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Dynamic Dividend Behaviour of Finnish Firms and Dividend Decision under Dual Income Taxation

Hanna Karikallio

Academic dissertation

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Abstract: The dissertation uses five essays to study the dividend policy of Finnish firms, the effect of dividend taxation on the financial decisions of firms, and the behavior of firms under the system of dual income taxes. In addition, the effects of the 2005 capital and corporate income tax reform on the dividend distribution and investments are evaluated. **The first essay** shows that dividend contains information to which the markets react. The dividend distribution of listed Finnish firms follows the famous Lintner model well. In non-listed firms the dividend decision is strictly based on profit development and investment opportunities. **The second essay** examines the effects of dividend taxation on firm's financial policy. It may be concluded that the better a group of firms with limited financial opportunities is isolated, the clearer support is given to the "new" view of dividend taxation. **The third essay** analyzes the dual income tax system from an efficiency perspective. We show that earned income dividend has been turned into capital income dividend with lighter taxation especially through investing more financial property to the firm. However, taxation has not distorted the optimal real capital stock of firms. **The fourth essay** examines the changes in firm decisions on dividend and investments in the years before the 2005 tax reform. According to the results, firms which anticipated dividend taxation to tighten increased dividend distribution to a statistically significant extent. Nevertheless, the increase in dividend is not accompanied by a decrease in investment activity; instead, the level of indebtedness in non-listed firms grew. **The fifth essay** studies the reactions of firms to the 2005 tax reform. According to the results, firm dividend was slightly decreased in those non-listed firms where dividend taxation was tightened. This may, however, be a short-term timing effect. Investments did not change.
Key words: *dividend, financing, dividend taxation, panel data*

Tiivistelmä: Väitöskirjassa tarkastellaan viidessä esseessä suomalaisten yritysten osinkopolitiikkaa, osinkoverotuksen vaikutusta yritysten rahoituspäätöksiin sekä yritysten käyttäytymistä eriytetyssä tuloverojärjestelmässä. Lisäksi arvioidaan vuoden 2005 yritys- ja pääomatuloverouudistuksen vaikutuksia osingonjakoon ja investointeihin. **Ensimmäisessä esseessä** tulokset osoittavat, että osingoilla on tietosisältöä, johon markkinat reagoivat. Pörssiyhtiöiden osingonjako seuraa hyvin kuuluisaa Lintnerin mallia. Pörssin ulkopuolisissa yrityksissä osinkopäätös on sen sijaan tiukasti sidottu tuloskehitykseen ja investointimahdollisuuksiin. **Toisessa esseessä** tarkastellaan osinkoverotuksen vaikutuksia yrityksen rahoituspolitiikkaan. Voidaan todeta, että mitä paremmin pystytään eristämään yritysjoukko, jonka rahoitusmahdollisuudet ovat rajalliset, sitä selvemmin osinkoverotuksen "uusi näkemys" saa tukea. **Kolmannessa esseessä** analysoidaan eriytettyä tuloverojärjestelmää tehokkuusnäkökulmasta. Osoitamme, että ansiotulo-osinkoja on muunnettu kevyemmin verottaviksi pääomatulo-osingoiksi erityisesti investoimalla yritykseen lisää finanssivarallisuutta. Verotus ei kuitenkaan ole vääristänyt yritysten optimaalista reaalipääomakantaa. **Neljännessä esseessä** tarkastellaan muutoksia yritysten osinko- ja investointipäätöksissä vuoden 2005 verouudistusta edeltävinä vuosina. Yritykset, jotka ennakoivat osinkoverotuksensa kiristyvän, lisäsivät osingonjakoaan tilastollisesti merkitsevällä tavalla. Osinkojen kasvuun ei kuitenkaan yhdisty investointiaktiivisuuden lasku; sen sijaan listaamattomilla yrityksillä on nähtävissä velkaantuneisuuden lisääntymistä. **Viidennessä esseessä** tarkastellaan yritysten reaktioita vuoden 2005 verouudistukseen. Tulosten mukaan yritysten osingot alenivat hieman enemmän niissä listaamattomissa osakeyhtiöissä, joiden osinkoverotus kiristyi. Kyseessä saattaa olla lyhyen aikavälin ajoitusvaikutus. Investoinnit eivät muuttuneet.
Asiasanat: *osingot, rahoitus, osinkoverotus, paneeliaineisto*

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Vantaa, August 2010

Hanna Karikallio

Yhteenveto

Väitöskirjassa tarkastellaan viidessä esseessä suomalaisten yritysten osinkopolitiikkaa ja siihen vaikuttavia tekijöitä, osinkoverotuksen vaikutusta yritysten rahoituspäätöksiin sekä erityisesti yritysten käyttäytymistä pohjoismaisessa eriytetyssä tuloverojärjestelmässä. Lisäksi arvioidaan Suomen vuoden 2005 yritys- ja pääomatuloverouudistuksen vaikutuksia yritysten osingonjakoon ja investointeihin. Johdantoluku pyrkii taustoittamaan ja motivoimaan tutkimuksen teemoja

Osingonjako on tärkeä osa yrityksen rahoituspolitiikkaa. Suomessa osinkojen merkitys yritysten voitonjakomuotona on viimeisen 15 vuoden aikana kasvanut huomattavasti. Suomalaisten yritysten osinkopolitiikkaa analysoidaan rahoitusteorioiden tarjoamien keskeisten tulosten valossa. Vastaavaa tarkastelua ei ole aikaisemmin Suomessa tehty laajalla yritysdatalla, joka sisältää kaikki yritykset mikroyrityksistä pörssiyhtiöihin. Tulokset osoittavat, että osingot eivät ole merkityksettömiä Suomen osakemarkkinoille: osingoilla on tietosisältöä, johon markkinat reagoivat. Suomalaisten pörssiyhtiöiden osingonjako seuraa hyvin kuuluisaa Lintnerin mallia. Tärkein osingonjakoon vaikuttava tekijä pörssiyhtiöissä on edellisen periodin osingot. Osinkoja tasataan yleisesti yli periodeiden. Lintnerin mallin tulokset osinkojen tasaamisesta eivät sen sijaan saa pörssin ulkopuolisissa yrityksissä kuin heikkoa tukea. Pörssin ulkopuolisissa yrityksissä – erityisesti mikroyrityksissä – osinkopäätös on tiukasti sidottu tuloskehitykseen ja investointimahdollisuuksiin. Rahoitusrajoitteet sitovat pienimpiä yrityksiä. Tutkimuksessa väitetään, että ristiriitaiset tulokset yritysten osingonjakokäyttäytymisestä johtuvat ainakin seuraavista kolmesta tekijästä: (1) yritysten erilaisesta markkina-asemasta ja markkinoiden reagoinnista osingonjakoon, (2) yrityksen omistusrakenteesta sekä (3) rajoitteista yrityksen mahdollisuuksissa hyödyntää ulkoisia rahoitusmarkkinoita. Tulokset tukevat myös staattisia verotukseen perustuvia omistajaryhmiä: yritykset sovittavat osinkopolitiikkansa vastaamaan omistajiensa veropreferenssejä. **(Essee 1)**

Investoinnit määrittävät keskeisellä tavalla talouden pitkäaikavälin kehitystä. Kansantaloudellisestikin merkittävä kysymys siis on, onko osinkoverotuksella vaikutusta yrityksen investointeihin. Osinkoverotuksen vaikutuksista yrityksen investointeihin, rahoitusmuodon valintaan ja arvoon on alan kirjallisuudessa erotettavissa karkeasti kolme eri näkemystä: perinteinen näkemys (”*traditional view*”), uusi näkemys (”*new view*”) ja verotuksen neutraalisuutta painottava näkemys (”*tax irrelevance view*”). Tutkimuksessa esitellään näkemysten taustalla oleva teoria sekä johtopäätökset. Kyseinen kolmijako on myös tutkimuksen empiirisen tarkastelun taustalla. Kysymykseen osinkoverotuksen vaikutuksista vastataan analysoimalla suomalaisten yritysten rahoituspolitiikkaa ja huomioimalla monia tekijöitä, mitkä saattavat tehdä osinkoveron vaikutuksesta erilaisen erilaisissa yrityksissä. Tulokset osoittavat, että useimmissa tapauksissa yritysten osingonjako- ja investointipäätöksillä on ”uuden näkemyksen” tulosten mukainen yhteys, mutta yhteyden voimakkuudessa on jopa suuria eroja yritysten välillä. Selvimmin ”uudelle näkemykselle” saadaan tukea yrityksistä, joilla ulkoisen vieraan pääoman ehtoisen rahoituksen saatavuus on oletettavasti rajattua ja kallista. Heikoiten ”uusi näkemys” saa tukea niiden yritysten rahoituspolitiikasta, joita eivät sido rahoitusrajoitteet ja joissa rahoituspäätökset voidaan tehdä joustavasti. Kaiken kaikkiaan tutkimuksessa tullaan siihen tulokseen, että yrityksillä on erilaiset mahdollisuudet ja halut reagoida osinkojen, osakeannin ja muiden rahoitustekijöiden kautta taloudessa tapahtuviin muutoksiin. Verotus ei ole ainoa ulkoinen tekijä, mikä saattaa ohjata yritysten rahoituspäätöksiä. Tästä syystä suoraan verotuksesta lähtevien vaikutusten empiirinen kuvaaminen on vaativaa. **(Essee 2)**

Pohjoismaisessa eriytetyssä tuloverojärjestelmässä pienyritysten osinkojen verotus on todettu ongelmalliseksi, koska siihen liittyy merkittäviä kannustinvaikutuksia. Tutkimuksessa analysoidaan Suomen eriytettyä tuloverojärjestelmää tehokkuusnäkökulmasta. Aikaisemmissa tutkimuksissa on korostettu erityisesti eriytetyn tuloverotuksen investointeja vääristäviä vaikutuksia. Järjestelmä luo kuitenkin myös merkittäviä kannustimia verosuunnitteluun. Empiiristä tutkimusta eriytetyn tuloverojärjestelmän osinkojen verokohtelun synnyttämistä käyttäytymisvaikutuksista on vain vähän saatavilla. Tutkimuksessa osoitetaankin myös empiirisesti verotuksen vaikuttaneen keskeisellä tavalla yritysten osingonjakoon ja myös muihin rahoituspäätöksiin. Tutkimuksen mukaan yrittäjä voi pyrkiä välttämään yritystoiminnasta saamaansa tuloon kohdistuvia veroja kahdella verosuunnittelustrategialla. Ensimmäinen strategia on ansiotulona verotettavasta osingonjaosta pidättäytyminen ja rahavarojen sijoittaminen ansiotulo-osingon sijaan rahoitusmarkkinoille. Toinen strategia on niin kutsuttu *”distribute-and-call-back policy”*: voittojen muuntaminen osakeannilla yrityksen uudeksi omaksi pääomaksi. Verotuksen ei kuitenkaan voida katsoa vääristäneen yritysten optimaalista reaalipääomakantaa, eli osingot eivät ole syrjäyttäneet investointeja mutta ovat saattaneet hidastaa reaali-investointien toteuttamista. **(Essee 3)**

Yritysverouudistusten arviointi on Suomessa ollut harvinaista. Vuoden 2005 yritys- ja pääomaverouudistus tarjoaa mielenkiintoiset puitteet empiiriselle osinkoverotutkimukselle. Hyödyntämällä verouudistuksen aiheuttamia käyttäytymismuutoksia saadaan lisätietoa osinkoveron vaikutuksista yrityksen rahoitukseen. Samalla myös sekä osallistutaan laajaan kansainväliseen verouudistusten vaikutuksia koskevaan keskusteluun että saadaan tärkeää tietoa tulevien verouudistusten suunnittelua varten.

Suomalaisten yritysten reagointia esityksiin osinkoverotuksen uudistamisesta selvitetään hyödyntämällä yrityspaneelia, joka kattaa kaikki suomalaiset osakeyhtiöt. Vuoden 2005 pääoma- ja yritysverouudistus tarjoaa hyödyllisen tilaisuuden analysoida ennakoimiskäyttäytymisen suuruutta, koska kyseiseen verouudistukseen liittyy eksogeenista vaihtelua veromuutoksen suuruudessa yritysten välillä. Estimointitulosten mukaan yritykset, jotka ennakoivat osinkoverotuksensa kiristyvän, lisäsivät osingonjakoaan tilastollisesti merkitsevällä tavalla. Osinkojen kasvuun ei kuitenkaan yhdisty investointiaktiivisuuden lasku; sen sijaan listaamattomilla yrityksillä on nähtävissä velkaantuneisuuden lisääntymistä. Lisäksi tulosten mukaan osingonjaon ajoituksen suunnittelu tasoittaa huomattavasti uudistuksella tavoiteltavaa osinkoverotulojen kasvua. **(Essee 4)**

Empiiriset, usein pörssiyhtiöaineistoilla tehdyt tutkimukset eivät ole toistaiseksi antaneet selkeää kuvaa siitä, miten osinkoverotus vaikuttaa yritysten voitonjakoon ja investointeihin. Suomen vuoden 2005 verouudistuksessa muutokset kohdentuivat eri tavoin eri yrityksiin ja siksi se tarjoaa hyvän lähtökohdan yritysten käyttäytymisreaktioiden mittaamiseen. Yritysten reaktioita osinkoverouudistukseen tarkastellaan laajalla paneeliaineistolla, joka koostuu pääosin listaamattomista yhtiöistä. Estimointitulosten mukaan yritysten osingot alenivat hieman enemmän niissä listaamattomissa osakeyhtiöissä, joiden osinkoverotus kiristyi. Kyseessä saattaa kuitenkin olla lyhyen aikavälin ajoitusvaikutus. Investoinnit eivät muuttuneet. Tulokset sopivat paremmin yhteen osinkoverotuksen ”uuden näkemyksen” kuin ”perinteisen näkemyksen” kanssa. Pörssiyhtiöitä koskevien tulosten mukaan osinkovero ei vaikuttanut yritysten osinko- ja investointipäätöksiin verouudistuksen tultua voimaan. **(Essee 5)**

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Introduction

1. Background of the study

This doctoral dissertation reviews the dividend policies of Finnish firms and the factors that influence it, the impact of dividend taxation on firms' financial decisions and particularly the behaviour of firms under the Nordic dual income taxation scheme. In addition, we make an assessment of the impacts of the corporate and capital income taxation reform of 2005 on firms' dividend payouts and investments.

The distribution of dividends is an important part of the financial policy of a firm. In Finland, the importance of dividends as a means of profit distribution has increased considerably over the last 15 years. The dividend policies of Finnish firms are analysed in light of the key findings of financial theories. Corresponding studies have not previously been conducted in Finland with extensive firm data including all enterprises from micro-enterprises to listed firms. **(Essay 1)**

Investments are a key determinant in the long-term development of the economy. Therefore, whether dividend taxation has an impact on corporate investment is also a significant question from the perspective of the national economy. In Finland, the impacts of dividend taxation on firms' financial decisions have not been studied empirically to any significant degree. This paper approaches the question by analysing the financial policies of Finnish firms and taking into account many factors that could make the impact of dividend taxation different for different firms. **(Essay 2)**

Under the Nordic dual income taxation system, the taxation of dividends from small corporations has been found problematic as it generates opportunities for tax planning. However, there is little available empirical research on the behavioural impacts of the tax treatment of dividends under the dual income taxation system. We rise to the challenge and show that taxation has had a key impact both on the distribution of dividends by firms and also on their other financial decisions. **(Essay 3)**

Corporate tax reforms have rarely been assessed in Finland. The corporate and capital income tax reform of 2005 provides an interesting framework for empirical dividend tax research. By analysing the behavioural changes caused by the tax reform, we gain additional information on the impacts of dividend taxation on the financing of a firm. At the same time, we also make a contribution to the extensive international discussion on the impacts of taxation reforms and provide important additional information for the planning of future tax reforms. **(Essays 4 and 5)**

The five essays in this doctoral dissertation discuss many issues relating to both corporate finance and the public finances. The introductory chapter aims to asset the background and present the motivation underlying the research themes.

2. Dividend payout behaviour of firms and impacts of taxation on dividend decisions

2.1. Financial theories and dividend policy

Dividends have historically been the most important means of profit distribution for a firm. The questions surrounding dividend payout are actually one of the most studied subjects within corporate finance. There are a number of theories explaining a firm's dividend policy. It is a topic that has also been subject to extensive empirical research. However, no single theory has surpassed the others, and empirical studies have failed to reach consistent findings. The word 'puzzle' is often used in describing the conclusions drawn in dividend studies. The debate surrounding the following questions has been ongoing now for more than half a century already. Why do firms distribute dividends? What factors influence a firm's dividend policy? Does dividend distribution have any effect on the market value of a firm?

Before Miller and Modigliani's (1961) pioneering theorem of the irrelevance of dividend payouts, economists generally believed that the more a firm distributes dividends, the higher is its value. Miller and Modigliani, however, showed that, in perfect capital markets, dividend policy has no impact on a firm's market value: the only relevant factor is the cash flows generated by investments. According to Miller and Modigliani, corporate decisions on investment and dividends are made separately, and the proportion of profits retained within a firm and the proportion distributed as dividends to shareholders have no impact on the market value of the firm. This finding lends itself to easy criticism: it is based on a number of simplifying assumptions. Distortions caused by taxation and other factors increasing the imperfectness of markets may make dividend payout a very crucial financial decision indeed, and one that also has an impact on the value of a firm.

The taxation of dividends can be considered to have at least two kinds of impacts. Firstly, if the taxation of dividends deviates from the taxation of retained earnings or other means of profit distribution, dividend payout policy becomes a factor influencing the value of a firm. It has been shown that investors' total return requirements increase as dividend yields increase if the taxation of dividends is harsher than the taxation of capital gains.[1] Secondly, there may be considerable differences in the marginal tax rates on dividend income received by investors. Therefore, investors have different preferences for dividend payout policies. The higher an investor's marginal tax rate, the more likely he will want the firm to reinvest its profits rather than distributing dividends. Shareholders with a high marginal tax rate are content with a lower rate of return on investment than shareholders with a low marginal tax rate. Abstaining from or postponing dividend payout may thus cause costs to a firm, the scale of which will depend on the shareholders' marginal tax rates.[2] As a consequence, firms following different dividend policies will form different '*clienteles*' (groups of shareholders). A change in dividend policy may result in changes in the structure of ownership.[3]

[1] Famous studies on the subject include at least Black and Scholes (1974), Brennan (1970), Farrar and Selwyn (1967), Friend and Puckett (1964) and Miller and Scholes (1978).
[2] Masulis and Trueman (1988).
[3] Studies on the clientele effect include Brennan (1970), Graham and Kumar (2006), Grinstein and Michaely (2006), Lasfer (1996) and Litzenberger and Ramaswamy (1979, 1980, 1982).

