0.029	0.58	-5.00	4.98
Ln(Employment)	332931	1.58	1.01	0.69	7.77
Debt / Assets	407577	0.29	0.21	<0.001	1.00

Figure 3.1 Median dividend in listed corporations

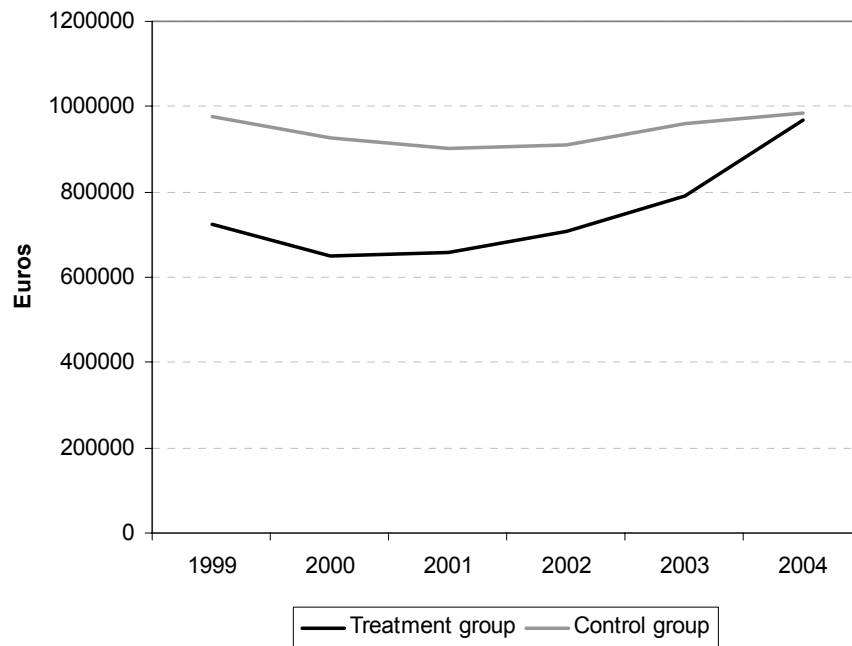
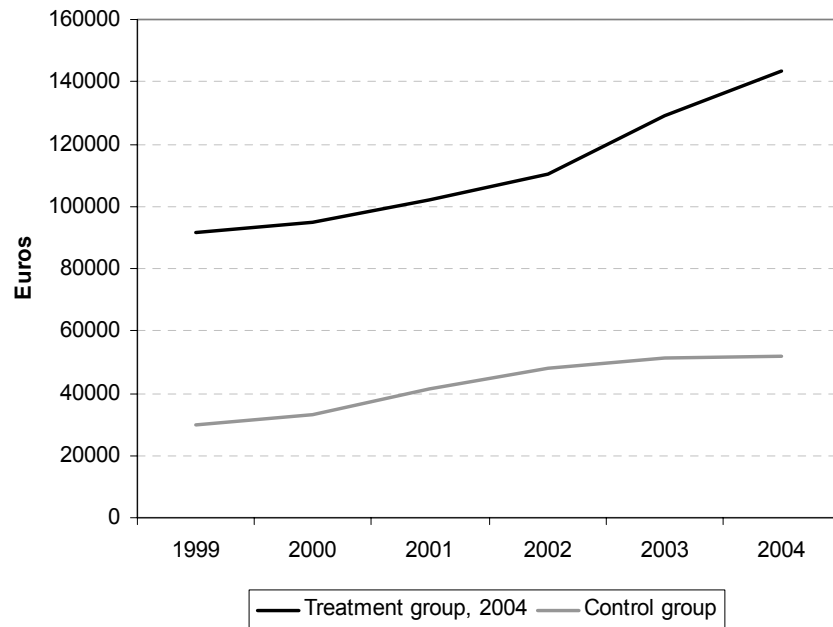


Figure 3.2 Median dividend in non-listed corporations



The Finnish 2005 tax reform allows us to use a simple difference-in-difference estimation strategy by providing exogenous variation in tax rate changes. We therefore estimate equations of the following type

$$(1) \quad d_{i,t} = \alpha_i + \beta X_{i,t} + \delta_g + \eta_t + treatment\ 03_{i,t} + treatment\ 04_{i,t} + \varepsilon_{i,t},$$

In Eq. (1), $d_{i,t}$ refers to the dependent variable of firm i at time t , δ_g is a dummy variable for each group of firms, η_t is a time dummy and $\varepsilon_{i,t}$ is the individual error term, assumed to be distributed independently across firms. In some specifications, we also let the constant vary by firm and that is why it also has the subscript i . Once more, the *treatment03* variable is a dummy variable which is equal to 1 if the firm expects to face an increase in dividend taxation after the tax reform and 0 otherwise according to the Arvela proposal. The *treatment04* variable refers, in turn, to the Government Proposal. The treatment variables differ across groups of firms and over time¹³. Finally, in some equations we include a number of other control variables, denoted by $\beta X_{i,t}$.

The identifying assumption is that other potential unobservable factors of dividend or investment behaviour affect the treatment and the control groups in the same way. Apart from the tax change, we do not see any other major reasons that would have a differential impact on firms differing in their ownership status and the dividend level over this time period. To further examine the credibility of our treatment/control group division, we estimated models where we used business profits as a dependent variable and the same set of explanatory and control variables as in our reported estimations. These model specifications did not produce significant coefficients for our treatment variables.¹⁴

4. Estimation results for dividend distributions

We follow Chetty and Saez (2004, 2005) and estimate both extensive and intensive responses in dividend payout policy. In our paper the extensive margin refers either to the initiation of

¹³ We also estimated models using only one treatment variable which was combination of Treatment03 and Treatment04 variables. This treatment variable was significant in all model specifications. Noticing this, the Arvela and Government effects can be estimated together or separately. These results are available from the authors upon request.

dividend distributions by firms that had not paid dividends earlier or to a discrete change in dividend policy of non-listed firms that had earlier paid dividends below the maximum amount taxable as capital income. The idea behind the latter analysis is that the dividend-tax hike induced them to raise their dividends from a low level to the ‘tax-optimal’ level corresponding to the maximum amount taxable as capital income. These extensive margin responses are estimated by logit models. The intensive margin refers, in turn, to the actual amount of distributed dividends. For investment and debt equations, we only measure intensive margins.