Financial markets are not imperfect solely because economic agents must pay taxes that have behavioural impacts. Asymmetric information, too, distorts the functioning of financial markets. Markets predict the income flows of a firm and based thereon calculate a market price for the firm. Market valuation is based on *observed* firm-specific income flows and financial factors. If corporate management so desires, it can have an impact on what kind of information shareholders and markets receive on their firm. Hence, management may send signals to the markets about expected earnings prospects if there are incentives for such signalling. Changes in the capital structure and dividends are the most common means for management to provide signals to the markets on the actual position and future prospects of a firm. Indeed, one of the benefits of dividends is their use as a means of signalling.[4]

Shareholders have a motive to monitor corporate management, since the management usually has more information on the situation of a firm than its owners do. Dividends can be seen as a means for the owners to monitor how the management is performing in their task of maximising the value of the firm. According to the free cash flow hypothesis[5], in the absence of other differences between firms, a firm paying out as dividends any profits it is unable to invest profitably is more valuable than a firm retaining corresponding profits within the firm. Although a large dividend payout involves the possibility the firm may have to resort to expensive external finance, it also constitutes closer monitoring of the activities of corporate management. Owners are able to delegate part of their monitoring task to other external financiers, which also means reduced agency costs to be borne by the owners.[6] Hence, dividends are considered to play a major role in reducing conflicts between corporate management and owners. It has been stated that differences in firms' payout ratios are largely explained by four factors: the firm's growth phase, size of insider

[4] Theoretical models are proposed e.g. by Allen, Bernando and Welch (2000), Bhattacharya (1979), John and Williams (1985), Miller and Rock (1985) and Ross (1977). Empirical findings supporting the signalling effect are meanwhile presented by Asquith and Mullins (1983), Nissim and Ziv (2001) and Petit (1972), and empirical findings against the signalling hypotheses by e.g. DeAngelo, DeAngelo and Skinner (1996), Grullon, Michaely, Benartzi and Thaler (2005) and Watts (1973).
[5] Jensen (1986). See also the empirical study by Lang and Litzenberg (1989).
[6] Literature on the principal-agent problem in the context of dividends is based on an article by Jensen and Meckling (1976).

group and heterogeneity of ownership, risks related to the firm and fluctuations in its income flows.[7]

As a conclusion, we can state that an optimal dividend policy is a trade-off between the benefits received from dividends and the related costs. Costs are caused, among other things, by stiffer taxation of dividends relative to capital gains, high costs for external finance and lost investment returns. On the other hand, the benefits of dividend distribution are based on, for example, an increase in the market value of the firm due to the signalling effect, lower agency costs and complementation of the markets, since shares offering different dividends provide variety for investors. Dividend policy should be designed so as to minimise the sum of costs related to capital, transaction and agency costs and taxation.

In his famous study, Lintner (1956) showed that the smoothing of dividends over periods was very common. The primary concern of firms is the stability of dividends, and new dividend decisions are always made relative to the previous payouts. Corporate management is usually very reluctant to make changes in dividends that they will have to revoke at a later stage. Therefore, only permanent changes in the earnings of the firm lead to a change in its dividend policy. Secondly, Lintner considered that the earnings of a firm are the most important external factor with an influence on its dividends. Usually firms have an observable fixed dividend target, which is, however, followed in a flexible manner. Rapid changes in profits are transferred slowly to dividends. According to Lintner, it is also possible to determine the speed at which a firm will adjust its dividend payout to the target level. Lintner's third conclusion was that a firm makes its dividend decision before other financial decisions. Other financial decisions are adjusted to the dividend payout decision. If a firm has ample profitable investment opportunities and internal finance is insufficient to cover both investments and dividends, the firm will resort to external finance.

Some of the key hypotheses and findings about the dividend payout behaviour of firms are presented briefly above. A review of dividends can be used to access the financial decision-making within a firm: it allows us to better understand the various factors guiding the financial decisions of

[7] Studies on the subject include Crutchley and Hansen (1989), Desai, Foley and Hines (2007), Easterbrook (1984), La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000), La Porta, Silanes and Shleifer (1999) and Rozeff (1982).

a firm and the connections between financial decisions. Knowing the dividend policy also helps us understand the relationship between a firm and its owners, and the role of the owners in the operation of the firm. As stated at the beginning, the findings of empirical studies on the factors influencing dividend payout by firms have been at times highly contradictory. A further review of the subject is needed.

When discussing dividends, we are dealing with significant amounts of money with economic impacts from the viewpoints of firm, investor and society as a whole. In the literature, the dividend policy of private firms has largely been ignored despite their importance to the economy. On the other hand, it is understandable that empirical dividend studies concentrate solely on listed firms, since a majority of the theories only apply to firms subject to public trading. By exploring factors that influence the dividends of Finnish firms, we can not only contribute to the extensive literature on the subject, but also provide new information on the dividend behaviour of small firms.

2.2. Impacts of dividend taxation on firms' financial decisions

Particular attention in dividend studies has been paid to the tax treatment of dividends and the resulting behavioural impacts. The tax system has often been identified as an important factor in a firm's financial decisions. Economists have worked hard to understand the incentive impacts of tax systems on firms' investment and financial decisions. Reviewing the impacts of taxation is important, especially since investments essentially determine the long-term growth and development of the economy; even small impacts from taxation accumulate and may ultimately have very strong impacts on employment, growth and wellbeing. With respect to the literature on the impacts of dividend taxation on corporate investments, selection of the form of finance and the value of a firm, we can make a rough distinction between three different views: the 'traditional' view, the 'new' view and the 'tax irrelevance' view.

The key assumption of the 'traditional' view is that shareholders benefit more from dividends than from appreciation in the value of their shares. Since shareholders want a firm to divide part of its profits as dividends, the firm is left with less earnings to finance investments.

Therefore, the marginal investments of the firm are financed by issuing shares. According to the 'traditional' view, dividend taxation increases a firm's investment costs and hence its fixed investments.

According to the 'new' view, firms minimising their user cost of equity capital finance their investments with profits instead of by issuing shares. In thus financing investments with retained earnings, they avoid dividend taxation. Dividend taxation has no adverse economic impacts, while a reduction in dividend taxation does not have an impact on the costs of marginal investment or distribution of profit.

According to the 'tax irrelevance' view, corporate tax only applies to pure profit from an investment and therefore has no impact on investments or cause deadweight loss. This outcome is produced under the assumption that interest expenses on debts are completely deductible, capital tax rates are harmonised and taxation is based on firms' actual profits. In this case, neither the taxes on the firm nor personal capital income taxes have any impact on the cost of capital or, by extension, on the investments of the firm. Due to the tax-deductibility of interest expenses on debt, the 'tax irrelevance' view considers that the use of debt is from a taxation point of view more favourable than equity as a form of finance for a firm, which will therefore finance all of its investments with debt.

Literature on the association of taxation and investments includes publications that are difficult to place, based on their findings, in any of the three basic views. The articles model more precisely taxation systems and account for different provisions in corporate law.[8] Particularly interesting are dynamic models accounting for the growth phase of a firm, the most famous probably being Sinn's (1991) 'nucleus theory of the firm'. The views have also been assessed empirically by testing the impacts of dividend taxation on firms' behaviour in investment and financial decisions. Challenges to empirical testing have been posed by both data restrictions and assumptions related to the models used.

[8] The theoretical discussion described is based on linear dividend taxation. Actual taxation schemes applied in practice may differ from this ideal model in many respects: they may involve non-linearity through progression, deductions and overlapping taxes. In addition, under non-linear dividend tax schemes, a firm's cost of capital may be dependent on dividend taxation even under the 'new' view assumptions. Lindhe, Södersten and Öberg (2004) and Hietala and Kari (2006) analyse such features of the Finnish dividend tax system.

If the impacts of dividend taxation on a firm's financial decisions are understood, dividend tax systems can be assessed more effectively. The views described above apply primarily to the classical corporate tax system. Classical corporate tax taxes income generated by a corporation twice: at the level of the firm and again at the level of the owners for dividend income and capital gains without granting compensation for the taxes already paid by the firm. Many an economist has claimed that this double taxation of corporate profits reduces firms' investment rate, therefore transferring capital to projects outside the corporate sector with lower expected returns. The wish to eradicate these disadvantages led to tax reforms at the turn of the 1960s and 1970s based on integration of the income taxation of limited firms and their owners. In many countries, it became accepted that income taxes paid by a limited firm are a form of withholding tax from the final taxes payable by the owners. This led for instance to the creation of the avoir fiscal system aimed at ensuring that a limited firm is taxed once only.

However, if the adverse behavioural impacts related to the classical corporate tax system are overestimated and the abolition of double taxation of corporate profits does not stimulate investments as expected (the 'traditional' view), the only consequence of relinquishing double taxation is a loss of government tax revenues. Therefore, empirical testing of the views creates significant support for economic and tax policy decision-making.

2.3. Findings on the impact of the tax reform on dividend payouts and other financial decisions

While the theoretical analysis of the impacts of dividend taxation on dividend and investment behaviour is well developed, there is still considerable uncertainty about the empirical magnitudes of these effects. Many studies have, nonetheless, successfully utilised tax policy reforms to examine the impacts of tax reforms on firms' policies. Taxation policy is an area of societal decision-making where reforms are frequently made. A majority of these are of a minor and technical nature, but each year also brings reforms that can be suspected of having significant impacts on the financial position and behaviour of the public. The impacts of tax reforms have been monitored very rarely in Finland, but the topic has been studied actively in many other countries. The most recent dividend taxation studies have drawn, for example, on the recent tax reforms in the United Kingdom and the United States, which have allowed the conceptualisation of a clearer link between taxation and corporate behaviour.

In the Tax Reform Act of 1986 (TRA) in the United States 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 realisation. Several studies argue that the TRA affected firms and that these adjusted their dividend payout ratios subsequent to the passage of the TRA.[9]

Based on experiences from the TRA, Slemrod (1992) proposes a three-tier hierarchy of behavioural responses to taxation, where the timing of tax payments is at the top (the greatest impact) and real behavioural changes are at the bottom. Secondly, anticipatory responses may be problematic from a policy-maker's point of view. They can reduce revenues and thus narrow the scope for efficiency-improving tax reforms. Anticipatory responses can also differ in sign and size from long-term effects, and this could conflict with the original goals of the reforms.[10] Thirdly, in order to estimate the true impacts of a tax reform, it is important to obtain an approximation of the extent to which the reform was anticipated. If this were not to be taken into account, we could mistakenly compare e.g. post-reform dividend levels to pre-reform values that are abnormally high because of anticipatory behaviour.

Korinek and Stiglitz (2008) analysed the dynamic effects of dividend taxation on macroeconomic variables, investments and output, using Sinn's nucleus model of capital-constrained firms. In their model, the arguments of the 'traditional' view apply in the initial phase and the 'new' view of dividend taxation applies in second and mature phases. Korinek and Stiglitz found that unanticipated dividend tax changes have only small effects on aggregate investments by firms in the second phase. An announced tax change will, on the other hand, induce firms to participate in intertemporal tax arbitrage through the timing of dividend payments. An anticipated tax hike increases distributions before the reform and may affect investments negatively both before and after the reform.

[9] Examples of studies of the TRA include Ben-Horim, Hochman and Palmon (1987), Bolster and Janjigian (1991) and Casey, Anderson, Mesak and Dickens (1999).
[10] Auerbach (1989) and Alvarez, Kanniainen, and Södersten, (1999).

Quantitatively, the effects may be substantial. Korinek and Stiglitz argue that short-term timing effects can have long-term real effects on the economy through the effect on cash holding in credit-constrained firms.

It is thus clear that, in addition to follow-up, it is also warranted to look at the anticipatory impacts of tax reforms. Although timing impacts are of a temporary nature, they have often been found to have significant weight.

In mid-2003, US tax rates on both dividends and capital gains were reduced for individual investors, thereby simplifying and greatly reducing the level of equity taxation (Jobs and Growth Tax Relief Reconciliation Act of 2003). Chetty and Saez (2005) conducted an analysis of the 2003 US dividend tax cut and established a causal link between the tax cut and increased dividend activity. They concluded that the tax cut led to increased dividend initiations and also found a rapid increase in dividend payments. They also reported that dividend increases were stronger among firms with high levels of accumulated assets and firms with strong owners.[11] As they argue in Chetty and Saez (2007), this is more in line with an agency cost model of dividend behaviour. They argue that the evidence on the US tax reform of 2003 is not easily compatible with either the 'traditional' view or the 'new' view.

Auerbach and Hassett (2007) also examined the US 2003 tax reform. They appear to be more in line with the 'new' view. They argue that temporary dividend tax changes[12] induce a timing effect in dividends and investments, thereby also affecting corporate behaviour under the 'new' view model. Auerbach and Hassett also find that the tax cut had a significantly positive effect on the share prices of high-dividend-paying stocks, which suggests that their marginal cost of equity finance was reduced. Such findings have often been interpreted as an indication that the dividend tax cut had a positive impact on aggregate investment.

Bond, Devereux and Klemm (2007) examine the impacts of the dividend tax change in the United Kingdom in 1997. They also find that the tax change led to a predictable change in the type of dividends but had limited impacts on the overall level of dividends and investments, thus supporting the 'new' view.

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[11] Examples of other studies of the US tax reform of 2003 include Blouin, Raedy and Shackelford (2004), Brown, Liang and Weisbenner (2004) and Nam, Wang and Zhang (2004).

[12] The 2003 reform is legislated to expire in 2009.

Studying the impacts of dividend taxation is important from the viewpoint of future tax reforms. For example, in Finland, there is active discussion at the moment about whether the gap between the tax rates on the highest levels of earned income and capital income should be narrowed. One way of doing this would be to increase dividend taxation. In this case, it is important to explore whether the tightening of dividend taxation reduces investment and what other kinds of impacts the reform would have on firms' behaviour.

3. Distribution of dividends by Finnish firms and behaviour of firms under dual income taxation

3.1. Descriptive review of dividend distribution by Finnish firms

The empirical reviews in all of the essays in this doctoral dissertation are based on the Government Institute for Economic Research's firm database, which holds data on Finnish taxable firms. The data used are comprehensive, in that they cover the whole population of Finnish firms. The data has been gathered by the Tax Administration on the basis of firms' tax returns. The database includes firms' financial statements and taxation details. It also includes a large set of data on owners. The points of interest in the studies of the dissertation are primarily the dividend policies of non-listed firms and factors with an influence on dividend decisions.

The following figures illustrate the development of dividend payouts in Finland in 1994–2006. The dividend payout information in the figures is classified according to listed and non-listed firms.

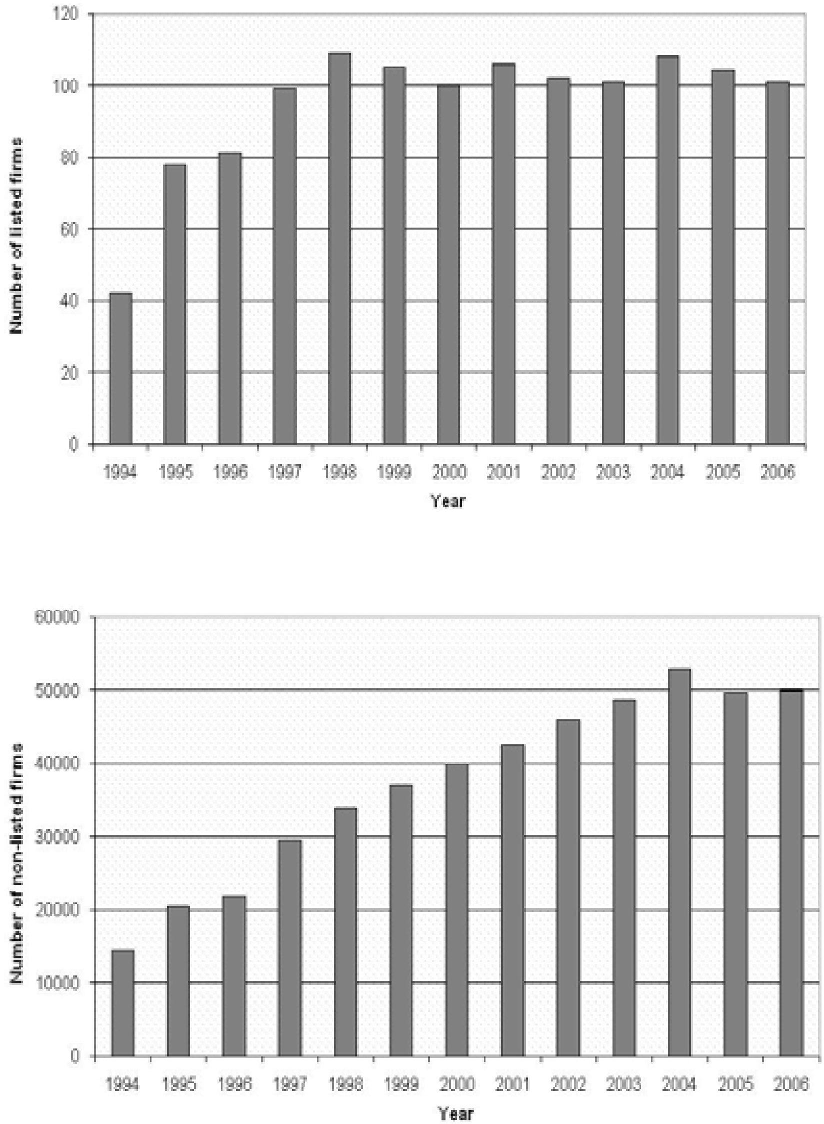
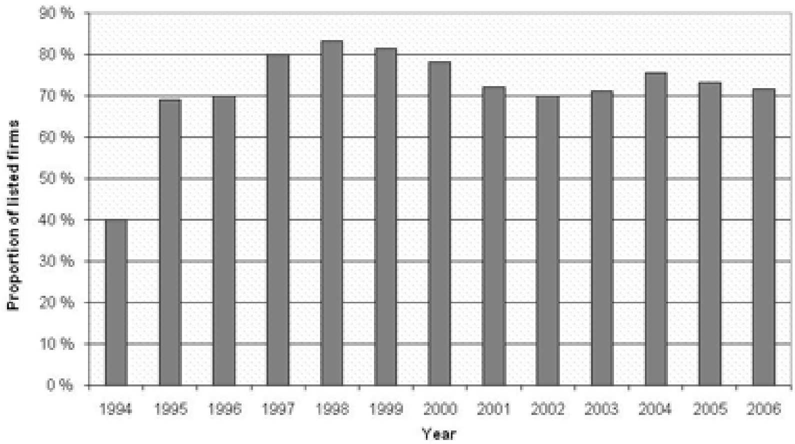


FIGURE 3.1: *Number of listed and non-listed firms paying dividends in 1994–2006.*



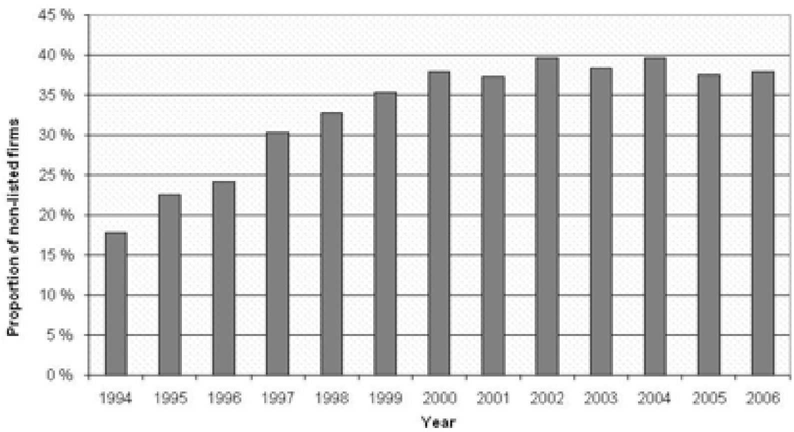


FIGURE 3.2: *Proportion of listed and non-listed firms paying dividends in 1994–2006.*

Based on figures 3.1 and 3.2, we can state that the number of non-listed firms distributing dividends in Finland has increased rather steadily in 1994–2006. In 1994, fewer than 15,000 non-listed firms paid dividends. In 2006, the number of non-listed firms distributing dividends was 50,000.[13] When accounting for the changes that occurred in the stock of firms, according to the data used the number of firms distributing dividends has more than doubled from 1994 to 2006. The development of the number of

[13] As later will be shown, tax reform in 2005 has affected the number of firms distributing dividends in years around the reform.

listed firms distributing dividends is more mixed in the period of 1994–2006.