4.1 Extensive models

We first investigate dividend initiations during the planning period of the tax reform in non-listed firms.¹⁵ If the anticipated tax increase affects dividend payments, we expect to see an increase in initiations prior to the reform. In Figure 4.1 we plot the distribution of dividends in years 2002, 2003 and 2004.

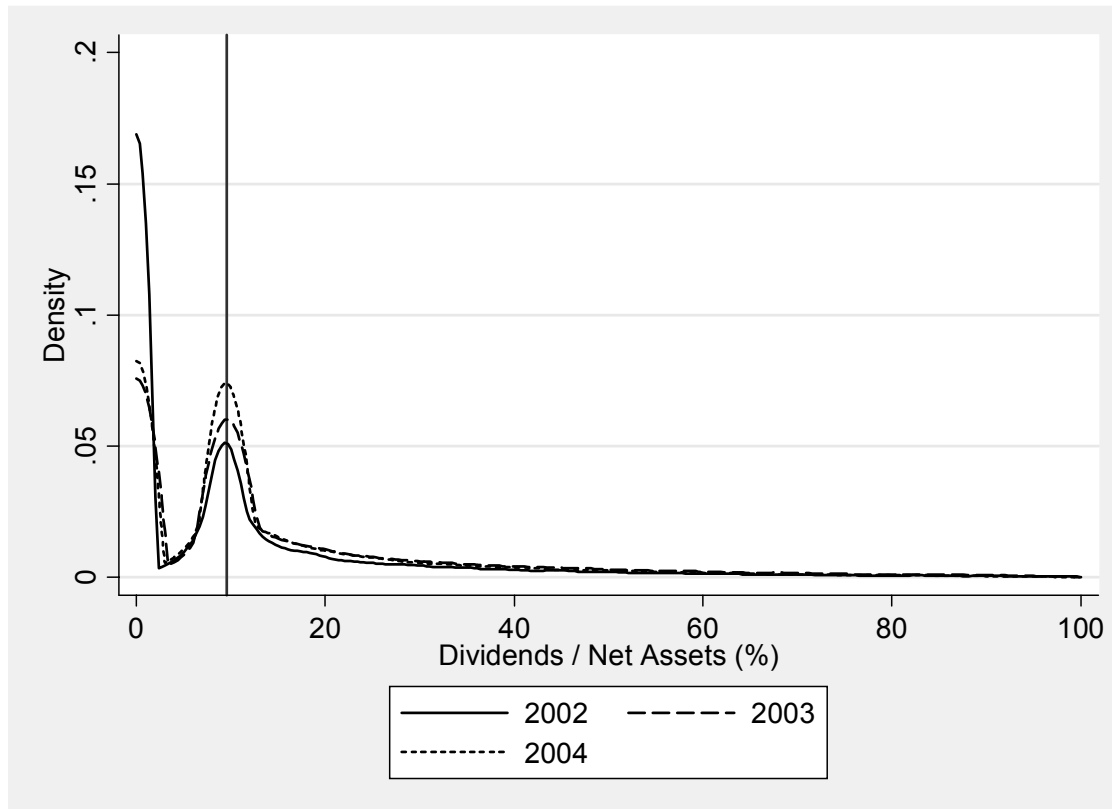
The figure clearly shows that the proportion of firms that do not distribute dividends drops from 2002 to 2003 and again from 2003 to 2004. What is also evident is the increase in the share of firms that began to distribute dividends roughly equal to the maximum amount that could be distributed tax free (the vertical line gives the exact tax-free percentage, 9.585, of net assets).

¹⁴ Again, these results are available from the authors upon request.

¹⁵ Almost all listed firms have always distributed some dividends and therefore measuring new dividend distributions is not of much importance.

Figure 4.1

Distribution of dividends in non-listed corporations



Next, we examine the initiation of dividend distributions by estimating a logit model, where the dependent variable takes the value 1 if the firm initiates dividend distribution and 0 otherwise.

Our basic specification with group and time dummies is given in column (1) of Table 4.1. In the other models, we investigate the robustness of these results. The model with a firm-specific dummy variable is given in column (2). This model is estimated as a linear probability model, since a panel logit model could suffer from the so-called incidental-parameters problem leading to inconsistent estimates (Hsiao 2003, Ch. 7). The logit model is again used in the rest of the specifications. There, the firm dummy is dropped and we include the following control variables: a) a profit-to-assets ratio; b) 2-digit industry dummies; c) location dummies and d) the logarithm of the number of employees. In every specification we have reported coefficients of the estimated models and marginal effects ($\partial y / \partial x$) which show directly the impact of belonging to the group facing tax increases on the probability of dividend initiation.

Table 4.1: Initiation of dividend distributions in non-listed corporations

	(1)	(2)	(3)	(4)	(5)				
	Initiation	Initiation	Initiation	Initiation	Initiation				
	$\partial y/\partial x$	$\partial y/\partial x$	$\partial y/\partial x$	$\partial y/\partial x$	$\partial y/\partial x$				
Treatment03	1.357 (41.28)** (25.13)**	0.027 (23.56)**	0.113 (56.87)** (56.87)**	1.727 (41.32)** (22.21)**	0.028 (22.21)**	1.731 (41.39)** (22.37)**	0.029 (22.37)**	1.693 (37.68)**	0.048
Treatment04	4.343 (59.49)**	0.129 (74.68)**	0.073 (8.28)** (8.28)**	4.395 (55.85)** (58.28)**	0.101 (58.28)**	4.376 (55.57)** (58.54)**	0.102 (58.54)**	4.019 (47.21)** (67.06)**	0.115 (67.06)**
Profit/assets				6.178 (102.40)**		6.973 (100.74)**		6.174 (102.41)**	
ln(employment)								-0.287 (47.15)**	
DUMMIES									
Group	yes	yes		yes		yes		yes	
Firm		yes							
Year	yes	yes		yes		yes		yes	
Industry				yes		yes		yes	
Location						yes		yes	
Constant	-7.893 (113.19)**	-0.116 (-24.85)**		-8.271 (102.79)**		-8.336 (102.39)**		-7.799 (87.95)**	
Obs	499595	499595		444877		441882		318849	
Pseudo R ²	0.44	0.41		0.52		0.52		0.50	

Robust z statistics in parentheses
* significant at 5%; ** significant at 1%

The results across specifications suggest that the number of firms distributing dividends increased as a response to both the Arvela tax plan in 2003 and the actual tax proposal in 2004. As expected, the magnitude of the impact of the actual plan is somewhat higher than that of the preliminary Arvela report. The Arvela report increased the probability that a firm distributes dividends by 3–8 per cent depending on specification, whereas the corresponding increase resulting from the government plan was 10-13 per cent.¹⁶ These results represent fairly large responses to the tax proposals.