There are many factors behind these developments, the most important being an improvement in the general economic situation, internationalisation of the equity market and the increased importance of foreign investors. As regards non-listed firms, the increased activity in dividend policies has been a consequence of the changes made in taxation at the beginning of 1990s favouring dividends as a means of profit distribution.

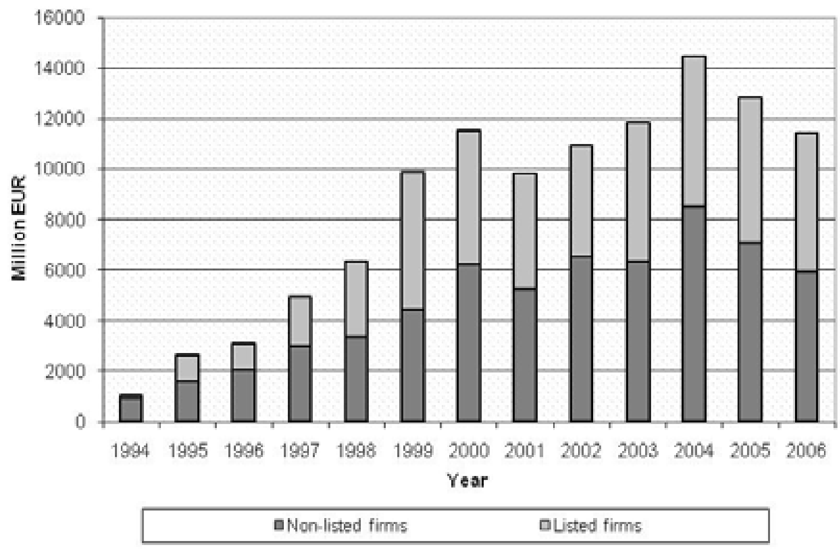


***FIGURE 3.3:** Dividends distributed (million EUR) 1994–2006.*

Figure 3.3 presents aggregate information on dividends paid in 1994–2006. In euro terms, too, dividends increased very clearly over that period. So far, the peak years have been 2000 and 2004. In 2004, a total of over 14 billion EUR was paid out in dividends in Finland.

Although listed firms make up only a fraction of the total number of firms, in terms of dividends distributed, they play a key role. Based on figure 3.3, in most of the years under review, almost half of the total dividends were paid by listed firms.[15]

[15] The data on listed firms for 1994 and 1995 is somewhat deficient, and the figures have been revised on the basis of listed firms' annual reports.

Figure 3.4 presents the average real dividends of listed and non-listed firms in 1994–2006.[14] The growth of average dividends distributed by listed firms has been very strong. In 2006, listed firms paid out an average of 55 million EUR in dividends, compared with less than 10 million EUR in 1994.

The average dividends of non-listed firms also increased substantially from 1994 to 2006. However, the growth was not as strong as with listed firms. In 2006, non-listed firms paid out an average of 147,000 EUR in dividends, compared with just 60,000 EUR in 1994. In the peak year 2004, non-listed firms paid out an average of 160,000 EUR in dividends.

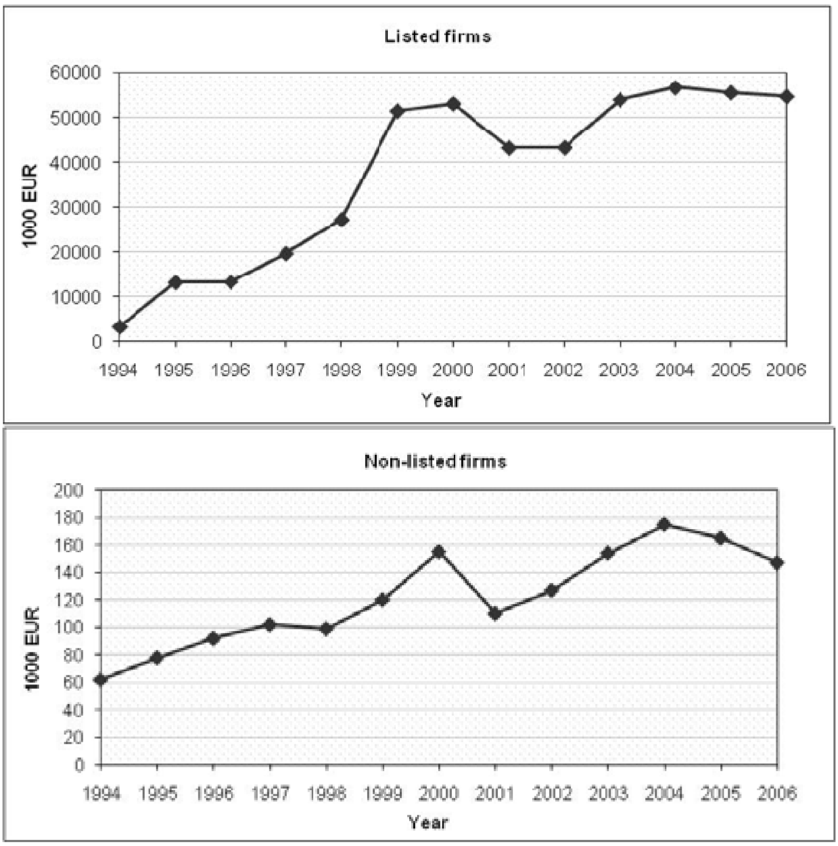


FIGURE 3.4: *Average dividends by listed and non-listed limited firms in 1994–2006.*

[14] Nominal dividends are deflated by the consumer price index.

Figure 3.5 reviews the average earnings per share and dividends per share in 1994–2006. We can deduce from the figure that the proportion of a non-listed firm's earnings devoted to dividends has increased fairly steadily over the review period. Since the turn of the millennium, dividends have taken on average over half of the profits made by non-listed firms. Furthermore, we can see that the variation in average dividends across the years reviewed follow changes in the average level of profits more closely in listed firms than in non-listed firms.

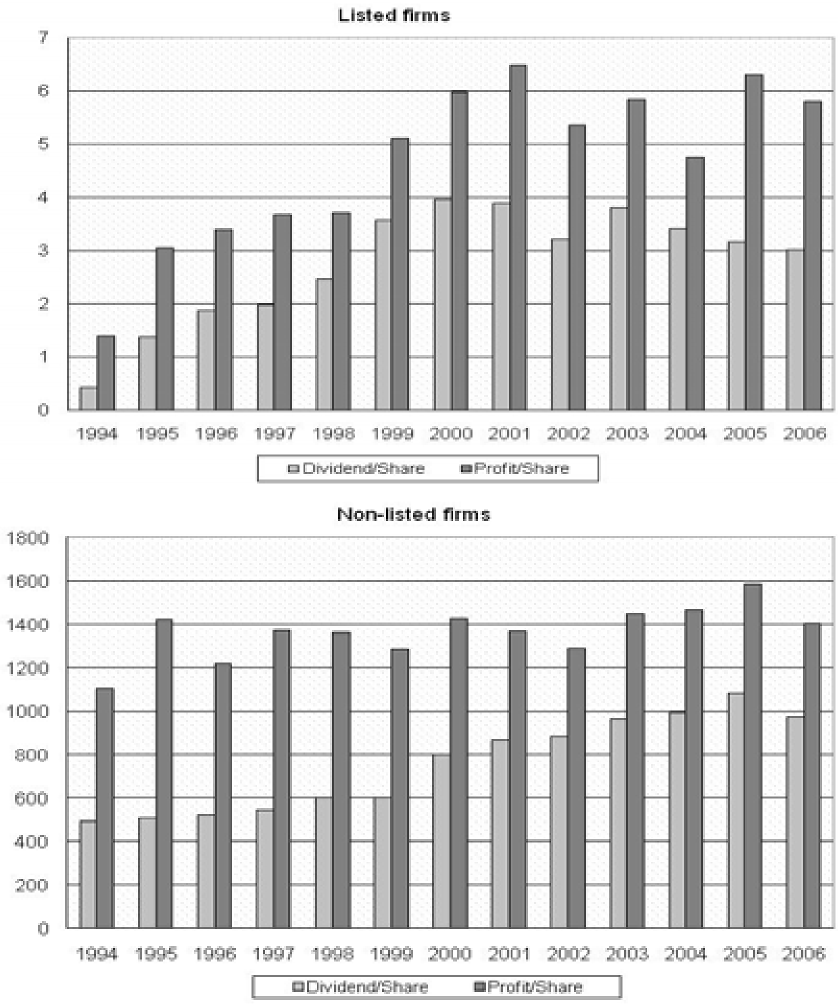


FIGURE 3.5: *Average earnings per share (EUR) and dividends per share (EUR) in 1994–2006.*

It can be postulated that after the tax reform at the beginning of the 1990s, non-listed firms shifted from planning the reported profit to planning the dividend payout. As dividend policy has become more active, dividend payout has also become an important component of the financial policy of Finnish non-listed firms.

3.2. Taxation of dividends in Finland

Starting point of Finnish corporate taxation

At the beginning of the 1990s, income tax reforms of general importance were made in the Nordic countries. The reforms largely followed the tax reform discussions in OECD countries in the 1980s, which were related to a considerable easing of the taxation of capital income and expansion of the tax base. The objective was to improve the efficiency of capital allocation, promote neutrality in investment and financial decisions and reduce the steering influence of the taxation system. The immediate drivers of the reforms were international economic integration and the liberalisation of capital movements.

A special characteristic of the Nordic reforms was the adoption of a model based on differentiated income taxation. Under such dual income taxation, income is divided into earned income and capital income, the earned income being taxed on a progressive scale and capital income and corporate income with a proportional tax rate.[15] The background motivation was the need to ensure the uniformity of capital income taxation and at the same time the international sustainability of the system. In Finland, dual income taxation has been applied in practice since 1993 (in Sweden since 1991 and in Norway since 1992).[16] Another

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[15] Sørensen (1998).

[16] The idea of the taxation model emanated at the beginning of the 1990s from Denmark which, however, did not adopt a pure system of dual income taxation. The Danish taxation model is characterised as a hybrid system including features of both integrated and differentiated taxation systems. At the beginning of the present decade, countries outside the Nordic countries, including Germany, Switzerland, Austria, Italy and the Netherlands, also adopted characteristics of the dual income taxation system into their income taxation, but the taxation of capital income is not completely uniform as in the Nordic countries.

significant tax reform from the perspective of corporate taxation had entered into force a few years earlier, in 1990, when dividend taxation moved from a system of dividend deductions into an avoir fiscal system.

International tax competition has generally forced an expansion of the tax base and reduction of tax rates. The background to the corporate and capital tax reform that entered into force in Finland at the beginning of 2005 was formed primarily by the intensified tax competition in Europe at the time and the pressures generated by the low tax rates of new EU member states. In addition, the Finnish avoir fiscal tax scheme had been considered illegitimate from perspective of EC law and had to be abolished. The apparent tax exemption of dividends distributed by listed firms can also be seen as one of the background factors: a significant form of income tax not being taxed. This reform lowered tax rates and renewed the taxation of dividends.

The Finnish dividend taxation system before the corporate and capital income tax reform of 2005

Before the corporate and capital income tax reform that entered into force at the beginning of 2005, the taxation of dividends in Finland was based on dual income taxation and an avoir fiscal system. The avoir fiscal system linked the taxation of a limited firm and its owners in connection with the distribution of dividends. Under the Finnish avoir fiscal system, taxes paid by the firm on profits distributed were credited entirely in the owner's taxation. The dividend and the related corporate tax credit were taxed as the dividend recipient's income. If dividend income was taxed entirely as capital income, the shareholder paid no taxes on the dividends received, since the tax rate on capital income was the same as the corporate tax rate. The imputation system did not generally apply to foreigners, who may had to pay an additional withholding tax of up to 29%, depending on the tax treaty between Finland and the country of residence of the foreign investor. Domestic nontaxable institutions such as mutual funds and nonprofit foundations did also not receive the imputation tax credit, as they did not pay taxes.

Before the corporate and capital income tax reform that entered into force at the beginning of 2005, dividends received from a listed firm were taxed entirely as capital income. Since dividends from listed firms were also granted the avoir fiscal credit, they were in practice tax free for domestic taxed investors. Dividends from other firms and related avoir fiscal credits were considered capital income up to an amount corresponding to the annual return on the mathematical value of the shares as determined in the Finnish Net Wealth Tax Act. The imputed return rate from 1999 onwards was 13.5%.[17] When dividends distributed corresponded to a return of 9.585% on the net wealth, they were taxed entirely as capital income (the avoir fiscal credit in 2000–2004 was 29/71 of the dividend distributed).[18] Dividends exceeding the capital income limit were taxed progressively as earned income.

The basis for calculating the proportion of capital income in Finland is a net model based on the net wealth of a firm. Net wealth comprises financial assets, inventories, fixed assets and such long-term liabilities as have an asset value. The value of financial assets, inventories and fixed assets is usually defined as the non-depreciated acquisition cost. The net model has typically been considered to favour equity and encourage investments under the name of a firm.[19]

The distribution of dividends by a firm is limited only by the confirmed balance sheet of the previous financial year. The amount of profit or loss for the period does not necessarily matter, as dividends can also be distributed for loss-making financial periods if the firm has distributable equity.

Characteristics of Finland's present dividend tax system

The dividend tax reform of 2005 included two main characteristics: reduction of the corporate income tax rate from 29% to 26% and the capital income tax rate from 29% to 28%. Thus, these tax rates were differentiated. Another significant characteristic of the reform was the

[17] Before 1999, the imputed rate of return was 15%. On the other hand, at that time, dividends to be distributed were first deducted from net wealth before determining the mathematical value of the shares.

[18] The capital income proportion of dividends from a foreign firm or firm subject to public trading other than a listed firm was calculated on the basis of fair value at the end of the previous fiscal year.

[19] For example, in Norway a gross model is used in which the capital comprises the total assets of the firm and the numerator is the earnings of the firm before deduction of interest expenses (gross earnings). Under a gross model, the tax treatment of equity and debt as means of financing investments is neutral. See Kari (2002).

abolition of the avoir fiscal system and the introduction of partial double taxation of dividends.

The tax treatment of dividends still makes a distinction based on whether the dividend is distributed by a listed or non-listed firm. Listed firms include all firms listed, whether on the main list or on other lists of the stock exchange. 70% of dividends distributed by a listed firm are considered as taxable capital income of the recipient. As the tax rate on capital income is 28%, the dividend income is subject to a tax burden of 19.6% in the dividend recipient's taxation. Therefore, the combined tax burden on profits distributed by a listed firm is 40.5%. The tax reform thus meant a considerable tightening of taxation of dividends distributed by listed firms, since in 2004, for example, the total tax burden on distribution of profits was 29%.

Dividends received from firms other than listed firms are tax-free to the recipient insofar as they fall below a 9% rate of return on the net wealth of the firm paying the dividend. Hence, the basis is still the net wealth of the firm paying the dividend. Furthermore, tax-free dividends are subject to a personal maximum amount of 90,000 EUR per fiscal year. This is a significant change from the old system, under which dividends could in effect be tax-free due to the avoir fiscal credit without any maximum limit.

Under the avoir fiscal scheme, dividends received from abroad were subject to harsher taxation than domestic dividends. Under the present system, the discrimination in respect of international dividends, which was problematic from the perspective of EC law, has been eliminated, since dividends from EU countries and tax treaty countries are now comparable to domestic dividends.

3.3. Behavioural impacts of dividend taxation

A working group of the Ministry of Finance that assessed the functionality of the dual income tax system in 2002 considered it a successful solution. The most significant strength of the system was considered to be its uniform treatment of capital income. Capital income and corporate taxation based on a broad tax base were considered a functional and transparent system that was equipped to meet the increasing demands of international tax competition.

It has been postulated that the dual income tax system may achieve neutrality in the taxation of capital income and thus prevent inefficient allocation of capital. Uniform taxation does not affect investment decisions and therefore capital is allocated in the most efficient manner from an economic perspective. The uniform tax treatment of capital income was also believed to bring symmetry between deductibility and taxability of income. However, there remains a lack of neutrality between the taxation of earned income and capital income. Lighter taxation of capital is supported by the free movement of capital and consequent tax competition between countries. On the other hand, inflation tightens the taxation of capital income. Labour income, in contrast, is better protected against changes in the value of money.[20]

The taxation of entrepreneurs has become the biggest challenge for the dual taxation system. Income received by entrepreneurs from a firm consists partly of compensation for labour input and partly of return on capital invested in the firm. With respect to a firm's earnings, it is difficult to assess how large a proportion should be considered labour compensation and how large a proportion return on investment (Sørensen, 1998). In the Nordic dual income tax system, the division is made on an imputed basis based on the assets of the firm.