As well as initiating dividends payouts, firms were also able to exploit the tax advantages of the old system more efficiently just before the introduction of the new tax system. As

¹⁶ We interpret the marginal effects mainly based on the specifications 1 and 3-5. This is because specification 2 is estimated as a linear probability model, which is in some sense a ‘wrong’ choice for limited dependent variable modelling.

discussed above, the old system seems to have created incentives for non-listed companies to distribute as dividends the maximum amount taxable as capital income. Kari and Karikallio (2007) present evidence that a significant proportion of dividend-distributing non-listed corporations closely followed this rule in their pay-out policies.

Therefore we also examine whether the expected dividend tax change increased the probability of firms distributing the maximum amount of normal dividends. We run a logit specification where the dependent variable is equal to 1 if the firm started to distribute dividends equal to the maximum amount of normal dividends and 0 otherwise. We use the same set of regressors and controls as in our earlier analyses (Table 4.2).

Table 4.2 Tax planning in non-listed corporations

	(1)		(2)		(3)		(4)		(5)	
	Initiation	$\partial y/\partial x$	Initiation	$\partial y/\partial x$	Initiation	$\partial y/\partial x$	Initiation	$\partial y/\partial x$	Initiation	$\partial y/\partial x$
Treatment03	2.563 (38.50)**	0.036 (14.49)**	0.108 (98.07)**	0.108 (98.07)**	3.178 (43.11)**	0.014 (12.16)**	3.183 (43.17)**	0.014 (12.19)**	3.317 (39.79)**	0.032 (12.07)**
Treatment04	3.739 (37.26)**	0.136 (13.38)**	0.041 (8.53)**	0.041 (8.53)**	5.022 (40.02)**	0.100 (11.45)**	5.022 (39.98)**	0.103 (11.45)**	4.116 (30.76)**	0.088 (9.88)**
Profit/assets					10.295 (107.93)**		10.756 (99.86)**		10.296 (108.00)**	
ln(employment)									0.034 (2.77)**	
DUMMIES										
Group	yes		yes		yes		yes		yes	
Firm			yes							
Year	yes		yes		yes		yes		yes	
Industry					yes		yes		yes	
Location							yes		yes	
Constant	-8.020 (92.07)**		0.009 (5.08)**		-10.747 (77.38)**		-10.700 (75.91)**		-9.954 (64.84)**	
Obs	499595		499595		444877		441882		319885	
Pseudo R ²	0.23		0.05		0.42		0.42		0.42	

Robust z statistics in parentheses
* significant at 5%; ** significant at 1%

We find that much of the response in tax planning appeared in 2004; it was 9–14 per cent more probable that a firm would exploit the maximum amount of tax-free dividends if it fore-

saw an increase in dividend taxation after the reform. The first-round impacts in 2003 were much milder.

We conclude that, in anticipation of a possible tax increase, firms took advantage of potential loopholes in the Finnish dividend tax system in force. We observe pre-reform increases in probabilities of initiation and of tax-planning, indicating that corporations prepared themselves for a tax increase.

4.2 Intensive models

In this subsection, we examine the change in the magnitude of dividends paid out. Thus our dependent variable is now continuous. We focus on firms that distributed dividends in every year of our sample and exclude firms with zero dividends paid out during some years.

Non-Listed Corporations

Table 4.3 below reports the results of the dividend regressions for non-listed corporations. The dummy variables and other controls are the same as earlier. Coefficients of the treatment variables are statistically significant in all model specifications. The results reveal that the amount of dividends increased in a significant way in firms that anticipated higher taxes in the future. This is valid both after the Arvela report and after the government proposal.

Table 4.3 *Dividend responses in non-listed corporations*

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Dividend/assets					
Treatment03	0.005 (4.93)**	0.006 (6.46)**	0.004 (4.45)**	0.004 (4.46)**	0.003 (3.18)**
Treatment04	0.013 (6.04)**	0.008 (3.67)**	0.012 (6.00)**	0.011 (5.93)**	0.011 (5.93)**
Profit/assets			0.282 (80.06)**	0.282 (80.08)**	0.293 (76.98)**
ln(employment)					-0.006 (45.80)**
DUMMIES					
Group	yes	yes	yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.037 (20.26)**	0.077 (30.26)**	0.009 (4.86)**	0.011 (5.61)**	0.066 (25.68)**
Obs.	161779	161779	156731	156731	137443
R-squared	0.28	0.17	0.42	0.42	0.44
Robust t statistics in parentheses * significant at 5%; ** significant at 1%					

From our data, the mean of the dividends/assets variable for non-listed firms in the period 2003–2004 was 0.04551. The increase in dividends consequent to the anticipated tax increase was therefore 7–13 per cent in 2003 and 18–29 per cent in 2004. While it may not be surprising that firms reacted to the dividend tax hike, the magnitude of the increase is, in our view, quite considerable.

Finally, one may wonder what would happen to the results if the whole distribution is modelled at the same time. To test this, we include the zero values of dividends to the sample and estimate a standard Tobit model. These results, reported in Appendix 2, are comparable to those reported in Table 4.3. Therefore, the choice of estimation technique does not seem to drive the results.

Listed Corporations

The response to the dividend tax reform proposals may differ across listed and non-listed firms. The following part analyses the response by the firms listed on the stock exchange. Under the reform proposals, the greatest increase in dividend taxation was faced by listed companies with individual Finnish owners. On the other hand, listed companies owned by institutional or foreign shareholders did not face big changes in dividend taxation.