In comparison to other firm forms, the advantage of a limited firm is that profits can be retained within the firm, or the entrepreneur may choose to distribute profits as dividends or wages to the shareholders. In other organizational forms, the profit of the firm is taxed in each fiscal year to the full in the taxation of the owner-entrepreneur as capital income and earned income (Kukkonen and Kari, 2003). Non-listed firms were able to restrict the payment of dividends at the limit of the capital income share, whereby dividends were not taxed at all as earned income. Subject to certain assumptions, it is therefore optimal for a limited firm to distribute dividends amounting to the maximum amount of the capital income share but to refrain from paying dividends taxed as earned income. The incentive for tax planning was high, particularly for entrepreneurs with high marginal tax rates on earned income.

[20] Sørensen (1998) defends the dual income tax system from the perspective of equitability and efficiency in comparison to a broad income tax and an expenditure tax.

Arguably the main structural problems in the differentiated income taxation system are the large gap between the highest marginal tax rates on earned income and the capital income tax rate as well as the mechanical division of limited firms' business income and dividends into earned income and capital income. The large difference between the tax rates is considered problematic from the perspectives of both the equitability of the tax system and also tax evasion. The amount of taxes paid by a tax subject does not depend solely on their total income but also on the distribution of income between capital and earned income. This creates a foundation for tax arbitrage, since the owners of small firms, in particular, can reduce their taxes if they are able to convert their earned income into capital income.[21]

A great deal of interest has been attached to the impacts of differentiated income taxation on corporate investment behaviour, financial decisions, the status of different firm forms and entrepreneurship.[22] Firms' tax-based investment incentives are due to the distribution model of the differentiated income taxation scheme. When the capital income share is calculated on the basis of the net wealth of a firm, an incentive emerges to the shareholder to invest more net-wealth-generating assets in the firm. It has been calculated that in Finland, at the highest marginal tax rates, the investment incentive is very significant. In contrast, taxation will dampen investments if the tax rate on earned income is lower than the tax rate on capital income. Tax-based incentives depend significantly on the marginal tax rate on the entrepreneur's earned income. Due to taxation, the cost of capital varies across firms. Therefore, taxation biases the allocation of investments in the economy.[23]

Behavioural impacts of the dual income tax scheme in the Nordic countries have been studied mostly on a theoretical level. There is still little empirical research on the impacts of the dual taxation system on firm

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[21] Conversion of income under a dual taxation system has been studied by Pirttilä and Selin (2006). According to their findings, after the 1993 tax reform, entrepreneurs' capital income increased significantly. In contrast, entrepreneurs' total income did not show statistically significant growth. There was no significant increase in the capital income received by other taxpayers.

[22] For example, Kari (1999), Lindhe, Södersten and Öberg (2002), Hietala and Kari (2006), Kanniainen, Kari and Ylä-Liedenpohja (2007). For a discussion of the impact of taxation on the choice of firm form, see Alstadsæter (2007) and Lindhe, Södersten and Öberg (2004). Selection of the means of profit distribution under a dual taxation system has been studied empirically by Fjaerli and Lund (2001).

[23] See Kari (1999).

behaviour, although the system has aroused substantial interest internationally.

In planning the corporate and capital income tax reform that entered into force in 2005, proposals by a working group of the Ministry of Finance on reducing the difference between the marginal tax rates on earned income and the capital income tax rate concentrated on reducing the highest marginal tax rates and tightening the taxation of dividends.

It has been calculated that the tax reform tightened the taxation of dividends for low-income firms with net debt. The tax burden on large firms paying high dividends also increased. However, for a majority of firms, taxation did not change or was eased slightly from the situation prior to the reform.[24]

The tax reform presumably reduced the attractiveness of dividends at the domestic level. This applies particularly to listed firms. It has been calculated that the reform in many cases strengthened the incentive for entrepreneurs to retain profits in the firm by lowering the return requirement on investments using internal finance. The cost of capital remained low for Finnish non-listed firms. The steering influence of income taxation on dividend payout was probably strengthened by the reform. However, changes in taxation do not seem to have affected investments by listed firms in Finland to any significant degree, since natural persons resident in Finland play only a small role in their ownership.

In Finland – and also the other Nordic countries – the follow-up on the tax reform has not so far been very intensive. By analysing the change in the tax burden on dividends due to the tax reform, however, we can obtain reliable information on the impact of taxation on a firm's financial decisions. The Finnish dividend tax reform of 2005 provides a rich foundation for empirical research, since it contains exogenous variation in terms of tax rate changes among different firms. Since the 2005 tax reform was planned for an extensive period, it is likely that it also generated anticipatory effects. As detailed earlier, it is important to account for anticipatory effects in reviewing the impacts of a tax reform. In addition to the behavioural changes stemming from the reform itself, exploration of the anticipatory effects provides additional insights into the impact of taxation on firm behaviour.

[24] See Hietala, Kari, Rauhanen and Ulvinen (2004).

3.4. Dividend distribution versus share repurchase

Share repurchase, along with dividend distribution, is a primary way to distribute retained profits to shareholders. When companies repurchase their own shares, they decrease the number of outstanding stock available, which increases the earnings per share and theoretically increases the stock value.

It has been empirically noticed that in the USA among firms traded on organized exchanges, the proportion of dividend-paying firms has been steadily declining. Most firms have initiated their cash payment to shareholders in the form of repurchases rather than dividends. (Fama and French, 2001.)

Should corporations pay their shareholders through dividends or by repurchasing their shares? Jagannathan, Stephens and Weisbach (2000) list as non-mutually exclusive factors for the choice between dividends and share repurchases the following: (1) asymmetric information, (2) taxes, and (3) stock options. First, asymmetric information can lead to signaling not only concerning the general level of the company performance, but also more specifically about the relative permanence of the cash flows. Second, taxes are a significant determinant of share repurchases activity. Tax effects have influenced firms to use more repurchases in the USA. However, the tax advantages of share repurchases in the USA were largely reduced with the tax reforms in 1986 and 2003. Third, employee/executive stock options have been suggested as a reason for firms preferring share repurchases. Stock options could influence payout decisions for two reasons. Dividend payments reduce the stock price on the ex-dividend date, and thus the option value. Alternatively, share repurchases can be used to fund executive options by counteracting the dilution of the stock price otherwise caused by option exercises. However, empirical findings regarding the relation between these characteristics and the choice between dividends and repurchases remain mixed (Jagannathan, Stephens and Weisbach, 2000).

In Finland, share repurchases were allowed in the amendments to the Company Act in 1997, and by 2005, the share of repurchases of total payout had risen to 15%. The most common way for Finnish companies to buy their own stock is open-market share repurchase in which a stockbroker is commissioned to buy corporations shares from daily trading. Share repurchases are governed by many rules both in the

Company Act and the rules of the Helsinki Stock Exchange. The shares can be repurchased through open-market repurchases in amounts not seriously affecting the normal trading volumes of the stock. Allowed amount for own shares owned by a company increased from five to ten percent in 2005. The shares can be bought only using free equity, i.e. proceedings that could also alternatively be paid out as dividends. (Tomperi, 2005.)

The choice between dividends and repurchases depends very much on tax reasons. Before the latest tax reform, a full imputation system allowed corporate tax deductions from dividends and hence, the effective tax rate of dividends became zero percent while the effective tax rate for capital gains was 29%. Nowadays, imputation system has been eliminated and all capital gains are taxed with rate of 28%. Instead, 30% of dividends are tax-free which gives dividends an effective tax rate of 19.6%. From the domestic shareholders point of view, benefits from dividends compared to capital gains narrowed to 8.4% from preceding 29%. Foreign owners are likely to prefer share repurchases to dividends because they mostly suffer from an additional source tax on dividends. Taxes thus influence the payout policy preferences of these two investor categories in a different way.

The financial behavior of the Finnish firms changed after the tax reform in 2005. Finnish listed companies have gone forward with their share repurchase programs. The increased popularity of share repurchases over dividends can be explained by the changes in tax treatment of dividends and capital gains. Korkeamäki, Liljeblom and Pasternack (2009) found a significant increase in share repurchases after the reform. Earlier empirical results for the Finnish market (Liljeblom and Pasternack, 2006) showed that foreign ownership seems to be the single most important explanatory variable for share repurchases in Finland.

4. Summaries of the papers

4.1. ESSAY 1: Determinants of dividend policy in Finland

This paper presents a review of dividend theories and their conclusions about the factors that influence dividend payouts by firms.

The empirical part of this work uses panel data to explore the factors affecting dividend decisions by Finnish firms in 1994–2004. The analyses are based on the findings of the dividend theories presented. A key point of departure for the empirical examination is to test the explanatory power of Lintner's model in regard to dividend distribution by Finnish firms. Another empirically reviewed factor is the significance of a firm's financial performance and growth phase in its dividend payout decisions.

The empirical results indicate it is hard to find financial factors other than the dividends of previous periods and profitability variables that would show a statistically significant association with dividend distribution by listed firms. One explanation for this is that dividend distribution by Finnish listed firms complies well with Lintner's model. The dividend payout decision is particularly affected by the size of dividends paid in the previous period. In other words, listed firms primarily seek stable dividend distribution.

We also find that listed firms' dividends are negatively associated with the presence of large block holdings and the leverage of the firm. These results are consistent with the predictions of the agency cost explanation of dividends. Both block holdings and leverage can perform as substitutes for dividend payouts as a mechanism of corporate governance. All in all, according to the research findings, agency costs and asymmetric information have a significant impact on the dividend policies of listed firms.

Thus, based on our findings, we can state that dividends are not irrelevant for the stock markets in Finland: they have information content the market responds to. Dividends are also a tool used by minor shareholders to control the activities of corporate management. In Finland, minor shareholders have rights, and they use these effectively in monitoring firm management. This argument is supported in the findings by the fact that diversification of ownership is associated with higher dividends.

In contrast, the dividends issued by private (non-listed) firms – micro-enterprises in particular – are closely linked to their profit performance: dividend decisions in small firms are sensitive to both positive and negative earnings shocks. Dividend distribution in the previous period has a considerably smaller impact on dividend payouts by non-listed firms than by listed firms. Thus, Lintner's model on the smoothing of dividends derives only weak support from non-listed firms.

In micro-firms, where ownership is more concentrated and agency problems largely irrelevant, we observe relatively higher dividend payout rates and greater sensitivity of dividends to earnings and investment opportunities. Furthermore, based on our results, the smallest firms are bound by financial constraints.

Significant differences in the association of dividend payout with other corporate financial decisions between firms of different size lend support to the life-cycle model of the firm in non-listed firms. We suggest there can be found a transition phase in which a non-listed firm's investment opportunities start shrinking, its growth begins to slow, capital expenditures decline and the firm starts generating larger amounts of free cash flows. These are increasingly directed to shareholders in the form of dividend payments.

We find that ownership is one of the important variables that influence dividend payout policies: in every corporate group, institutional and foreign ownership are related to lower dividend payouts, whereas the proportion of domestic ownership has a clear positive connection with the dividends distributed by a firm. While individual shareholders may prefer dividends because of the tax advantages, we find evidence that foreign and institutional ownership have a negative impact on dividend payouts. We provide supportive evidence for the static tax clientele model that firms adjust dividend policy to fit the tax preference of their investors.

In the paper, we argue that the contradictory results on firms' dividend distribution behaviour are the consequence of at least the following three factors: (1) firms' different market positions and market responses to dividend payouts, (2) the different ownership structures of different firms (3) limitations in the opportunities of some firms to make use of external financial markets and (4) growth phase and investment opportunities of the firm.

4.2. ESSAY 2: Taxes and firms' financial decisions: some evidence from a Finnish corporate panel

This paper considers the impacts of dividend taxation on the financial policy of a firm. With respect to the literature on the impacts of dividend taxation on corporate investments, the selection of the form of finance and the value of a firm, a rough distinction can be made between three different views: the 'traditional' view, the 'new' view and the 'tax irrelevance' view. This paper presents the theory behind these views and their conclusions. There is no general consensus about which of the three views best describes the behaviour of a firm in the relevant financial decisions. Neither do empirical studies provide a unanimous answer. This paper discusses the arguments and presents research findings for and against the different views.

The paper estimates the association of dividends with investment decisions and income flows by controlling simultaneously for the financial development of the firm (value and amount of debt). If the results show that these relations are significant, this can be considered as empirical support for the 'new' view in Finland. The study also takes into account that, for firms in different financial positions, these connections – and thus the impacts of dividend taxation – may be different. In addition, the paper reviews the significance of share issues as a form of finance in a firm's financial policy. The 'traditional' view maintains that, as the marginal source of finance for investments, share issues play an important role in firm finance. The 'traditional' view receives empirical support if share issue finance has a stronger association with investments than the cash flows generated by investments. In this case, it can be considered that investments are the factor that steer the utilisation of share issues in a firm's financial policy.

The results show that the 'new' view does not unambiguously describe the impacts of dividend taxation on the financial decisions by Finnish firms. In most cases, dividend and investment decisions have an association in line with the findings of the 'new' view, but there are sometimes major differences between firms in the strength of the connection. The clearest support for the 'new' view comes from firms that are assumed to have less external finance available and at higher cost. The weakest support is seen in the financial policies of firms that are not bound by financial restrictions and can make financial decisions in a flexible manner.

Based on the results of models on the probability of share issuance, we can state that the probability of share issue funding is most significantly influenced by a firm's ability to use internally generated cash financing. Hence, share issues may be considered one financing alternative and decisions concerning their utilisation are made in consideration with other available forms of finance. In principle, the result can be interpreted as contradictory to the assumptions of the 'traditional' view. In addition, we observed that share issue finance is used in obtaining external finance equally frequently both in firms with high solvency and in firms with weak solvency. One reason why the constraint related to the availability of external debt capital is not shown in the results on the use of share issue finance may be the incentive from the Finnish taxation system to employ equity finance.

Finally, empirical analyses delineate, in terms of both solvency and probability of share issuance, the category of firms for which the availability of finance in external financial markets is most probably tightly constrained and, on the other hand, the category which most probably has access to many alternative forms of finance. As a summary of the results, we can state that the better the category of firms with limited financing opportunities can be isolated, the better support is found for the 'new' view in the financial policy of the Finnish corporate sector. However, we cannot state that the findings of the 'new' view could not be valid for solvent firms with good financing opportunities. Rather, for such firms, the findings of the 'new' view are difficult to prove with the review method used. Furthermore, it can be argued that interpretations of the 'new' view about the impacts of dividend taxation on investment and financing decisions by firms include very demanding assumptions and results for which it is hard to find empirical support applicable to the entire corporate sector.

All in all, the paper arrives at the conclusion that firms have different opportunities and capacities to respond, through dividends, share issues and other financial decisions, to changes occurring in the economy. Taxation is not the only factor that may steer firms' financial decisions. Therefore, it is difficult to describe empirically any impacts directly emanating from taxation.

4.3. ESSAY 3: Tax treatment of dividends and capital gains and the dividend decision under dual income tax

This paper analyses the taxation of closely held firms (CHC) under the variant of dual income tax applied in Finland since 1993. More formally, the paper analyses efficiency aspects of a dual income tax system with a higher tax on capital gains than dividends. The tax literature suggests that the relative tax burden on distributed and retained profits is important for dividend and financing decisions. The paper centres on tax planning, especially on how dividends and financial investments should be arranged to maximise after-tax income in the long run. It argues that apart from the distortions to investments claimed in earlier literature, the system puts even more emphasis on creating incentives for entrepreneurs to participate in tax planning.

The paper suggests that the owner of a closely held firm can avoid all personal taxes on entrepreneurial income by two tax-planning strategies. The first is the avoidance of distributions, which would be taxed at the tax rate on labour income. These funds would instead be invested in the financial markets. Taxation thus induces the firm to postpone distributions because of the high tax rate on earned income and instead invest these funds in the financial markets. Through these financial investments, the firm increases its net assets and transforms excess dividends into more leniently taxed future normal dividends. The second strategy is a distribute-and-call-back policy (Sinn 1987). The firm's retained profits are transformed into new equity capital and thus capital gains tax is not paid on the increase in the firm's equity value. As a result of these two strategies, the entrepreneur never pays personal taxes on dividends.

The paper presents a formal analysis of the financial behaviour of a CHC under the Finnish system of dual income tax. In the theoretical part, a standard deterministic corporate tax model is used (Auerbach 1979; Sinn 1987), augmented here by financial capital. The modelling of the Finnish system closely follows Kari (1999) and Lindhe, Södersten and Öberg (2002). The firm's optimal policy is analysed not only in the long-run equilibrium, but also in the adjustment phase. Interestingly, the outcome is that investment in real capital is not distorted in the long-run equilibrium.

Empirical evidence based on tax return data supports the hypothesis concerning the effects on dividend policy as well as the effect on financial investment. In particular, the data gives strong support to the hypothesis that it is optimal for a firm to distribute the maximum normal dividends. A significant proportion of dividend-paying firms pursue exactly this type of policy. The empirical part also provides evidence that firms increase their capital base by investing in financial assets and simultaneously distribute dividends to an amount corresponding to the maximum normal dividends. However, the data only lightly supports the hypothesis concerning the tax-induced distribute-and-call-back policy.

The paper provides a useful contribution to the debate on design issues in a dual income tax system. The policy conclusion remains ambiguous, however. There seems to be a trade-off between efficiency aspects and adverse effects on tax revenue due to income shifting.

4.4. ESSAY 4: Anticipating tax changes: evidence from the Finnish corporate income tax reform of 2005

Using register-based panel data covering all Finnish firms in 1999–2004, we examine how firms anticipated the 2005 dividend tax increase via changes in their dividend and investment policies.

Although timing impacts are of a temporary nature, they have often been found to have significant weight. From the viewpoint of economic policy, anticipatory effects are a difficult phenomenon. They reduce tax revenues and generate inefficiency. This hampers the carrying out of reforms and hence the adjustment of public finances to changes in the operating environment. Knowledge of anticipatory effects is also important in assessing the behavioural changes occurring after a reform has come into effect.

The Finnish capital and corporate income tax reform of 2005 provides a useful opportunity to measure anticipatory behaviour, since it 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 therefore opens up a promising avenue for empirical work.

The hypotheses tested in this paper are based on a categorisation of firms according to factors that can be considered to have an impact on the expected change in the tax treatment of dividends. For listed firms, such a factor is the ownership structure; for non-listed firms there is also the issue of the size of dividends distributed.

The basic idea of the empirical approach used *(differences-in-differences)* is to compare the changes in dividends, investments and debt in the treatment and control groups (a group whose dividend taxation was tightened and a group whose dividend taxation remained unchanged) in 1994–2004, while at the same time accounting for differences between the firms in terms of e.g. profitability, financial position and employment. If firms respond anticipatorily to the tax reform, dividends should increase relative to the control group in 2003 and 2004 in those groups subject to the threat of increasing dividend taxation as of 2005.