Table 4.4 *Dividend responses in listed corporations*

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Dividend/assets					
Treatment03	0.026 (4.20)**	0.029 (2.42)*	0.019 (3.01)**	0.019 (2.96)**	0.024 (3.25)**
Treatment04	0.003 (0.53)	0.047 (4.26)**	0.006 (0.85)	0.004 (0.54)	0.0001 (0.05)
Profit/assets			0.492 (3.96)**	0.492 (3.90)**	0.488 (3.88)**
ln(employment)					-0.011 (4.58)**
DUMMIES					
Group	yes	yes	yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.056 (6.05)**	0.063 (10.00)**	0.048 (1.11)	0.070 (1.54)	0.199 (3.80)**
Obs	595	595	588	585	573
R-squared	0.17	0.28	0.33	0.33	0.38
Absolute value of t statistics in parentheses * significant at 5%; ** significant at 1%					

Table 4.4 summarizes the results of these estimations. The coefficients measuring the reaction in 2003 are statistically significant in all cases, whereas the additional impact from the Government plan in 2004 is typically not significant, except for specification (2). Perhaps the reason is that for quoted firms, the contents of the Arvela plan and the Government plan were essentially the same. Given that the mean of the dividends/assets ratio in 2003 was 0.05521,

the marginal impact of the Arvela report on the amount of dividends distributed was 34–47 per cent. This is a much greater response than in the case of non-listed companies.

4.3 Calculating losses in tax revenues

The value of the treatment parameters, together with the amount of dividends in the category of treated firms enables us to give an estimate of the tax revenue losses the government suffered owing to the timing of the dividend decisions.

The idea is as follows. The treatment dummy variables tell how much the firms that anticipated a tax increase advanced their dividend payments to the period before the tax reform. As we saw, the actual magnitude of these parameters varied from specification to specification. We therefore take the mean value of the treatment parameter values. The actual dividends paid out by the treated firms in 2003 and 2004 include these additional dividends, and taking out the magnitude equal to the marginal effect of the mean of the treatment variable gives the value of the additional dividends. Without the tax reform, we assume that they would have not been paid before the reform. Therefore it is plausible to expect that these additional dividends were then missing from the tax base after the reform.

The value of the dividends in the listed and non-listed firms in the treated categories in 2003 and 2004 was roughly a billion euros, and the overall value of additional dividends was 210 million euros (See Table 4.5 below). After the tax reform, 70% of this amount would have become taxed at the flat capital income tax rate of 28%. This means that the overall tax revenue loss would have amounted to 41 million euros. Before the reform, the government estimated that the overall increase in dividend tax receipts could be approximately 150 million euros per year. Therefore, the tax revenue loss took away 27 per cent of the increase in dividend tax revenues in the first year (if all losses were realized in that year). Whether this is a small or large revenue loss is, of course, debatable. But had the dividend tax increase been more wide-ranging than it actually was (because, in the end, only dividends exceeding 90,000 euros were taxable in non-listed companies), the euro amount of the revenue loss would have been larger as well.

Table 4.5 *Estimating tax revenue losses*

	Amount of dividends, t €		Mean treatment parameter, %		Increase in dividends, t €	
	2003	2004	2003	2004	2003	2004
Listed	507,479	367,383	25	28	101,496	80,365
Non-listed	80,714	78,395	18	26	12,312	16,177

5. Financing the additional dividends

Since dividends increased, the question arises of how this is reflected in the firms' other decisions. One alternative is that investments could have decreased. This can have happened for two reasons. First, if firms are liquidity constrained, paying out some of their funds as dividends reduces their resources available for investments. Second, an increase in dividend taxation in the future may reduce the incentives for investment already earlier. This can happen if an investor foresees that an investment provides return after a few years, but the net-of-tax return of the investment is lowered because at the future period, dividends paid out from the profitable investment are already subject to heavier taxes. There are reasons to believe, however, that we should not observe a difference in investments between our treatment and control groups affected by this profitability channel. First, as explained in the introduction, according to the 'new view', dividend taxes do not affect investments of mature corporations. Second, Hietala and Kari (2006) analyse the tax rules for dividends from Finnish non-listed firms, and claim that the effects of the 2005 reform on the cost capital of non-listed corporations is very mixed and depends much on the circumstances of the owner and the firm. This would mean that the main potential effect on investments might well come through the cash flow channel.

Even if investments would not react, the balance sheet position of firms could change due to increased dividends so that, for example, indebtedness increases. In this section we will investigate the effects on both investments and indebtedness.

5.1 Investment responses

We first consider investment responses. The models are similar to those used in the dividend regressions, but we now also include two additional control variables: capital adequacy, measured by equity/debt, and the growth rate in the firm's turnover. The results for listed firms are reported in Table 5.1 and the results for non-listed firms in Table 5.2.

Table 5.1 Investment responses in listed corporations

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Investment/assets					
Treatment03	-0.012 (1.12)	-0.025 (1.71)	-0.007 (0.52)	-0.009 (0.63)	-0.007 (0.51)
Treatment04	-0.001 (0.22)	0.008 (0.54)	0.010 (1.20)	0.011 (1.08)	0.011 (1.11)
Profit/assets			0.014 (0.29)	-0.019 (0.38)	-0.006 (0.12)
Growth rate			0.026 (1.61)	0.025 (1.50)	0.030 (1.72)
Equity/debt			0.103 (2.38)*	0.089 (2.23)*	0.101 (2.33)*
ln(employment)					-0.007 (2.04)*
DUMMIES					
Group	yes	yes	yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.057 (5.82)**	0.055 (7.92)**	0.148 (7.20)**	0.175 (7.38)**	0.196 (3.75)**
Obs.	690	690	435	433	427
R-squared	0.14	0.21	0.24	0.30	0.31
Robust t statistics in parentheses * significant at 5%; ** significant at 1%					

Table 5.2: *Weighted investment responses in non-listed corporations*

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Investment/assets, weighted by turnover					
Treatment03	0.014 (0.13)	-0.011 (0.13)	-0.024 (0.17)	-0.023 (0.16)	-0.024 (0.17)
Treatment04	-0.006 (0.06)	-0.001 (0.00)	0.014 (0.10)	0.013 (0.09)	0.014 (0.10)
Profit/assets			0.076 (30.17)**	0.076 (30.31)**	0.070 (26.88)**
Equity/debt			-0.001 (13.19)**	-0.001 (13.22)**	-0.001 (17.50)**
Growth rate			-0.001 (1.38)	0.001 (1.28)	0.003 (3.28)**
ln(employment)					-0.012 (47.73)**
DUMMIES					
Group	yes	yes	yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.118 (98.08)**	0.099 (98.98)**	0.084 (55.96)**	0.092 (59.01)**	0.109 (66.26)**
Obs.	229321	227125	179117	179005	168593
R-squared	0.04	0.46	0.25	0.25	0.28
Robust t statistics in parentheses significant at 5%; ** significant at 1%					

An interesting pattern in the investment results emerges. For both listed firms and for non-listed firms in general, there appears to be no link between the anticipated tax change and investment prior the reform. For the non-listed firms, this result holds for the weighted regressions (as those shown in Table 5.2), where the firms' size (their turnover) is used as a weight. One possible explanation is that the level of investment decisions is relatively inflexible in the short period of our analysis. Or it may imply that investments can be financed by other sources of funds and therefore the treatment of dividends is not of paramount importance (as in the 'new view' of dividend taxation).