The paper gives separate consideration to extensive and intensive effects. By extensive effects, we mean either that a firm that has not previously distributed dividends begins to distribute dividends, or that a non-listed firm increases its dividends to the maximum amount of dividends taxed as capital income. The estimation results measuring extensive effects indicate that distribution of dividends increased after the publication of the tax reform proposal. Both in 2003 and 2004, the number of firms distributing dividends increased by 6–7% depending on the model specification. According to extensive models concerning tax planning, the effect was shown to be minor in 2003, but in 2004 the probability of distributing dividends amounting to the maximum amount taxed as capital income rose to 60%.

In the intensive models explaining the size of dividend payouts, anticipatory behaviour by non-listed firms was shown to be strong. Non-listed firms preparing for tightening dividend taxation increased their dividends by around 13% in 2003 and around 62% in 2004.

Listed firms also increased their dividends significantly before the reform came into effect. Firms anticipating a tightening of dividend taxation substantially increased their dividend payouts in 2003. According to the estimation results, the average marginal impact in firms responding to the tightening of dividend taxation in 2003 was around 56%.

Since both non-listed firms and listed firms prepared for the tightening of dividend tax by raising dividends, we can assume that anticipatory behaviour also had an impact on the government's dividend tax revenues. According to our calculations, anticipatory behaviour reduced the expected growth in dividend tax receipts by 31%, assuming that all tax revenue losses are shown immediately after a reform comes into effect.

The impacts of an expected tightening of dividend taxation and larger dividends can be most notably transmitted to a firm's other financial decisions directly through the budget constraint: in addition to a reduction in investments, extra dividends may force firms to resort to external finance. The estimation results show that investments did not respond to the expected tightening of dividend tax in non-listed firms or in listed firms. However, the debt capital of non-listed firms did increase as they anticipated the tightening of dividend tax. Thus, some of the increased dividend payout related to anticipatory behaviour was financed by increased borrowing. A similar increase in debt capital is not observable in listed firms anticipating a tightening in the dividend tax.

4.5. ESSAY 5: The Impact of Dividend Taxation on Dividends and Investment: New Evidence Based on a Natural Experiment

This paper reviews the impacts of the corporate and capital income tax reform of 2005 on firms' dividend payouts and investments based on extensive corporate data. The paper attempts to respond to the challenge of a follow-up assessment of tax reform.

The key issue in the tax reform of 2005 is that it had different impacts on different firms depending on e.g. whether a firm is listed or not, what its ownership structure is and how much it distributes in dividends. This variation can be seen as a test setting in which behavioural changes sparked by the reform could be identified by comparing changes between firms falling into different categories.

The objective is to estimate the impact of the tightening of dividend tax on a firm's dividend payouts and investments. The hypotheses tested are based on a categorisation of firms according to whether the estimates of the impacts of the reform based on the 'traditional' and 'new' views differ with respect to a firm's cost of capital and hence also its financial decisions.

With respect to non-listed firms, the views differ only where dividends paid by the firm and taxable as capital income exceed the amount of tax-free dividends, 90,000 EUR.[25] According to the 'traditional' view, the tax reform will increase the cost of capital for these firms and hence have a negative impact on investments. According to the 'new' view, the tax reform will have no impact on the cost of capital even for non-listed firms, and will therefore also have no impact on their investments or other financial decisions. In analysing the impacts of tightening dividend tax on non-listed firms, the treatment group established by methods of experimental research consists of firms paying dividends taxable as capital income in excess of the 90,000 EUR limit. The remaining firms make up the control group.

With respect to listed firms, the tax reform increased the dividend tax burden on firms with a significant degree of ownership by domestic households. In contrast, the tax burden on listed firms under foreign or institutional ownership was not changed. According to the 'traditional' view, a heightened dividend tax rate will increase a firm's cost of capital and reduce its investments in proportion to the ownership share of domestic households. According to the 'new' view, the tightening of dividend taxation will have no impact on investments or other financial decisions by listed firms owned by domestic households. In analysing the behavioural impacts on listed firms, the firms are not divided into treatment and control groups. Instead, we employ a continuous variable on the proportional ownership by domestic households.

The impacts of the tax reform of 2005 are estimated by the differences-in-differences method. In addition, firms in the test and control groups are rendered as similar as possible by the use of the differences-in-differences matching method. The situation before the reform is based on the average for the years 2000–2002, which is compared against the situation after the reform, in 2006. By this choice, we ensure that anticipatory effects do not distort the estimation results.

According to the estimation results, the total amount of dividends was reduced when the dependent variable was the change of the logarithm of dividends. Based on the matching models, the average reduction of dividends was considerable, roughly 40%. Thus, dividends do clearly

[25] See Hietala and Kari (2005).

respond to changes in dividend taxes. The results on the impacts of dividend taxes on the real investments of non-listed firms show that investments are relatively inelastic and do not, at least immediately, respond to a tax change. The estimation results do not unambiguously establish that changes in investments would be larger in firms subject to a change in dividend taxation. Therefore, with respect to investments, the results lend more support to the 'new' view of the impacts of dividend taxation.

According to the results on listed firms, dividend tax had no impact on the firms' dividend and investment decisions after the tax reform entered into force. This result can be interpreted as meaning that taxation has only a minor influence on listed firms' financial decisions in the short term. However, it is possible that the impacts of a tax increase may materialise only later, rather than immediately following a reform.

5. Key findings

Finance

Our results show that dividends are not irrelevant to the Finnish equity market: dividends have information content the market responds to. In their dividend decisions, firms seek to anticipate the market impacts of dividend payouts. In addition, agency costs and asymmetric information have a significant effect on the dividend policies of listed firms.

Dividend distribution by Finnish listed firms complies well with Lintner's model. The most important factor affecting dividends in a listed firm is the dividend for the previous period. Dividends are generally smoothed over periods.

In contrast, the results of Lintner's model on the smoothing of dividends derive only weak support from non-listed firms. In respect of micro-enterprises, in which ownership is more concentrated and agency problems are largely irrelevant, we observe a sensitivity of dividends to earnings and investment opportunities.

We provide supportive evidence for the static tax clientele model according to which firms adjust their dividend policies to fit the tax preferences of their investors.

We argue that the contradictory results on firms' dividend distribution behaviour are the consequence of at least the following four factors: (1) firms' different market positions and market responses to dividend payouts, (2) the different ownership structures of different firms (3) limitations in the opportunities of some firms to make use of external financial markets and (4) growth phase and investment opportunities of the firm.

Taxation

After the tax reform of the early 1990s, dividends have become by far the most important means of profit distribution for firms. One reason for this has been the favourable tax treatment of dividends.

Due to the avoir fiscal scheme, the effective tax rate on dividends taxable as capital income was zero before the tax reform of 2005. This created a very significant incentive for firms to distribute dividends amounting to the proportion taxable as capital income. We show that a significant proportion of firms distributing dividends paid dividends corresponding exactly to that amount.

Dividend taxation creates an incentive for firms to invest more net wealth in the firm. We prove that earned-income dividends have been converted into capital-income dividends particularly by investing more financial wealth into the firm. Although there is considerable instability in dividend payouts by non-listed firms, they seek to ensure that dividends distributed are always taxed entirely as the recipient's capital income.

The favourable tax treatment of dividends has also prodded firms with profitable investment opportunities to distribute dividends. It is possible that the growth phase of firms has been protracted due to the dividend taxation regime. However, we cannot say that taxation has distorted firms' optimal real capital stock, meaning that dividends have not superseded investment but may have slowed the implementation of real investment.

Our research results show that the 'new' view on the impacts of dividend taxation describes best – albeit not unambiguously – the behaviour of Finnish firms.

The reform of 2005 led to a significant timing impact on dividends to the effect that dividends were increased significantly before the tightening of dividend taxation. In addition, the number of firms distributing dividends increased. The anticipatory effects are not seen in firms' investments but are evident in a growth of indebtedness among non-listed firms. Due to tax planning, the government lost part of the tax revenues sought through the tightening of dividend taxation.

The tightening of dividend taxation that came into effect in 2005 was not reflected in a cutback in investment in 2005 and 2006. In contrast, the dividends distributed by firms faced with higher dividend taxation decreased somewhat in those years. The results lend further support to the 'new' view on the impacts of dividend taxation on a firm's financial decisions. However, timing effects somewhat hamper analysis of the actual impacts.

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ESSAY 1

Determinants of Dividend Policy in Finland

1. Introduction

Distribution of dividends is one of a firm's most important financial decisions. The dividends it decides to distribute reduce the amount of equity available, thereby affecting both the firm's possibilities to use internal finance and also its growth opportunities. In many studies have been postulated that the dividend decision is influenced, among other things, by a firm's investment opportunities, its capital structure, the availability and price of external finance and the dividend preferences of its owners.

It has also been strongly suggested that dividend policy is anything but irrelevant to shareholders and markets. The questions surrounding dividend payout are actually one of the most studied subjects within corporate finance. There are a number of theories explaining a firm's dividend policy. It is a topic that has also been subject to extensive empirical research. However, no single theory has surpassed the others, and empirical studies have failed to reach consistent findings. The word 'puzzle' is often used in describing the conclusions drawn in dividend studies. Debate surrounding the following questions has been ongoing for decades: Why do firms distribute dividends? What factors influence a firm's dividend policy? Does dividend distribution have any effect on the value of a firm?

The most famous – and in many respects contradictory – findings on dividend distribution are Miller and Modigliani's theorem on the irrelevance of dividends and Lintner's dividend policy model. Miller and Modigliani (1961) posited that, in a perfect and complete capital market, a firm's payout policy is not related to its value. On the other hand, Lintner (1956) documented that firms pay a large proportion of their earnings as dividend and tend to smooth the dividend payment over time in order to retain a certain payout level.

Other popular explanations for dividend behaviour come from theories predicated on information asymmetry, agency problems or tax reasons. The rationale behind signalling theories (for example Bhattacharya, 1979; Miller and Rock, 1985) is that the markets do not provide shareholders with information that corresponds to the information the management has on the firm's financial position and prospects. Under asymmetric information, dividends are used as a signal to convey information about future profitability. In contrast, agency theories (for example Jensen and Meckling, 1976; Easterbrook, 1984) are based on the idea that the incentives of the management and shareholders of a firm diverge to at least some extent. Agency theories suggest that dividends are a means to mitigate perquisite consumption or other value-destroying activities by management. In tax clientele models (for example Miller and Modigliani, 1961), investors apply an investment strategy adapted to the tax regime and choose the stocks that would minimize their tax liabilities. When the tax environment changes, the clientele model predicts that either the firms will adjust their dividend policy to match the tax preference of the investors or there will be a change in ownership.

Allen and Michaely (2002) summarize that there are five imperfections in the capital market that can influence a firm's dividend policy: taxes, asymmetric information, incomplete contracts, institutional constraints and transaction costs. Chapter 2 provides a review of dividend theories and their conclusions concerning the factors affecting distribution of dividends by firms.

The empirical part of this work, Chapter 3, looks into the factors affecting dividend decisions by Finnish firms in 1994–2004. The analyses are based on the conclusions of dividend theories concerning the factors affecting dividend payout. A total of 9 hypotheses are derived from the dividend theories for empirical testing. A key point of departure for the empirical examination is testing the explanatory power of Lintner's model in regard to dividend distribution by Finnish firms. Another empirically reviewed factor is the significance of a firm's financial performance and growth phase in its dividend payout decisions. Hypotheses motivated by agency problems and asymmetric information are also tested. Finally, the tax asymmetry between domestic, institutional and foreign investors provides an interesting background for studying tax clientele effects in dividend decisions.

The empirical analysis compares the dividend policies of listed firms with those of non-listed firms in Finland. We provide an insight into the dividend policy of small private firms, which have largely been ignored in literature despite their importance to the economy. Firms are divided into three groups: listed firms, small and medium-sized firms and micro-firms. It is interesting to explore how dividend policies differ between these groups of firms and whether different factors can be found that explain dividend decisions by firms in different market positions.

Our results show that listed and non-listed firms emphasise different factors in their dividend decisions. Scrutiny by the public capital market induces public firms to smooth dividends according to Lintner's model. In contrast, dividend decisions by non-listed firms – micro-firms in particular – are closely linked to profit performance: the dividend decisions in micro-firms are sensitive to both positive and negative earnings shocks.

The arguments for asymmetric information and agency costs are also supported by our review of dividend distribution by Finnish listed firms. Based on our findings, dividends are not irrelevant for the stock markets in Finland: dividends have information content the market responds to. Firms seek to take the market effects into account in their dividend decisions. However, dividends not only serve to increase information on the stock markets; our findings suggest they are also a means for minor shareholders to control the activities of the management. In dividend decisions by non-listed firms, asymmetric information and the principal-agent problem are irrelevant. The most likely reason for this is that the owners commonly participate in the operation of the firm. In extreme cases, the owner and the manager are the same person.

All in all, the results indicate that the dividend policies of listed firms show the most similarity with the dividend payout behaviour suggested by Lintner's model: listed firms smooth dividends over periods in an attempt to reach a fixed dividend payout target in the long term. In contrast to the dividend payout behaviour of listed firms, distribution of dividends by micro-firms follows – at least loosely speaking – more closely Miller and Modigliani's theorem of the irrelevance of dividends: dividend payout in these firms is largely a unique financial decision closely linked to the firm's other financial decisions.

The results also show that a high proportion of domestic households among a firm's shareholders is associated positively with the dividends distributed across all groups of firms studied. One explanation for this is the lighter taxation of individual dividend income relative to the taxation of capital gains. The tax burden on dividends received by the different types of owners studied (households, foreign owners and institutions) is different, and, in tax terms, dividend income received by Finnish households has much the most favourable position. This result provides supportive evidence for the static tax clientele model whereby firms adjust dividend policies to fit the tax preferences of their investors.

2. Framework for the review of dividend policy

2.1. Financial theories and a firm's dividend policy

Theorem of the irrelevance of dividend payouts

Before Miller and Modigliani's pioneering study concerning the impact of dividend policy on a firm's market value, economists generally believed that the more a firm distributes dividends, the higher is its value. The rationale behind this viewpoint is that the value of a share is calculated by discounting future dividends in the present. Although investments would likely increase future dividends, the shareholders' required return (i.e. the discount rate) also rises at the same time, eliminating the impact of higher future dividends on the value of the share. The higher discount rate is a result of risks related to investments. The models by Walter (1956) and Gordon (1959, 1962 and 1966) provide examples of this type of reasoning.

Modigliani and Miller revolutionized corporate finance. The Modigliani-Miller Theorem provides conditions under which a firm's financial decisions do not affect its value. The theorem is commonly regarded as a *benchmark* outcome in studies on corporate finance. On the whole, the

Modigliani-Miller Theorem comprises four distinct results from a series of papers (1958, 1961 and 1963).[26]

Miller and Modigliani (1961) showed that, in perfect capital markets, dividend policy has no impact on a firm's value: the only relevant factor is the cash flows generated by investments. Miller and Modigliani postulated that the value of a share is the same after the financial decision and dividend payout as it was before. The need for external finance fully levels the impact of dividend payout on the value of the share.[27] If external

[26] The first proposition establishes that, under certain conditions, a corporation's debt-equity ratio does not affect its value. The second proposition establishes that a corporation's leverage has no effect on its weighted average cost of capital (i.e. the cost of equity capital is a linear function of the debt-equity ratio). The third proposition establishes that a corporation's value is independent of its dividend policy. The fourth proposition establishes that equity holders are indifferent about the corporation's financial policy.

[27] The point of departure of Miller and Modigliani's theory: Assuming perfect markets, rationally behaving investors and perfect information and certainty, the price of each share is determined so that total return (dividend and capital gain) is equal in size for the shares of every firm subject to trading in any given period. Thus, the value of the share at the beginning of the period is the present value of the sum of the value at the end of the period and the dividends paid during the period, or

$$p_j(t) = [d_j(t) + p_j(t+1)] / [1 + \rho(t)],$$

where $p_j(t)$ = share price of corporation j at the beginning of period t
$d_j(t)$ = dividend paid on the share by corporation j in period t
ρ = interest, the market rate of return (constant).

The equation holds true for every corporation j in all periods t. Hence, the sub-index j can be overlooked in the examination. In period t the number of shares outstanding is $n(t)$. The term $m(t+1)$ indicates new shares sold in period t at price $p(t+1)$, or

$$V(t) = [D(t) + n(t)p(t+1)] / [1 + \rho(t)],$$
$$= [D(t) + V(t+1) - m(t+1)p(t+1)] / [1 + \rho(t)],$$

where $V(t) = n(t)p(t)$= value of the corporation at the beginning of period t
$D(t) = n(t)d(t)$ = total dividends paid to shareholders in period t.

Hence, the value of shares at the beginning of period t equals the present value of the sum of dividends paid in period t and the value of shares at the beginning of period $t+1$, minus the present value of new shares. According to Miller and Modigliani's theory, net profit $X(t)$ and new share issue correspond to the funds needed for investments $I(t)$ and dividends. The value of new external finance needed, i.e. new shares issued, is therefore

$$m(t+1)\ p(t+1) = I(t) – [X(t) – D(t)],$$

By combining the equations, Miller and Modigliani eliminate the term $D(t)$:

finance is disregarded, the outcome can also be expressed so that a higher dividend payout ratio leads to lower undistributed profits and thus also lower capital gains. As a conclusion, we can state that, according to Miller and Modigliani's theorem, neither present nor future dividend payout decisions have an impact on shareholders' wealth. The only relevant factor is the firm's expected cash flows, which are solely affected by the investment policy of the firm. According to the theorem, firms diverging from each other only in dividend policy have the same market value.

The theorem does not suggest that firms do not distribute dividends. It only explains the irrelevance of dividends as a factor affecting the value of the firm. There are certain very strong assumptions underlying Miller and Modigliani's theorem. Firstly, it assumes perfect capital markets, and it disregards taxes, transaction costs and asymmetric information. Secondly, investment decisions are assumed to be independent of dividend decisions. Thirdly, dividend policy is considered not to have any influence on shareholders' required return on investment.

A completely opposite outcome from Miller and Modigliani's theorem was reached in Gordon (1963) and Lintner's (1962) bird-in-the-hand theory, which is referred to in many dividend studies. Gordon and Lintner assume that dividend policy has an influence on shareholders' return requirements. According to their theory, when a dividend payout is reduced, the required return on equity increases because investors associate higher uncertainty and risk with future dividends and capital gains in comparison to dividends available immediately. Dividends *('a bird in the hand')* are better than retained earnings *('a bird in the bush')* because the latter might never materialise as future dividends (i.e. they could *'fly away'*). Whereas Miller and Modigliani consider dividend policy irrelevant, Gordon and Lintner regard high dividends as the best policy recommendation. However, the outcome leaves room for criticism. The firm's risks equal the risks of its projects and the risks of related expected

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$$V(t) \equiv n(t)p(t) = [(V(t+1) - I(t) + X(t)] / [1 + \rho(t)].$$

Since D_1 does not appear directly in the equation and because $X(t)$, $I(t)$, $V(t+1)$ and $\rho(t)$ are independent of dividends, Miller and Modigliani stated that the value of the corporation is completely independent of the amount of dividends that it has decided to distribute.

income flows, and the distribution of dividend does not increase the firm's market share by reducing the riskiness of its income flows.