However, when the smallest firms are given the same weight as all other firms, one obtains negative and statistically significant effects from the tax change on investments (See Appendix 3).¹⁷ The reason is probably that the smallest control group firms are micro-sized, growing firms where investment-to-asset ratios are large anyway. For investment equations, we prefer the weighted estimation, since there the bigger (control group) firms get a larger

weight. This is desirable since these firms are a closer comparison to the actual treated firms that are relatively large.

5.2 Debt financing

Let us now consider the reaction in the debt/assets ratio. One of the motivations for the earlier tax reform in 1993, when Finland moved to a Nordic dual income tax system, was to increase the attractiveness of equity finance and to reduce the vulnerability of firms to external shocks. Without considering whether these incentives actually went too far – Lindhe et al. (2004) argue that the cost of capital in the form of equity was very low in the previous tax regime in Finland – the 2005 tax reform clearly reduced the incentives for reducing leverage for some firms (Hietala and Kari 2006). The debt regressions below reveal that in non-listed firms which anticipated tax increases, the stock of debt also increased. The increased dividend distributions were therefore partially funded by an increase in indebtedness. There was no similar effect in listed firms, which may more often have other items in their balance sheets to fund dividend distributions.

¹⁷ All other results reported in the paper remain qualitatively the same regardless of whether these weights are used or not.

Table 5.3 Debt responses in listed corporations

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Debt/assets					
Treatment03	-0.007 (0.36)	-0.007 (0.46)	-0.013 (0.65)	-0.015 (0.75)	-0.021 (1.05)
Treatment04	-0.013 (0.71)	-0.025 (1.71)	-0.007 (0.38)	-0.004 (0.22)	0.004 (0.21)
Profit/assets			-0.240 (2.97)**	-0.230 (2.93)**	-0.232 (3.08)**
ln(employment)					0.015 (5.96)**
DUMMIES					
Group	yes	yes	yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.212 (20.67)**	0.201 (25.61)**	0.234 (7.38)**	0.191 (5.30)**	-0.053 (1.06)
Obs.	710	710	693	690	674
R-squared	0.02	0.02	0.20	0.23	0.29
Robust t statistics in parentheses * significant at 5%; ** significant at 1%					

Table 5.4 Debt responses in non-listed corporations

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Debt/assets					
Treatment03	0.063 (33.87)**	0.075 (40.82)**	0.068 (35.78)**	0.068 (35.67)**	0.079 (37.98)**
Treatment04	0.052 (11.26)**	0.050 (8.40)**	0.052 (10.65)**	0.053 (10.74)**	0.042 (8.34)**
Profit/assets			-0.228 (61.55)**	-0.230 (61.43)**	-0.252 (55.66)**
ln(employment)					0.015 (56.11)**
DUMMIES					
Group	yes	yes	yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.363 (312.29)**	0.245 (84.76)**	0.352 (213.67)**	0.348 (203.46)**	0.353 (185.22)**
Obs.	415051	415051	388242	385414	283885
R-squared	0.12	0.03	0.16	0.16	0.24
Robust t statistics in parentheses * significant at 5%; ** significant at 1%					

6. Discussion

This paper examines how Finnish corporations adjusted their dividend distributions and investments in anticipation of the 2005 corporate and capital income tax reform. Since the reform treated different types of corporations in different ways, it involved exogenous variations to their tax treatment, offering an opportunity for promising empirical estimates. The results can be used to shed light on three distinct issues: the debate between the ‘old’ vs. the ‘new’ view of dividend taxation, the strength of anticipatory responses, and the design of the dual income tax. Since we have measured only reactions on a short term, the conclusions regarding the long-term effects should be seen as tentative.

We find that firms which anticipated increased tax on dividend distributions increased their dividend payouts in a statistically significant way prior to the reform. This took place both at the extensive margin and at the intensive margin. However, this was not reflected in a reduction in investment activity, except when the smallest firms are included in the control group. There is also evidence that in non-listed firms the increased dividend distributions were partially funded by increasing debt. Therefore, the tax linkage between dividends and financial structure appears to be more direct than that of investments. This behaviour can be, at least cautiously, seen as consistent with the ‘new view’ of dividend taxation, according to which the timing of dividends is adjusted, whereas investment behaviour remains untouched.

Secondly, the results imply that while companies distributed abnormally high dividends before the reform, they tended to pay out abnormally low dividends after the reform. This tax planning behaviour therefore probably reduced dividend tax receipts for a few years after the reform. According to our calculations, the revenue losses amounted to roughly 30% of predicted annual investor-level dividend tax receipts. The Finnish capital income tax reform was publicly debated extensively and for quite a long time. This seems to have had both positive and negative effects. The public discussion might have corrected misguided policies in the first tax reform proposal, but it also made the tax reform vulnerable to lobbying. And during the process, firms found ample time to organize their financial structure to minimize their tax burden over time.

Finally, we find that the prospect of increased dividend taxation pushed the firms to make the most out of the tax-planning opportunities embodied in the Finnish version of the dual income tax system. In particular, more firms started to distribute dividends up to the maximum level taxed at the more lenient capital income tax rate. This suggests that the tax-planning incentives of the dual income tax system must indeed be taken seriously, and these incentives, as well as incentives on capital accumulation and financial structure, need to be designed in a more rigorous manner.

References

- Alvarez, L. – Kannianen, V. – Södersten, J. (1999): "Why is the Corporation Tax not Neutral? Anticipated Tax Reform, Investment Spurts and Corporate Borrowing.", *FinanzArchiv*, 56, 285-309.
- Amromin, G. – Harrison, P. – Liang, N. – Sharpe, S. (2005): How Did the 2003 Dividend Tax Cut Affect Stock Prices and Corporate Payout Policy? FEDs Working Paper No. 2005–57.
- Auerbach, A. (1989). "Tax reform and adjustment costs: The impact on investment and market value". *International Economic Review*, 30, 939-962.
- Auerbach, A.J. (2003): Taxation and corporate financial policy. In Auerbach, A.J. – Feldstein, M. (Eds.): *Handbook of Public Economics* vol. 3, North-Holland.
- Auerbach, A. – K.A. Hassett (2007): The 2003 Dividend Tax Cuts and the Value of the Firm: An Event Study. In Auerbach, A. – Hines, J.R. – Slemrod, J. (eds.): *Taxing Corporate Income in the 21st Century*, Cambridge University Press.
- Ben-Horim, M. – Hochman, S. – Palmon, O. (1987): The impact of the 1986 Tax Reform Act on corporate financial policy. *Financial Management* (Autumn 1987), 29–35.
- Blouin, L. – Raedy, J. – Shackelford, D. (2004): The initial impact of the 2003 reduction in the dividend tax rate. Working Paper.
- Bolster, P. – Janjigian, V. (1991): Dividend policy and valuation effects of the Tax Reform Act of 1986. *National Tax Journal* (December 1991), 1–22.
- Bond, S.R. – M.P. Devereux – A. Klemm (2007): Dissecting Dividend Decisions: Some Clues about the Effects of Dividend Taxation from Recent UK Reforms. In Auerbach, A. – Hines, J.R. – Slemrod, J. (eds.): *Taxing Corporate Income in the 21st Century*, Cambridge University Press.
- Brown, Jeffrey – Nellie Liang – Scott Weisbenner (2004): Executive Financial Incentives and Payout Policy: Firm Responses to the 2003 Dividend Tax Cut. NBER Working Paper No. 11002.
- Casey, K. – Anderson, D. – Mesak, H. – Dickens, R. (1999): Examining the impact of the 1986 Tax Reform Act on corporate dividend policy: A new methodology. *The Financial Review* (34), 33–46.
- Chetty, R. – Saez, E. (2004): Do dividend payments respond to taxes? Preliminary evidence from the 2003 dividend tax cut. NBER Working Paper 10572.
- Chetty, R. – Saez, E. (2005): Dividend taxes and corporate behavior: Evidence from the 2003 dividend tax cut. *Quarterly Journal of Economics*, vol CXX, 791–833.
- Gordon, R. – Dietz, M. (2006): Dividends and Taxes. NBER Working Paper No. 12292.
- Hartman, D.G. (1985): Tax policy and foreign direct investment, *Journal of Public Economics* 26, 107-121.
- Hietala, H. – Kari, S. (2006): Investment Incentives in Closely Held Corporations and Finland's 2005 Tax Reform, *Finnish Economic Papers* 19, 41–57.
- Hsiao, C. (2003): *Analysis of Panel Data*. Second Edition. Cambridge: University Press.

- Kari, S. – Karikallio, H. (2007): Tax treatment of dividends and capital gains and the dividend decision under dual income tax. *International Tax and Public Finance* 14, 427-456.
- Lindhe, T. – Södersten, J. – Öberg A. (2004): Economic effects of taxing different organizational forms under the Nordic dual income tax. *International Tax and Public Finance* 11, 469–486.
- Moffitt, R.A. – M.O. Wilhelm (2000): Taxation and the labor supply decisions of the affluent. In J. Slemrod (ed.): *Does Atlas shrug? The Economic Consequences of Taxing the Rich*. Harvard, Russell Sage Foundation.
- Nam, J. – Wang, J. – Zhang, G. (2004): The Impact of Dividend Tax Cut and Managerial Stock Holdings on Firm's Dividend Policy. EFMA 2004 Basel Meetings Paper.
- Sinn, H.-W. (1987): *Capital income taxation and resource allocation*, North-Holland, Amsterdam.
- Slemrod, J. (1992): Do taxes matter? Lessons from the 1980's. *American Economic Review, Papers and Proceedings*, 82, 250-256.

Appendix 1 : The role of group definition

Shares of the firms that have switched the group (%)

	2000	2001	2002	2003	2004
1. Listed corporations the majority of shares owned by foreign or domestic institutional investors	5.1	6.5	8.1	6.7	2.1
2. Listed corporations with a large share of domestic ownership	8.6	8.7	6.5	3.0	7.1
3. Non-listed corporations with dividends taxed as earned income at the margin	7.4	4.3	8.8	3.4	8.2
4. Non-listed corporations with dividends taxed at the margin as capital income, maximum dividend payment below 90,000 euros	8.9	7.4	6.8	7.3	7.9
5. Non-listed corporations with dividends taxed at the margin as capital income, maximum dividend payment above 90,000 euros	9.9	8.4	14.2	14.9	11.8

Sensitivity analysis of estimation models in different definitions of corporate group number 5
Estimated models include the total control set.

Maximum dividend payment above		Initiation of Dividend Distribution				Tax Planning			
		coeff.	Robust z	$\partial y/\partial x$	Robust z	coeff.	Robust z	$\partial y/\partial x$	Robust z
70000€	Treatment03	1.007	(9.03)**	0.042	(6.45)**	4.963	(31.70)**	0.016	(16.61)**
	Treatment04	5.299	(68.31)**	0.184	(155.97)**	2.224	(8.25)**	0.001	(3.32)**
85000€*	Treatment03	1.693	(37.68)**	0.048	(25.13)**	3.317	(39.79)**	0.032	(12.07)**
	Treatment04	4.019	(47.21)**	0.115	(67.06)**	4.116	(30.76)**	0.088	(9.88)**
100000€	Treatment03	1.692	(38.60)**	0.044	(25.55)**	2.626	(34.89)**	0.056	(13.46)**
	Treatment04	3.587	(44.45)**	0.093	(60.40)**	3.311	(25.66)**	0.130	(9.74)**