Taxation

Miller and Modigliani have not taken income taxation into account in their dividend irrelevance theorem. Many studies have proposed that taxation of dividends – particularly if it differs from taxation of capital gains – makes dividends a factor that affects a firm's value. If the starting point is a neoclassical profit-maximizing firm, the best form of profit distribution from the shareholder's point of view is the one subject to the lowest taxation. When the tax rate on capital gains is lower than the tax rate on dividend income, the firm should transfer profits to the shareholders in the form of capital gains (e.g. by buying back its own shares) and refrain from paying dividends, perhaps altogether. For example, Farrar and Selwyn (1967)[28] and Brennan (1970)[29] reviewed the

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[28] A model of partial equilibrium in which the shareholder maximizes after-tax income.
Farrar and Selwyn (1967): If a corporation employs dividends as its sole means of profit distribution, the shareholder receives after-tax income from the corporation as follows:

$$Y_d = [X - rL_c(1 - \tau_c) - rL_i](1 - \tau_{di}),$$

where Y_d = dividend payable to shareholder i based on the corporation's profit
X = corporation's profit
r = interest rate, which is equal for the corporation and the shareholder
L_c = corporation's debt
L_i = shareholder i's personal debt
τ_c = corporate income tax rate
τ_{di} = tax rate on shareholder i's dividend income.

Alternatively, the corporation may refrain from paying dividends and use capital gains as a means of sharing profits. Farrar and Selwyn assumed that in this case shareholders will realise their capital gains immediately. The shareholder's after-tax income from the corporation is

$$Y_g = (X - rL_c)(1 - \tau_c)(1 - \tau_{gi}) - rL_i(1 - \tau_{di}) = [X - rL_c(1 - \tau_c) - rL_i](1 - \tau_{gi}) + rL_i(1 - \tau_{gi}),$$

where Y_d = capital gain received by shareholder i based on the corporation's profit impact of taxation on the choice of the form of profit distribution. Both studies end up recommending zero dividends if the taxation of capital gains is lower than the taxation of dividends. When capital gains tax is lower than the tax on dividends, investors will prefer capital gains for any given value of profits, interest rates, or debt level (of the investor or of the firm).

However, Miller and Scholes (1978) demonstrated that even if the dividend tax is higher than the tax on capital gains, there are instruments in the financial market that allow individuals to design financing strategies to neutralize the fiscal disadvantage of the dividends. The implication of their demonstration is that the investors should be indifferent to dividends or capital gains. Hence, dividend policy cannot have an impact on the market value of the firm.

The tax system has often been identified as an important factor in a firm's financing decisions. A firm's optimal investment and dividend policy depends on the marginal tax rate on profits distributed to shareholders; the higher the shareholder's marginal tax rate, the lower is the capital cost of investments made by the firm. Shareholders with a high marginal tax rate are, therefore, content with a lower rate of return on investment than shareholders with a low marginal tax rate. Masulis and Trueman (1988) showed that investors with differing tax liabilities will have diverging preferences as to the optimal firm investment/dividend policy.

τ_{di} = tax rate on shareholder *i*'s capital gains.

On the basis of these equations, we can deduce that, when the tax rate on capital gains is lower than the tax rate on dividends ($\tau_{gi} < \tau_{di}$), shareholders' preferred means of profit distribution is capital gains. The ratio of these two alternative forms of income is

$$\frac{Y_g}{Y_d} = \frac{[X - rL_c(1-\tau_c) - rL_i](1-\tau_{gi}) + rL_i(1-\tau_{gi})}{[X - rL_c(1-\tau_c) - rL_i](1-\tau_{di})}$$

$$> 1, \text{ if } \tau_{gi} < \tau_{di}.$$

The result holds true in all interest rate values, corporate profit levels and amounts of debt held by the corporation and the investor.

[29] A model of general equilibrium, where the shareholder maximizes the expected utility of wealth. The author developed a basic condition for the equilibrium of the stock market in a context of uncertainty in which investors face different taxes. The framework is the Capital Asset Pricing Model, extended to include the effects of taxes that investors pay on dividends and on capital gains.

As a consequence, investors with different marginal tax rates are not content with any given investment/dividend decision by the firm. Investors with high marginal tax rates prefer shares in firms that invest heavily. Correspondingly, investors with low marginal tax rates prefer to invest in firms investing fairly little and distributing more profits as dividends to shareholders. It has been shown empirically that firms following different dividend policies will form different 'clienteles' (groups of shareholders). A change in dividend policy may result in changes in the structure of ownership. The reluctance of firms to change their dividend policy has often been said to be related to this clientele effect.

Static models built around tax-based clienteles are the other main branch of financial research concerning dividend taxation. The static clientele models review whether it is possible to find in the stock markets static, taxation-based clienteles to the effect that owners of shares paying high dividends have lower marginal tax rates than owners of shares paying low dividends. Miller and Modigliani (1961) were the first to postulate that investors choose to invest in firms whose dividend payout ratio is optimal for them. Each payout ratio is attractive to a certain group of investors. The tax-based clientele effect has been tested empirically by studying the relation between investors' marginal tax rates and dividend yields of shares. The clientele effect is supported by, for example, studies by Brennan (1970), Petit (1972)[30], Black and Scholes (1974) and Litzenberger and Ramaswamy (1980).

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[30] Petit (1972) tested the clientele effect by reviewing the investment portfolios of 914 persons in 1964–1970. He postulated that shares paying low dividends are held by (1) young investors, (2) investors with high earned income, (3) investors whose tax rates on dividend income and capital gains differ materially and (4) investors with high systemic risks attached to their portfolios. Petit tested the model:

$$DY_i = a_1 + a_2\beta_i + a_3AGE_i + a_4INC_i + a_5DTR_i + \varepsilon_i,$$

where
DY_i = dividend yield of the portfolio
β_i = systemic risk in the portfolio
AGE_i = age
INC_i = average earned income during last three years
DTR_i = difference in tax rates on dividend income and capital gains
ε_i = error term.

In the equation, subscript *i* indexes investor. As a result of this estimation, Petit reported on the clientele effect on the stock market, since the model was able to explain a significant proportion of observed differences in the dividend yields of different portfolios.

Dynamic models based on stock trading are the other main branch of financial studies related to the impacts of dividend taxation. These studies review whether dynamic taxation-based clienteles can be found on the stock markets to the effect that trading volume is high around the ex-dividend day (ex-date) and dividends are finally collected by investors with the lowest tax rate on dividends. If transaction costs and risks are not taken into account, dynamic trading on the ex-date can be used to avoid paying any dividend tax. It has been found empirically that trading volume is very high around the ex-date on almost all stock markets. In general, however, the share price drops less than the dividend amount, meaning that dividend tax cannot be avoided entirely on the stock markets. The ex-date effect is supported by, for example, studies by Elton and Gruber (1970)[31], Poterba and Summers (1984), Barclay (1987), Lasfer (1996) and Bhardwaj and Brooks (1999).

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[31] Elton and Gruber's starting point was that the investor calculates which is the more profitable strategy: to sell shares just before the ex-date or just after it. The price of the shares is higher before the ex-date. The investor pays capital gains tax based on the sale price. After the ex-date, the price of the shares is lower, but in this case the investor receives both dividends and the lower sale price. Hence, taxation consists partly of dividend taxes and capital gains taxes. In equilibrium, shares are priced so that the tax burden falling on the marginal investor is the same under both strategies. In this case, the marginal investor is indifferent to selling the shares either before or after the ex-date. Elton and Gruber assumed that investors are risk-neutral and there are no transaction costs. Then

$$P_B - t_g (P_B - P_0) = P_A - t_g(P_A - P_0) + D (1 - t_d),$$

where P_B = share price immediately before the ex-date
P_A = expected price after the ex-date
P_0 = share price at time of purchase
D = dividend
t_g = tax rate on capital gains
t_d = tax rate on dividend income.

The left side of the equation indicates a situation where a marginal investor sells shares before the ex-date. Correspondingly, the right side indicates a situation where a marginal investor sells shares immediately after the ex-date. The equation can be rearranged as follows:

$$(P_B - P_A) / D = (1 - t_d) / (1 - t_g).$$

Thus, the relation of the price determination of the share to dividend distribution corresponds to the tax rate of the marginal investor. The right side also describes the marginal substitution between dividends and capital gains. When the markets are in equilibrium, the expected share price after the ex-date is such that the marginal investor is indifferent to making a trade before or after the ex-date.

Miller and Scholes (1982), for example, criticised the theory. If, after risk adjustment, the share price reduction on the ex-date would actually be smaller than the dividend, arbitrage profits could be made by short-term investors with the same tax rate on dividend income and capital gains. According to Kalay (1982), investors operating with the lowest transaction costs determine the size of the drop in share price on the ex-date. Kalay also considered investors to have an opportunity to make arbitrage profits if the difference between the expected drop in share price and dividend yield is large enough.

Signalling

Financial markets are not imperfect only because economic agents must pay taxes that have behavioural impacts. Asymmetric information, too, distorts the functioning of financial markets.

Markets predict the income flows of a firm, and based thereon calculate a market price for the firm. Market valuation is based on *observed* firm-specific income flows and financial factors. Changes in the firm's capital structure and dividends and its unexpected profit performance force the markets to re-evaluate the firm. Corporate management and other insiders usually have more detailed information on a firm's situation and prospects than do the markets. Hence, management may send signals about expected profitability prospects if there are incentives for such signalling. Changes in the capital structure and dividends are the most common means for management to signal to the markets on the actual position and future prospects of the firm. Indeed, one of the benefits related to dividends is their use as signalling mechanism.

The signalling function of dividends is based on the identity between the firm's sources and uses of finance. Miller and Modigliani (1959, 1961) already suggested that contraction of dividend payout constitutes a signal to investors about a firm's weak financial performance over the following years. When a firm changes a dividend policy that has remained unchanged for a long period, investors may consider this an indication of the management's view of the firm's future profitability. Correspondingly, dividend growth is a signal of increasing income flows in the coming periods.

The classic models of dividends used as a means of signalling have been presented by Bhattacharya (1979)[32] and Miller and Rock (1985). These theoretical models suggest that dividends convey information about future prospects. Firms pay out funds only if managers expect future funds to be abundant. Otherwise, the firms might face future fund shortages and have to forego valuable investment opportunities (Miller and Rock) or raise costly external funds (Bhattacharya). Thus, dividends convey information because the uses of funds are constrained by the sources of funds, regardless of whether managers deliberately use dividend payouts as signalling mechanisms.

The information content and signalling function of dividends can also be tested empirically. If changes made in dividends contain information on a firm's future income flows, this should also be reflected in the share price and in market expectations the future income flows. However, this does not necessarily happen if the information provided by dividends is also available from other sources.

The signalling effect of the dividend announcement is supported in a number of studies, including Petit (1972) and Asquith and Mullins (1983). In contrast, e.g. Watts (1973) and DeAngelo, DeAngelo and Skinner (1996) arrived at opposite findings. Taylor (1979) proposed that simultaneous release of a firm's profits with the dividend announcement could result in a signalling effect. According to Vermaelen (1981), on the other hand, the signalling effect from repurchase of own shares is considerably stronger than the corresponding effect from dividend distribution.

More recent empirical studies on the dividend signalling hypothesis include Nissim and Ziv (2000), Bernheim and Redding (2001) and Grullon, Michaely and Swaminathan (2002). According to the findings of

[32] Bhattacharya (1979) presented a two-period signalling model where corporate management acts in the best interests of the owners. In the model, management makes investment and dividend payout decisions at the same time, and only management has information on the return of the investments. The critical question in the model is whether the investment returns can cover the dividends to be distributed. By distributing high dividends, the management can signal about the return on investments and thus increase the market value of the shares. In equilibrium, however, the corporation should never distribute high dividends if it has no profitable investments. When paying dividends, the corporation may have to resort to external finance and thus also pay extra transaction costs. If dividends are very high, the extra costs may be higher than the benefit from the increased share price. Thus, the juxtaposition in the model is between transaction costs and the price of the corporation.

the study by Nissim and Ziv, a change made in dividend payout was found to correlate positively with a change in future profits. Grullon, Michaely and Swaminathan (2002) ended up with the opposite result to Nissim and Ziv in a simple comparison of the level of profits of firms that changed their dividend payout.

Agency costs and monitoring

It was suggested above that the information available to financial market agents is distributed asymmetrically, which biases the functioning of the markets.[33] Shareholders have a motive to monitor corporate management, since the management usually has more information on the situation of a firm than they do. Furthermore, management can have an impact on what kind of information shareholders and markets receive on the firm.

Dividends can help reduce the agency costs associated with separation of ownership and control. When ownership of a firm is highly diversified, investors have little opportunity to control the actions of managers. If they do so, the result is high costs for the owners. The policy of paying dividends forces managers to go increasingly to the capital markets, submitting their behaviour to market evaluation. Hence, dividends are considered to play a major role in reducing conflicts between corporate management and owners. A study by Fenn and Liang (2001) supports the observation that potential principal-agent problems in firms tend to coincide with higher profit payouts to owners. Desai, Foley and Hines (2007) also provide support for the agency theory as an explanation of why firms pay dividends. Paying dividends provides a cost-effective substitute for shareholder monitoring.

Corporate management may have incentives to use corporate funds to their own benefit and make investments that are unprofitable from the shareholders' point of view. To prevent such sub-optimal expenditures, shareholders can minimize the cash under the management's control by demanding substantial dividend payments from the firm. According to

[33] Models of asymmetric information are essentially based on Akerlof's (1970) article '*The Market for Lemons: Quality Uncertainty and Market Mechanism*'. The literature on the principal-agent problem is based on Jensen and Meckling's (1976) article '*Theory of the firm: Managerial behavior, agency costs and capital structure*'.

the *free cash flow hypothesis*[34], in the absence of other differences between firms, a firm paying out as dividends any profits it is unable to invest profitably is more valuable than a firm retaining corresponding profits within the firm. This hypothesis has also been tested empirically, for example in a study by Lang and Litzenberger (1989)[35].

The extent to which management is capable of value-destroying activities is tied up with the ownership structure of a firm. La Porta, Silanes and Shleifer (1999) concluded that different ownership patterns impact significantly on the agency problems of a firm. In particular, a small and heterogeneous group of owners needs to monitor its corporate management through dividends.

Agency conflicts can take many other forms, too. Myers and Majluf (1984) argued that firms acting in the interest of current shareholders should rationally pass up profitable investment projects if the benefits are captured by outside investors. Shleifer and Vishny (1986) raised the argument that large shareholders in a firm can play the role of monitoring management, which enhances the value of the firm. Moreover, Allen, Bernando and Welch (2000) emphasized firms' preference for large institutional shareholders. These results suggest that high dividend payouts and the presence of large shareholders constitute alternative corporate governance mechanisms.

La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000) offered evidence that greater investor protection – due to stronger governance structures, regulatory environments, and legal recourse – is associated with higher dividend payout ratios. Investor protection affords minority

[34] The original idea was proposed by Jensen (1986): In principle, corporate management has an interest in retaining free cash flows in the corporation under their control.

[35] Based on the free cash flow hypothesis, it can be deduced that unprofitable investments are a bigger problem in stable industries where cash flows are generally large and growth prospects weak. Lang and Litzenberger (1989) tested this point of view empirically. Their idea was that an increase in dividends by a corporation investing unprofitably should have a larger impact on the corporation's share price than an increase in dividends by a corporation making profitable investments. Empirically, they calculated Tobin's Q values for firms and determined that when this value was less than one, the corporation was investing too much. Lang and Litzenberger only utilised information from dividend payouts where a change exceeding 10% had occurred. They observed that in firms with a Q lower than one, an increase in dividend payouts increased the share price more than in firms with a Q higher than one. They also reached a similar outcome in cases where dividend payouts had been reduced. Lang and Litzenberger considered this provided empirical support for the free cash flow hypothesis.

shareholders a greater ‘power’ over management to extract free cash flow through dividend payments, which is consistent with the use of dividends to control managerial actions. La Porta, Lopez-de-Silanes, Shleifer and Vishny predicted that stronger minority shareholder rights should be associated with higher dividend payouts.

In Rozeff’s (1982) model, an optimal dividend policy is the outcome of a trade-off between equity agency costs and transaction costs. Consistent with such a trade-off model, Rozeff reported evidence of a strong relationship between dividend payouts and a set of variables proxying for agency and transaction costs in a large sample composed of one thousand US firms for the period 1974 to 1980. According to Rozeff, differences in firms’ payout ratios are largely explained by four factors: the firm’s growth phase, the size of the insider group and the heterogeneity of ownership, risks related to the firm and the extent of fluctuation in its income flows. According to Crutchley and Hansen (1989), agency costs can be controlled in a firm through three financial variables: managerial stock ownership, leverage and dividend policy.

As a conclusion, we can state that the optimal dividend policy is a trade-off between the benefits received from dividends and the related costs.[36] Costs are caused, among other things, by stiffer taxation of dividends relative to capital gains, high costs for external finance and lost investment returns. On the other hand, the benefits of dividend distribution are based on, for example, an increase in the market value of the firm due to the signalling effect, lower agency costs and complementation of the markets, since shares offering different dividends provide variety for investors. Dividend policy should be designed so as to minimise the sum of costs related to capital, transaction and agency costs and taxation.

[36] A new theoretical approach, *catering theories*, is based on the assumption that investor demand and preferences have a significant impact on the dividend payout decisions of a corporation. Demand changes over time: sometimes dividends are appreciated more in the markets, and sometimes less. When investors compensate dividend payout with a high share price premium, management strives to keep dividends at a high level. On the other hand, when markets do not seem to appreciate dividends in the form of share prices, firms reduce their dividend payouts (Baker and Wurgler, 2004).

Constant dividends

In practice, the long-term dividend policy of many firms follows constant payouts relative to profits. Firms have been considered reluctant to increase the level of dividends distributed if they cannot ensure they will be able to keep them at the higher level in the longer term. Correspondingly, cutting dividends is a difficult decision for any firm. Managers regard it as a negative sign of the firm's quality if the dividend is reduced or skipped. These factors explain the lag in dividends distributed relative to changes occurring in profits.

In a characteristic study, John Lintner (1956) conducted a series of interviews with corporate managers about the dividend policies of their firms. Lintner made a number of important observations concerning the dividend policies of these firms. He showed that the smoothing of dividends over periods was very common. One of the most important conclusions of his study was that firms have a long-term target dividend payout ratio. This means that firms aim to distribute, in the long term, a constant portion of their earnings each year. Another interesting remark in Lintner's study concerns the contention that managers proved to be more interested in changes than on absolute levels of dividends. Additionally, managers avoided changing dividend policy if they were not certain that they would be able to keep the new policy constant for a reasonable period. Managers are reluctant to cut (raise) dividends immediately following a decrease (increase) in earnings; dividend changes appear to lag behind changes in earnings by a number of periods. Managers avoid changing dividend policy very often since it is likely to give a negative signal to investors as uncertainty increases.

Lintner's model is a partial adjustment model which suggests that the payout level is set so that it takes into account both the previous payout level and the current earnings of a firm. Firms have a long-term target pay-out ratio between dividends and profits, in which the dividend payout relative to profits is set at a desired level. However, firms follow dividend policies in line with their targets in a flexible manner. Rapid changes in profits are transferred slowly to dividends. According to Lintner, also it is possible to determine the speed at which a firm will adjust its dividend payout to the target level. Lintner suggested that dividend changes will tend to follow the model:

2.1 $$D^*_{it} = r^* P_{it}$$

2.2 $$D_{it} - D_{it-1} = a_i + c_i (D^*_{it} - D_{it-1}) + u_{it},$$

where D^*_{it} = dividend target

D_{it} = dividends decided

r^* = target payout-ratio

P_{it} = profits

a_i = a constant relative to dividend growth

c_i = speed of adjustment coefficient

u_{it} = error term.

In these equations, subscripts *i* and *t* index firm and time, respectively. The model may also be presented in the following form:

2.3 $$D_{it} = a_i + b P_{it} + d D_{it-1} + u_{it}$$

2.4 $$b = c_i r^*$$

2.5 $$d = 1 - c_i$$

After some adjustment (Georgen, Renneboog and Correira da Silva, 2005), we obtain the following empirically testable equation:

2.6 $$D_{it} = a_i + b_i P_{i,t} + (1\text{-}c_i) D_{i,t-1} + d_i Years_t + \varepsilon_{it}$$

with $r_i = b_i/c_i$ being the target payout ratio, c_i the speed of adjustment coefficient, *Years* the time dummies that account for the incidence of time on dividend distribution and ε_{it} a classical disturbance term.

In estimating the equation, Lintner used data on 28 firms in 1918–1941. Based on the estimation, he calculated that the target payout ratio was 50% of a firm's profits. The model was able to explain 85% of changes occurring in the dividend distribution of the firms reviewed.

Lintner's model was not originally mathematically derived, being based on interviews with corporate executives. Subsequently, the model has been tested in many studies with corporate data from different countries. In their famous study, Fama and Babiak (1968) used data on

392 major industrial firms over the period 1946 through 1964 and concluded that the Lintner model explains dividend changes for individual firms fairly well. However, they found that the model can be improved by introducing, as an additional explanatory variable, the earnings from the previous year without a constant term. For example Baker, Farrelly and Edelman (1985), Healy and Palepu (1988) and Eriotis (2005) have also confirmed the validity of the model.

Lintner proposed that investors are interested not only in the payout ratio (proportion of dividends to a firm's profits) but also in the stability of dividends over years. According to the hypothesis, the value of firms following a stable dividend policy is higher than that of firms whose dividends fluctuate from period to period. Constant dividend policies are appreciated because, for example, many investors want a stable periodic income flow from a firm. Furthermore, the stability of dividends is also appreciated due to their information content. Both signalling and agency cost theory provide a theoretical basis for Lintner's findings.

2.2. Dividend research in Finland

Högholm and Liljeblom (1997) divided Finnish empirical financial studies on dividends into three groups: (1) studies modelling dividend policy or discussing the information content of dividends, (2) studies reviewing changes in share prices around the ex-date and (3) studies discussing financial decisions that could be used as alternatives to dividend distribution and also have a direct impact on dividend distribution. This chapter presents some Finnish studies mostly falling into the first two groups. Studies presented in the first part of the chapter review the interactions between dividends and other financial decisions of a firm. The latter part of the chapter concentrates on reactions on the financial markets to firms' dividend decisions and related findings in Finnish studies.[37]

Finnish studies modelling dividend policy have utilised Lintner's model, among others. As described above, according to Lintner's model, firms' dividend policy tends to follow a fixed dividend distribution relative

[37] Reviews of Finnish studies on the topic include Högholm and Liljeblom (1997) and Kinkki (2001).

to corporate profits in the long term. Firms primarily seek to ensure dividend stability and always decide on new payouts relative to previous dividend decisions. In Finland, Yli-Olli (1980, 1982) has reviewed the dividend policies and information content of Finnish firms with Lintner's model. In his 1982 study, he also made comparisons between the dividend policies of Finnish, Swedish and Japanese firms. The results showed that the previous year's dividends were the most important factor explaining dividend payouts by Finnish firms. The speed at which firms adjusted their dividend payouts to the target level was relatively low in Yli-Olli's studies: 0.26 for Japanese, 0.1 for Swedish and 0.07 for Finnish firms.[38] Yli-Olli considered Lintner's model to be better suited to describe the dividend policies of Swedish and Japanese firms than Finnish firms. In his studies, he found support for the hypothesis that a firm's future income flows may be predicted on the basis of changes made to its dividends. Furthermore, Yli-Olli postulated that in Finland firms only 'show' profits to the extent required for dividend payouts. Provisions which had been previously in force in Finnish accounting and tax legislation provided firms with opportunities to regulate on one hand their accounting profit, and on the other hand their taxable profit. The need to distribute profits is considered to play a key role in determining what level of profit a firm adopts as its target.

In a study by Kasanen and Niskanen (1992), Lintner's model was used to review the impacts of changes in the taxation system on distribution of dividends by Finnish firms. The review period covered the years 1953–1985. Kasanen and Niskanen showed that dividend tax cuts implemented in the 1969 tax reform increased dividend payouts, but there were differences in the magnitude of the impact across industries. According to the study, dividends paid in the previous year are a more important explanatory variable for dividend distribution than profit for the relevant period.

Many dividend studies have been conducted in Finland following reasoning based on Gordon's model. The rationale behind these studies is that in purchasing shares, investors are buying future dividend flows. The price of a share is directly determined by discounted future dividends. For example, in his study, Martikainen (1990) reviewed 28 Finnish listed firms and found a significant positive association between dividend growth and share price.

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[38] The rate is indicated by the coefficient c_1 in Equation 2.2.

As stated above, according to Miller and Modigliani's famous theorem, a firm's investment and dividend decisions are mutually independent. Furthermore, dividends paid by a firm have no impact on its value. Yli-Olli (1979) reviewed the validity of Miller and Modigliani's findings in Finland. The study postulated a connection with investments and capital costs and the value of the firm based on Miller and Modigliani's theorem. According to Yli-Olli's findings, dividend policy had no impact on a firm's market value in Finland, which was regarded as support for Miller and Modigliani's irrelevance of dividends theorem. In contrast, statistically significant associations with dividends were found in firms' income flows, amount of leverage, growth rate and size in terms of capital invested.

In Finland, financial market reactions to dividend announcements by firms – the study of information content and signalling of dividend announcements – are complicated by the fact that earnings and dividends are announced at the same time. Finnish firms typically distribute dividends only once a year, which in turn may increase the financial market significance of the information carried by dividends. Korhonen (1977) reviewed the predictive performance of dividends and the impact of dividend announcements on share prices in 1955–1970. In this study, dividends were not found to have any predictive power. Korhonen did not find dividend announcements to have any impact on share prices either. This observation was valid for both unexpected dividend increases and unexpected dividend cuts.

Martikainen, Rothovius and Yli-Olli (1991, 1993) studied price reactions caused by dividend announcements with data covering the years 1977–1986. They reported a strong association between an unexpected dividend change and share price. However, the study has been criticised for naive assumptions and problematic methods of analysis.

Heikkilä's (1997) study on the information content of dividends has been considered less problematic in terms of both data and methods used. This study also found support for the hypotheses on the information content and signalling function of dividends based on significant share price changes in connection with dividend announcements. In addition, Heikkilä postulated that the impact of dividends on price changes was more significant than that of the earnings figures released at the same time.

All in all, dividend announcements by Finnish firms can be considered to provide additional information to the markets, even to a rather significant degree. The fact that dividend announcements and earnings data are often released at the same time in Finland is problematic. As a consequence, studies must take into account both reactions to the dividends and to the released earnings.

As described above, share price changes around the ex-dividend date are known as the ex-date effect. In Finland, the ex-date effect as been studied primarily so as to test tax hypotheses. In other words, the studies have aimed to explore the impacts of changes in investors' marginal tax rates and taxation on share prices. According to Elton and Gruber (1970), the reduction in share prices relative to dividend payouts depends on the tax rates of marginal investors: the share price will drop less than the dividend amount if the taxation of dividends is harder on the marginal investor than the taxation of capital gains.

In Hietala (1990), the drop in share price after the ex-date was estimated based on data from 1974–1985. Depending on the methods used to calculate expected returns, the drop in share prices relative to dividends was 89–92.5% in this study. This result lends support to the tax hypothesis, since at that time in Finland, for the majority of investors, taxation of capital gains was lighter than taxation of dividends.

Rantapuska (2008) examined the ex-dividend day trading behavior of all investors in the Finnish stock market. He found that consistently with dynamic dividend clientele theories, investors with a preference for dividend income buy shares cum-dividend and sell ex-dividend. According to the study investors engaged in overnight arbitrage, earning on average 2% overnight return on their invested capital.

Sorjonen (1995) studied the impacts of the tax reform at the beginning of the 1990s on the ratio of the drop in share price after the ex-date and the dividend distributed. For natural persons, banks and insurance firms, the reform relived the taxation of dividends, which should be reflected in an increase in the price ratio. Sorjonen's findings supported this assumption: the drop in share price relative to dividend was 51% in 1989–1990 and 79% in 1991–1992. Furthermore, Sorjonen (2000) documented that stock prices fall by 70 to 75% of the dividend amount on ex-dividend days in Finland in 1989–1990 and 1993–1997. This suggested that domestic individuals were marginal investors in the former period and foreign investors in the latter period. There was a weak evidence in favour of a tax clientele effect in 1989–1990. In addition, Sorjonen found that stocks with abnormally high dividend yields and liquidity exhibits abnormally high trading volumes around ex-dates and abnormally low volumes on the following two trading days in 1993–1997. These abnormal volumes were not, however, matched by simultaneous abnormal returns. This evidence was seen to be consistent with long-term traders timing their trades ex-dates and inconsistent with short-term trading of any importance.

In Finland, the change in share price after the ex-date has been considered to be associated with the finding by Elton and Gruber according to which the drop in share price relative to the dividend distributed can be used to derive the marginal tax rate for marginal investors. In contrast, Finnish studies do not support Kalay's hypothesis on short-term investors.

Hietala (1987) has studied the clientele effect on the Finnish financial markets. However, his research findings have not shown any tax-based clientele effects.

Liljeblom and Felixson (2008) investigated for the identity of the ex-dividend date traders on the Finnish stock market. They found evidence of two investor groups trading around the ex-dividend date: domestic non-financial investors doing dividend capturing arbitrage, and foreign investors together with domestic financial institutions, doing mainly the opposite. The study reported significant deviations from neutral buy probabilities for these investor groups around the ex-dividend date. While part of the trading can be characterized as dividend tax clientele trading, also immediate arbitrage activity by some investors was documented.

Liljeblom, Löflund and Hedvall (2001) reported evidence on the consequences of differential tax treatment for domestic and foreign owners in Helsinki Stock Exchange. They found both highly significant abnormal trading volumes and the violation of non-arbitrage conditions between domestic taxable companies and foreign investors, which they seemed to indicate that some ex-dividend arbitrage is in fact taking place on the market. According to the study, the tax heterogeneity of the company's ownership structure seemed to play a role in explaining deviations from dividend neutrality, more deviations are observed for companies with a more homogeneous ownership structure in terms of taxation.

Liljeblom and Pasternack (2006) studied the determinants of share repurchases and dividends in Finland. They found that higher foreign ownership serves as a determinant of share repurchases and suggested that this is explained by the different tax treatment of foreign and domestic investors. Further, they also found support for the signaling and agency cost hypotheses for cash distributions.

In conclusion, we can say that the findings from the Finnish financial markets concerning phenomena related to distribution of dividends do not differ materially from corresponding research outcomes from financial markets in other countries.

2.3. Dividend policies of non-listed firms

Small enterprises are a heterogeneous group, but they are also an important player in the economy: the majority of new jobs in the corporate sector are created in non-listed firms. These firms have been said to balance the structural change related to globalisation. The challenges and opportunities – including in terms of finance – facing small, non-listed enterprises are materially different in comparison to firms listed on the stock exchange. The dividend theories presented above are in many respects unable to explain decisions concerning dividend distributions by non-listed firms. Therefore, in reviewing dividend policy, a distinction should be made between listed and non-listed firms. In this chapter, the purpose is to outline the special characteristics of the factors affecting dividend distribution by small, non-listed enterprises. In the literature, the dividend policy of private firms has largely been ignored despite their importance to the economy.

Michaely and Roberts (2007) compared dividend decisions by British listed and non-listed firms. They classified firms into three groups differing in ownership structure and access to public equity markets: (1) publicly held firms, (2) privately held firms in which there exists a significant number of minority outside shareholders, and (3) privately held firms where ownership is concentrated on a few shareholders. Their study tested both the suitability of Lintner's model and the explanatory power of theories based on agency costs and asymmetric information to the dividend policies of these groups of firms. Michaely and Roberts found significant differences in the factors explaining distribution of dividends when firms are divided according to ownership structure and market status.

It has been suggested that private firms follow relatively erratic dividend policies that are sensitive to both positive and negative transitory earnings shocks. They are usually bound by stricter budget constraints in their distribution of dividends than listed firms: distributable assets are often linked to the profitability and earnings performance of the firm. Non-listed firms also often have scarcer opportunities to utilise the financial markets and obtain external finance. It may be particularly difficult for a small, non-listed enterprise to raise additional external finance. It has also been suggested that dividend policy in private firms displays the traits of a residual financing decision. Specifically, dividends are reduced when investment opportunities abound and increased when investment opportunities shrink.[39]

For its owner, a small enterprise is often not just an investment generating a return; it is his life's work, which his – and maybe also his family's – livelihood depends on. Furthermore, in small enterprises, family enterprises in particular, fostering traditions may be as important as profit maximisation. More diverse objectives in comparison to listed firms add complications to the study of the dividend policies of small enterprises.

Popular explanations for dividend behaviour come from theories predicated on either information asymmetry or agency problems between managers and shareholders. Typically, privately owned firms experiencing little information or agency problems between managers and shareholders, because in many cases the shareholder or shareholders are intimately involved in the operations and management of the firm. The incentives for management and shareholders are often same or at least closely aligned. This makes information and agency concerns largely irrelevant.

Non-listed firms are, however, a heterogeneous group and also include firms where agency conflicts may emerge as a major problem. Compared with public firms, these private firms might have a weaker governance structure, which means that shareholders have no power over management and it is difficult for them to extract free cash flow through dividend payments. On the other hand, due to the weaker governance structure, maintaining their reputation and conveying quality is even

[39] For more information, see Brav, Graham, Harvey and Michaely (2005).

more important to these private firms than to their public counterparts. One vehicle to enhance reputation and signal quality is by paying dividends. Some private firms might even have a greater need to use dividends to signal their quality than public firms, which are subject to the scrutiny of the capital markets. Hence, in the large group of non-listed firms, there may also be firms where the viewpoints of agency and signalling theories emerge as key factors influencing dividend policy. Such firms are likely to include large non-listed firms with a heterogeneous ownership.

Neither Lintner nor the literature that has followed him have been able to offer an explanation as to why firms are so reluctant to cut dividends or why they appear to smooth dividends. However, there are reasons to believe that this behaviour is linked directly to whether or not a firm is publicly traded. Empirical evidence suggests that management's reluctance to cut dividends is partly driven by investors' reactions to such announcements. For private firms, the immediate change in value is less visible and, therefore, potentially less important for the decision-making process. Managers of private firms find the consequences of dividend cuts and omissions to be less severe than their public counterparts, primarily because of differences in informational content. Private firms are more likely to pay dividends in response to temporary changes in earnings.

Finally, taxation may be assumed to have a stronger impact on distribution of dividends by non-listed firms than by listed firms. This is on one hand a consequence of the fact that non-listed firms do not have to predict market reactions in making their dividend decisions and can instead focus on other impacts of dividend distribution, such as the tax consequences. This is potentially important, particularly in Finland, where the taxation of dividends distributed by non-listed firms is highly non-linear.

3. Empirical study of factors with influencing dividend distribution by Finnish firms

3.1. Data used and basis of study

This empirical review is based on the Government Institute for Economic Research's firm database, which holds data on Finnish taxable firms. The data has been gathered by the Tax Administration on the basis of firms' tax returns. The study uses data from the financial statements and taxation of corporations in 1994–2004.

The firm database used contains information on firms' income statements, balance sheets, taxation, depreciations and provisions as well as public subsidies received. In addition, the database includes a large set of data on owners. This includes identification, income and taxation information related either to the major shareholders of corporations or partners of private enterprises.

The strengths of the database include the large amount of data and good coverage in terms of both firms and variables. The data used are comprehensive, in that they cover the whole population of Finnish firms. For example, in comparison to the corporate register maintained by Statistics Finland, the Tax Administration's firm data includes significantly more small enterprises, since the data is not limited by turnover or number of personnel.[40] On the other hand, the weaknesses of the database include partial structural discontinuity from year to year, and an occasionally large variation in data quality.

In the present study, a major effort has been made to ensure data quality: observation values found to be incorrect have been either corrected or eliminated from the data. When all items in a firm's financial statements are available, it is fairly easy to detect incorrect values. Incorrect values are explained by the fact that a majority of the data has been manually entered onto a machine from the firms' tax forms. The Tax Administration has no interest in checking the correctness of variables of

[40] The corporate register of Statistics Finland includes firms whose span of operation in the review year exceeded half a year and which have employed more than half a person or whose turnover has exceeded an annual statistical limit (e.g. 9,337 EUR in 2006).

minor importance to taxation. As regards variables important for taxation, checks have been made and errors are less frequent. Furthermore, incorrect data has been reduced significantly over the last few years as the electronic filing of tax returns has become more common. The objective was to build as extensive and comprehensive data as possible with as little elimination of observation values as possible.

The points of interest in the study are corporations, dividends distributed and factors with an influence on the dividend decision. Tables 3.1 and 3.2 indicate the number of firms and dividends distributed in the data used.