Maximum dividend payment above		Dividend Responses		Weighted Investment Responses		Debt Responses	
		coeff.	Robust z	coeff.	Robust z	coeff.	Robust z
70000€	Treatment03	0.009	(3.55)**	-0.011	(1.41)	0.098	(17.42)**
	Treatment04	0.004	(1.52)	-0.019	(3.34)**	0.025	(5.24)**
85000€*	Treatment03	0.003	(3.18)**	-0.024	(0.17)	0.079	(37.98)**
	Treatment04	0.011	(5.93)**	0.014	(0.10)	0.042	(8.34)**
100000€	Treatment03	0.004	(4.20)**	0.007	(0.62)	0.076	(36.97)**
	Treatment04	0.016	(5.66)**	0.001	(0.03)	0.039	(6.98)**

* Used in the estimation results in the text

Appendix 2: Modelling the whole distribution by Tobit

Dividend responses in non-listed corporations (TOBIT)

	(1)	(2)	(3)	(4)
Dependent variable: Dividend/assets				
Treatment03	0.009 (27.12)**	0.008 (25.06)**	0.008 (24.87)**	0.008 (20.23)**
Treatment04	0.009 (7.16)**	0.009 (6.13)**	0.009 (6.12)**	0.008 (5.43)**
Profit/assets			0.067 (149.42)**	0.088 (149.59)**
ln(employment)				-0.002 (32.65)**
DUMMIES				
Group	yes	yes	yes	yes
Firm				
Year	yes	yes	yes	yes
Industry		yes	yes	yes
Location			yes	yes
Constant	-0.018 (69.46)**	0.019 (55.21)**	0.019 (53.87)**	0.015 (34.07)**
Obs.	499595	444913	441918	319905
R-squared	0.15	0.20	0.20	0.20
Robust t statistics in parentheses * significant at 5%; ** significant at 1%				

Appendix 3: Investment results in non-listed corporations using non-weighted regressions

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Investment/assets					
Treatment03	-0.007 (5.75)**	-0.002 (1.44)	-0.006 (4.45)**	-0.006 (4.57)**	-0.005 (3.44)**
Treatment04	-0.007 (3.01)**	-0.006 (2.11)*	-0.008 (2.80)**	-0.008 (2.83)**	-0.009 (2.98)**
Profit/assets			0.038 (8.61)**	0.039 (8.77)**	0.037 (7.85)**
Equity/debt			-0.001 (16.63)**	-0.001 (16.46)**	-0.001 (20.43)**
Growth rate			0.006 (8.24)**	0.006 (8.42)**	0.010 (10.96)**
ln(employment)					-0.010 (40.77)**
DUMMIES					
Group	yes	yes	yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.109 (103.06)**	0.096 (87.26)**	0.088 (67.63)**	0.092 (67.04)**	0.109 (67.86)**
Obs.	254297	254297	179349	179172	160805
R-squared	0.02	0.02	0.05	0.05	0.07
Robust t statistics in parentheses significant at 5%; ** significant at 1%					

CESifo Working Paper Series

for full list see www.cesifo-group.org/wp

(address: Poschingerstr. 5, 81679 Munich, Germany, office@cesifo.de)

- 2136 Xavier Freixas and Bruno M. Parigi, Banking Regulation and Prompt Corrective Action, November 2007
- 2137 Jan K. Brueckner, Partial Fiscal Decentralization, November 2007
- 2138 Silvia Console Battilana, Uncovered Power: External Agenda Setting, Sophisticated Voting, and Transnational Lobbying, November 2007
- 2139 Alan J. Auerbach, Michael P. Devereux and Helen Simpson, Taxing Corporate Income, November 2007
- 2140 Lorenzo Cappellari, Paolo Ghinetti and Gilberto Turati, On Time and Money Donations, November 2007
- 2141 Roel Beetsma and Heikki Oksanen, Pension Systems, Ageing and the Stability and Growth Pact, November 2007
- 2142 Hikaru Ogawa and David E. Wildasin, Think Locally, Act Locally: Spillovers, Spillbacks, and Efficient Decentralized Policymaking, November 2007
- 2143 Alessandro Cigno, A Theoretical Analysis of the Effects of Legislation on Marriage, Fertility, Domestic Division of Labour, and the Education of Children, November 2007
- 2144 Kai A. Konrad, Mobile Tax Base as a Global Common, November 2007
- 2145 Ola Kvaløy and Trond E. Olsen, The Rise of Individual Performance Pay, November 2007
- 2146 Guglielmo Maria Caporale, Yannis Georgellis, Nicholas Tsitsianis and Ya Ping Yin, Income and Happiness across Europe: Do Reference Values Matter?, November 2007
- 2147 Dan Anderberg, Tax Credits, Income Support and Partnership Decisions, November 2007
- 2148 Andreas Irmen and Rainer Klump, Factor Substitution, Income Distribution, and Growth in a Generalized Neoclassical Model, November 2007
- 2149 Lorenz Blume, Jens Müller and Stefan Voigt, The Economic Effects of Direct Democracy – A First Global Assessment, November 2007
- 2150 Axel Dreher, Pierre-Guillaume Méon and Friedrich Schneider, The Devil is in the Shadow – Do Institutions Affect Income and Productivity or only Official Income and Official Productivity?, November 2007

- 2151 Valentina Bosetti, Carlo Carraro, Emanuele Massetti and Massimo Tavoni, International Energy R&D Spillovers and the Economics of Greenhouse Gas Atmospheric Stabilization, November 2007
- 2152 Balázs Égert and Dubravko Mihaljek, Determinants of House Prices in Central and Eastern Europe, November 2007
- 2153 Christa Hainz and Hendrik Hakenes, The Politician and his Banker, November 2007
- 2154 Josef Falkinger, Distribution and Use of Knowledge under the “Laws of the Web”, December 2007
- 2155 Thorvaldur Gylfason and Eduard Hochreiter, Growing Apart? A Tale of Two Republics: Estonia and Georgia, December 2007
- 2156 Morris A. Davis and François Ortalo-Magné, Household Expenditures, Wages, Rents, December 2007
- 2157 Andreas Haufler and Christian Schulte, Merger Policy and Tax Competition, December 2007
- 2158 Marko Köthenbürger and Panu Poutvaara, Rent Taxation and its Intertemporal Welfare Effects in a Small Open Economy, December 2007
- 2159 Betsey Stevenson, Title IX and the Evolution of High School Sports, December 2007
- 2160 Stergios Skaperdas and Samarth Vaidya, Persuasion as a Contest, December 2007
- 2161 Morten Bønsnes and Christian Schultz, Arm’s Length Provision of Public Services, December 2007
- 2162 Bas Jacobs, Optimal Redistributive Tax and Education Policies in General Equilibrium, December 2007
- 2163 Christian Jaag, Christian Keuschnigg and Mirela Keuschnigg, Pension Reform, Retirement and Life-Cycle Unemployment, December 2007
- 2164 Dieter M. Urban, Terms of Trade, Catch-up, and Home Market Effect: The Example of Japan, December 2007
- 2165 Marcelo Resende and Rodrigo M. Zeidan, Lionel Robbins: A Methodological Reappraisal, December 2007
- 2166 Samuel Bentolila, Juan J. Dolado and Juan F. Jimeno, Does Immigration Affect the Phillips Curve? Some Evidence for Spain, December 2007
- 2167 Rainald Borck, Federalism, Fertility and Growth, December 2007
- 2168 Erkki Koskela and Jan König, Strategic Outsourcing, Profit Sharing and Equilibrium Unemployment, December 2007

- 2169 Egil Matsen and Øystein Thøgersen, Habit Formation, Strategic Extremism and Debt Policy, December 2007
- 2170 Torben M. Andersen and Allan Sørensen, Product Market Integration and Income Taxation: Distortions and Gains from Trade, December 2007
- 2171 J. Atsu Amegashie, American Idol: Should it be a Singing Contest or a Popularity Contest?, December 2007
- 2172 Patricia Apps and Ray Rees, Household Models: An Historical Perspective, December 2007
- 2173 Ben Greiner, Axel Ockenfels and Peter Werner, The Dynamic Interplay of Inequality and Trust – An Experimental Study, December 2007
- 2174 Michael Melvin and Magali Valero, The Dark Side of International Cross-Listing: Effects on Rival Firms at Home, December 2007
- 2175 Gebhard Flaig and Horst Rottmann, Labour Market Institutions and the Employment Intensity of Output Growth. An International Comparison, December 2007
- 2176 Alexander Chudik and M. Hashem Pesaran, Infinite Dimensional VARs and Factor Models, December 2007
- 2177 Christoph Moser and Axel Dreher, Do Markets Care about Central Bank Governor Changes? Evidence from Emerging Markets, December 2007
- 2178 Alessandra Sgobbi and Carlo Carraro, A Stochastic Multiple Players Multi-Issues Bargaining Model for the Piave River Basin, December 2007
- 2179 Christa Hainz, Creditor Passivity: The Effects of Bank Competition and Institutions on the Strategic Use of Bankruptcy Filings, December 2007
- 2180 Emilia Del Bono, Andrea Weber and Rudolf Winter-Ebmer, Clash of Career and Family: Fertility Decisions after Job Displacement, January 2008
- 2181 Harald Badinger and Peter Egger, Intra- and Inter-Industry Productivity Spillovers in OECD Manufacturing: A Spatial Econometric Perspective, January 2008
- 2182 María del Carmen Boado-Penas, Salvador Valdés-Prieto and Carlos Vidal-Meliá, the Actuarial Balance Sheet for Pay-As-You-Go Finance: Solvency Indicators for Spain and Sweden, January 2008
- 2183 Assar Lindbeck, Economic-Social Interaction in China, January 2008
- 2184 Pierre Dubois, Bruno Jullien and Thierry Magnac, Formal and Informal Risk Sharing in LDCs: Theory and Empirical Evidence, January 2008
- 2185 Roel M. W. J. Beetsma, Ward E. Romp and Siert J. Vos, Intergenerational Risk Sharing, Pensions and Endogenous Labor Supply in General Equilibrium, January 2008

- 2186 Lans Bovenberg and Coen Teulings, Rhineland Exit?, January 2008
- 2187 Wolfgang Leininger and Axel Ockenfels, The Penalty-Duel and Institutional Design: Is there a Neeskens-Effect?, January 2008
- 2188 Sándor Csengődi and Dieter M. Urban, Foreign Takeovers and Wage Dispersion in Hungary, January 2008
- 2189 Joerg Baten and Andreas Böhm, Trends of Children's Height and Parental Unemployment: A Large-Scale Anthropometric Study on Eastern Germany, 1994 – 2006, January 2008
- 2190 Chris van Klaveren, Bernard van Praag and Henriette Maassen van den Brink, A Public Good Version of the Collective Household Model: An Empirical Approach with an Application to British Household Data, January 2008
- 2191 Harry Garretsen and Jolanda Peeters, FDI and the Relevance of Spatial Linkages: Do third Country Effects Matter for Dutch FDI?, January 2008
- 2192 Jan Bouckaert, Hans Degryse and Theon van Dijk, Price Discrimination Bans on Dominant Firms, January 2008
- 2193 M. Hashem Pesaran, L. Vanessa Smith and Takashi Yamagata, Panel Unit Root Tests in the Presence of a Multifactor Error Structure, January 2008
- 2194 Tomer Blumkin, Bradley J. Ruffle and Yosef Ganun, Are Income and Consumption Taxes ever really Equivalent? Evidence from a Real-Effort Experiment with Real Goods, January 2008
- 2195 Mika Widgrén, The Impact of Council's Internal Decision-Making Rules on the Future EU, January 2008
- 2196 Antonis Adam, Margarita Katsimi and Thomas Moutos, Inequality and the Import Demand Function, January 2008
- 2197 Helmut Seitz, Democratic Participation and the Size of Regions: An Empirical Study Using Data on German Counties, January 2008
- 2198 Theresa Fahrenberger and Hans Gersbach, Minority Voting and Long-term Decisions, January 2008
- 2199 Chiara Dalle Nogare and Roberto Ricciuti, Term Limits: Do they really Affect Fiscal Policy Choices?, January 2008
- 2200 Andreas Bühn and Friedrich Schneider, MIMIC Models, Cointegration and Error Correction: An Application to the French Shadow Economy, January 2008
- 2201 Seppo Kari, Hanna Karikallio and Jukka Pirttilä, Anticipating Tax Change: Evidence from the Finnish Corporate Income Tax Reform of 2005, January 2008