TABLE 3.1: *Number of firms*

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
All firms	82910	92063	98507	105079	111743	113926	115709	124899	130186	141180	147613	146444	145745
Listed firms	105	113	116	124	131	129	128	147	146	142	143	142	141
Consolidated firms	1222	1572	7617	7944	8147	9089	9983	10743	14468	14023	14227	14119	14158
Others	81583	90378	90774	97011	103464	104707	105598	114009	115572	127015	133243	132183	131446

TABLE 3.2: *Number of firms distributing dividends and the amount of dividends distributed*

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
All firms													
Number of dividend-distributing firms	14502	20476	21974	29490	34050	37114	40028	42575	45880	48788	52951	49660	49948
Dividends (million EUR)	1029	2622	3104	4954	6343	9863	11501	9255	9789	12374	14440	12834	11443
Mean dividend (1000 EUR)	71	128	141	168	186	266	287	217	213	254	273	279	218
Listed firms													
Number of dividend-distributing firms	42	78	81	99	109	105	100	106	102	101	108	104	101
Dividends (million EUR)	138	1031	1081	1949	2970	5407	5309	4583	4417	5449	5899	5776	5523
Mean dividend (1000 EUR)	3286	13218	13346	19690	27249	51492	53089	43232	43304	53950	56673	55538	54683
Non-listed firms													
Number of dividend-distributing firms	14460	20398	21893	29391	33941	37009	39928	42469	45778	45778	45778	45778	45778
Dividends (million EUR)	891	1591	2023	3005	3373	4456	6192	4672	5372	6925	8541	7058	5920
Mean dividend (1000 EUR)	62	78	92	102	99	120	155	110	127	154	175	165	107

One of the problems with the data is that firms belonging to the same consolidation group are reported separately. Therefore group structures cannot be mapped. Group firms can be identified with their specific code, but the code does not specify whether the firms are subsidiaries of listed firms or part of non-listed groups. Due to this lack of clarity, group firms have been eliminated from the studies of non-listed firms.

3.2. Hypotheses reviewed

The following chapters take an empirical look into the dividend policy of Finnish firms and the factors influencing it. The review focuses mainly on non-listed firms, which have often been neglected in the literature. As a basic point of departure, we can assume that dividend decisions by listed and non-listed firms are guided by different incentives and empirical analyses aim to capture these differences.

The reviewed viewpoints to dividend distribution can be expressed as hypotheses formulated on the basis of the theoretical findings in the previous chapters.

Hypothesis 1: Distribution of dividends is one of a firm's most important financial decisions and is made taking the firm's other financial decisions into account. Therefore, we can deduce that the key figures for firms that distributed dividends will show a statistically significant difference to the corresponding figures for firms that did not distribute dividends.

Hypothesis 2: There are differences between the dividend policies of listed and non-listed private firms: listed firms are less likely to alter (increase, decrease, initiate, omit) their dividends than non-listed firms. This is largely a consequence of *asymmetric information* in the public stock markets. According to the *signalling hypothesis*, a dividend decision by a listed firm is a signal to the markets about the management's view of the situation and prospects of the firm. Stability of dividends is important due to their information content and listed firms must take market reactions to dividend decisions into account.

Hypothesis 3: *A higher rate of economic yield*, the result of an increase in profits, makes a proportional increase in dividend payout possible. Distribution of dividends by small enterprises is usually more closely linked to profitability and earnings capacity than dividend distribution by large firms.

Hypothesis 4: Private firms' dividends should exhibit *greater sensitivity to investment opportunities* than public firms' dividends. For small private firms, dividend policy behaves more as if it were a residual financing decision.

Hypothesis 5: *The use of debt* is a way of restricting discretion in the behaviour of managers and is an alternative mechanism to dividends, which means that as financial leverage increases then the handing out of dividends is less necessary. Debt serves to shift responsibility for monitoring a firm from its owners to the debt markets. However, there is also a more direct explanation for the negative association between dividends and debt: small non-listed firms have less opportunity to use the financial markets, and therefore leverage has a direct negative connection to other financial decisions of the firm. A high debt ratio reduces a firm's distributable funds due to high financing costs.

Hypothesis 6: Firms with good opportunities for growth need greater volumes of funds to face their future investment projects. One – and sometimes the only – possibility is the self-financing of a good part of these projects by reducing the dividends paid to shareholders. Firms which have *higher rates of growth* have greater need for resources, which leads them to reduce the dividends they pay to their shareholders.

Hypothesis 7: *Lintner's model:* Firms smooth out their dividend policies to try to adjust them to a long-term target payout ratio which they set as an objective and which is proportional to the profits obtained and the dividend of the previous year. The smoothing of dividends is clearest in listed firms if capital markets play a role in the decision to smooth dividends. In contrast, small non-listed firms' dividend policies do not closely follow Lintner's model, being more prone to adapt dividend payouts in response to external shocks.

Hypothesis 8: *Agency theory:* When ownership of a firm is highly diversified, investors have little opportunity to control the actions of managers. Dividends have been considered to play a major role in reducing conflicts between corporate management and owners: potential principal-agent problems are associated with higher profit distributions to the owners. It is particularly the case that small and heterogeneous ownerships with strong shareholder rights use dividends to monitor management. In contrast, large shareholders can play the role of monitoring management, reducing the agency costs associated with monitoring. This suggests that high dividend payout and the presence of large shareholders are alternative corporate governance mechanisms. Dividend payout is positively related to the number of shareholders and negatively related to the presence of large shareholders. In non-listed firms, asymmetric information and agency theoretical aspects are irrelevant: the incentives between management and shareholders are relatively closely aligned.

Hypothesis 9: *Tax clienteles:* When institutional and foreign investors are taxed in a different way to individual investors, dividends induce ‘clientele’ effects. Individual investors have mixed tax incentives overall, depending on the marginal tax rate on the investor’s dividend income. In general, due to the avoir fiscal system, the tax burden on dividends received by individual investors has been lighter in Finland than the taxation of capital gains. Institutions and foreign investors have tax incentives which imply that they are more indifferent to the alternatives of capital gains and dividends. The clientele effect is supported if there are differences in dividend payouts that reflect the type of main shareholder in a firm.

Hence, this study is most interested in factors that explain dividend decisions in firms of different sizes. The empirical chapters seek to explain comprehensively the factors that have an influence on the decision by Finnish firms to distribute dividends. It is interesting to see whether the very extensive firm data – including comprehensive coverage of small enterprises – reveals new features about firms’ dividend distribution behaviour.

Appendix 1 provides a more detailed description of the data on the variables used in the analyses.

3.3. Firms distributing and not distributing dividends: differences in key financial figures

About a third of Finnish corporations have distributed dividends in recent years. Their number has increased steadily in both absolute and relative terms. Dividend distribution in Finland is not limited by anything other than the amount of non-restricted equity. What differentiates firms that have distributed dividends from firms not distributing any dividends? The purpose of this section is to compare these firms in terms of different, mostly financial, variables. The focus of analysis is Hypothesis 1 in Section 3.2.

The idea of the review is that for every firm that distributed dividends another firm in the same industry that did not distribute dividends is selected as its matched pair. When the comparative groups have been established, the groups and their differences are compared with a simple t-test for two independent samples.

Matching methods are used in establishing the pairs. The idea of matching methods is to minimise the bias resulting from the fact that firms distributing dividends vary in size or operate in different sectors. Hence, the method seeks to identify firms that are as similar as possible in terms of the desired factors and make pairs where one did and the other did not distribute dividends. The study uses the *propensity scores* matching method (Rosenbaum and Rosen, 1983). In this method, a binary formula is estimated and used to create a *propensity scores* index. This index is used to find pairs of firms in the data that are as similar as possible, where one did and the other did not distribute dividends, so that the outcomes of these firms can be compared. This study uses *closest neighbour* matching, where each firm that distributed dividends is compared with the firm that did not distribute dividends with the closest *propensity score*.

In terms of experimental research methods, in the following review, the group of firms that distributed dividends constitutes the treatment group, and firms that did not distribute dividends constitute the control group. The matched pairs are on average similar in terms of the desired factors. At this point the pairs are expected to operate in the same sector as closely as possible (sector code at two-digit level)[41] and to be as similar in size as possible. The size of the firm is measured by balance sheet total, which is accounted for in the estimation as logarithmic and squared logarithmic values.

The results of the estimation are presented in Table 3.3. The estimation utilises panel data including all Finnish corporations from the years 1994–2004. The first column in the table reports the results as estimated from the original data. The second column presents the results of estimating the model with data only comprising the matched pairs. If the matching of the groups of firms has been successful, the coefficients in the second column will no longer be statistically significant, or the significances will be considerably smaller than in the estimation results based on the whole data.

[41] Sector codes according to the EU's common industry classification (NACE). See, for example, Statistics Finland.

TABLE 3.3: *Results of probit estimation*

PROBIT estimation results	Before	After
ln(Total $asset_s$)	0.146 (0.00073)**	0.0231 (0.0096)**
[ln(Total $asset_s$)]^2	0.025 (0.00112)**	0.0037 (0.00179)
Agriculture, hunting and forestry	-0.241 (0.0094)**	-0.101 (0.0484)
Mining and quarrying	-0.091 (0.0187)**	-0.052 (0.0266)*
Manufacture of food products, beverages and tobacco	0.287 (0.0119)**	0.112 (0.0609)
Manufacture of textiles	0.127 (0.0150)**	0.094 (0.0101)**
Manufacture of leather and leather products	0.301 (0.0358)**	-0.247 (0.0873)**
Manufacture of wood and wood products	0.322 (0.0108)**	0.135 (0.0711)
Manufacture of pulp, paper and paper products	0.573 (0.0299)**	0.301 (0.1801)
Publishing, printing and reproduction of recorded media	0.140 (0.0101)**	0.105 (0.0627)
Manufacture of coke, refined petroleum products and nuclear fuel	1.231 (0.163)**	0.650 (0.294)**
Manufacture of chemicals, chemical products and man-made fibres	0.317 (0.0236)**	0.133 (0.0724)
Manufacture of rubber and plastic products	0.069 (0.0174)**	0.017 (0.0228)
Manufacture of other non-metallic mineral products	0.165 (0.0166)**	0.087 (0.0531)
Manufacture of basic metals	0.0935 (0.0343)*	0.0902 (0.0512)
Manufacture of fabricated metal products, except machinery and equipment	0.170 (0.0088)**	0.110 (0.0358)**
Manufacture of machinery and equipment n.e.c.	0.0476 (0.0105)**	0.0084 (0.0154)
Manufacture of electrical and optical equipment	0.0416 (0.0107)**	0.0171 (0.0153)
Manufacture of transport equipment	0.155 (0.0169)**	0.0937 (0.0607)
Manufacturing n.e.c.	-0.097 (0.0130)**	-0.066 (0.0369)
Electricity, gas and water supply	1.292 (0.2148)**	0.571 (0.2913)
Construction	0.141 (0.0060)**	0.0525 (0.0284)
Sale, maintenance and repair of motor vehicles and motorcycles	0.0027 (0.0083)	0.0040 (0.0102)
Wholesale trade and commission trade, except of motor vehicles	0.0682 (0.0057)**	0.0179 (0.0147)
Retail trade, except of motor vehicles; repair of personal and household goods	0.0358 (0.0066)**	0.0058 (0.0082)
Hotels and restaurants	0.287 (0.0084)**	0.242 (0.167)
Transport, storage and communication	0.122 (0.0077)**	0.089 (0.050)
Financial intermediation, except insurance and pension funding	0.360 (0.0108)**	0.261 (0.0333)**
Insurance and pension funding, except compulsory social security	0.198 (0.697)	0.0401 (0.0806)
Real estate activities	0.46 (0.0065)**	0.168 (0.0312)**
Renting of machinery and equipmentr and of personal and household goods	0.223 (0.0154)**	0.0107 (0.0625)
Computer and related activities	0.210 (0.0987)**	0.141 (0.0854)
Other business activities	0.170 (0.0055)**	0.188 (0.0655)**
Year 1994	-0.607 (0.0062)**	-0.115 (0.0106)**
Year 1995	-0.454 (0.0063)**	-0.101 (0.0095)**
Year 1996	-0.459 (0.0057)**	-0.092 (0.0088)**
Year 1997	-0.241 (0.0049)**	-0.074 (0.0079)**
Year 1998	-0.188 (0.0057)**	-0.068(0.0090)**
Year 1999	-0.138 (0.0051)**	-0.053 (0.0082)**
Year 2000	-0.102 (0.0053)**	-0.051(0.0078)**
Year 2001	-0.080 (0.0052)**	-0.038 (0.0075)**
Year 2002	-0.028 (0.0054)**	-0.015 (0.0074)*
Year 2003	0.010 (0.054)	0.0050 (0.061)
Constant	-2.117 (0.091)**	-0.522 (0.140)**
Number of firms	1073072	718954
Number of dividend-distributing firms	359477	359477
Number of non-dividend firms	713595	359477
Log likelihood	-627310.84	-241310.76
Pseudo R^2	0.2711	0.0233

The results show that the firms that distributed dividends and those that did not are statistically significantly different in terms of size and operating sector. In the results estimated with the data only comprising matched pairs presented in the *after* column, the explanatory power of the size and sector variables with respect to the probability of dividend distribution decreases markedly and many explanatory variables are no longer statistically significant.

The objective was that the firms would be as closely as possible from the same sector and as similar as possible in terms of balance sheet total. Tables 3.4 and 3.5 present the breakdown of both groups of firms to different sectors and categories according to balance sheet size.

TABLE 3.4: *Firms categorised by sector*

Industries	Dividend-distributing firms	Non-dividend firms	All firms
Agriculture, hunting and forestry	**11240**	**14562**	**25802**
Manufacturing	**53873**	**55341**	**109214**
Mining and quarrying	1356	1118	2474
Manufacture of food products, beverages and tobacco	3059	3679	6738
Manufacture of textiles	2462	2011	4473
Manufacture of leather and leather products	430	387	817
Manufacture of wood and wood products	3420	3457	6877
Manufacture of pulp, paper and paper products	630	595	1225
Publishing, printing and reproduction of recorded media	6769	7251	14020
Manufacture of coke, refined petroleum products and nuclear fuel	14	46	60
Manufacture of chemicals, chemical products and man-made fibres	1096	997	2093
Manufacture of rubber and plastic products	2194	2271	4465
Manufacture of other non-metallic mineral products	1951	1543	3494
Manufacture of basic metals	518	341	859
Manufacture of fabricated metal products, except machinery and equipment	12284	15368	27652
Manufacture of machinery and equipment n.e.c.	7822	6982	14804
Manufacture of electrical and optical equipment	4900	3805	8705
Manufacture of transport equipment	1653	1164	2817
Manufacturing n.e.c.	3315	4326	7641
Electricity, gas and water supply	**840**	**1137**	**1977**
Construction	**49962**	**44612**	**94574**
Wholesale and retail trade	**88695**	**93705**	**182400**
Sale, maintenance and repair of motor vehicles and motorcycles	14010	17532	31542
Wholesale trade and commission trade, except of motor vehicles	42859	37917	80776
Retail trade, except of motor vehicles; repair of personal and household goods	31826	38256	70082
Hotels and restaurants	**9891**	**15786**	**25677**
Transport, storage and communication	**17294**	**19133**	**36427**
Financial intermediation	**4870**	**4885**	**9755**
Real estate, renting and business activities; social service activities	**122813**	**110316**	**233129**
Real estate activities	17969	22078	40047
Renting of machinery and equipmentr and of personal and household goods	2247	2067	4314
Computer and related activities	10551	9290	19841
Other business activities	68773	57403	126176
Other community, social and personal service activities	23273	19478	42751
Total	**359477**	**359477**	**718954**

TABLE 3.5: *Firms categorised by size of balance sheet*

Size of balance sheet (€)	Dividend-distributing firms	%	Non-dividend firms	%	All firms	%
-100000	127484	35.46	121361	33.76	248845	34.61
100001-1000000	185239	51.53	194665	54.15	379904	52.84
1000001-10000000	40214	11.19	37831	10.52	78045	10.86
10000001-50000000	4534	1.26	3843	1.07	8377	1.16
50000001-	2006	0.56	1777	0.49	3783	0.53
Total	359477	100	359477	100	718954	100

There are no major differences in the breakdown of firms that distributed dividends and those that did not into sectors and categories according to balance sheet size. Crossing the balance sheet size categories and sectors shows that in most cases firms similar in size also operate in the same sector (not reported).

Based on these results, we can state that we now have two groups of firms available, one comprising firms that distributed dividends and the other comprising firms that did not. Both groups include over 350,000 firms that are distributed across sectors in a similar manner and that include similar amounts of firms of the same size in terms of balance sheet total.

Next, differences between these groups are analysed with a simple t-test of two independent samples. Equality of the variances and thus also standard deviations of the groups has been deduced on the basis of *Levene*'s test, after which a suitable t-test value has been chosen. The variables compared are financial key figures, personnel and wage expense data, in addition to e.g. sales growth figures.

TABLE 3.6: *T-test results*

Variable	Dividend distribution	Mean	Difference	T-value	P-value
Sales	Yes	2817774	152869	0.83	0.406
	No	2664905			
Sales growth (%)	Yes	2.04	-1.77	-20.90	0.000
	No	3.81			
Operating income	Yes	247972	74271	2.70	0.007
	No	173701			
Operating margin (%)	Yes	16.02	9.54	154.16	0.000
	No	6.48			
Profit for the financial year	Yes	212615	155884	6.54	0.000
	No	56731			
Total profit margin (%)	Yes	11.65	10.02	194.57	0.000
	No	1.63			
N of personnel	Yes	17.66	-0.609	-1.55	0.129
	No	18.27			
Wage expenses	Yes	353311	-37534	-2.98	0.003
	No	390845			
Wage expenses/personnel	Yes	15143	-1821.85	-2.63	0.048
	No	16965			
Wages/sales (%)	Yes	32.05	-4.63	-2.21	0.082
	No	36.68			
Real investments	Yes	191875	-89592	-4.45	0.000
	No	281467			
Real investments/sales (%)	Yes	10.7	-14.52	-26.86	0.000
	No	25.22			
Capital Intensity (K/L)	Yes	158.97	34.02	0.22	0.673
	No	124.95			
Value added	Yes	1325940	22514	0.23	0.821
	No	1303426			
Value added/personnel	Yes	97556	34299	1.06	0.290
	No	63257			
EBITDA margin (%)	Yes	20.5	7.5	2.21	0.027
	No	13			
Return on equity (%)	Yes	23.07	17.97	7.60	0.000
	No	5.1			
Equity ratio (%)	Yes	33.18	9.28	9.75	0.000
	No	23.90			

Since the size of the groups of firms was harmonised at the time of matching, there is no statistically significant difference in average sales between the groups. Average sales among the dividend-distributing firms in 1994–2004 were about 2,800,000 EUR, and among non-dividend firms about 2,650,000 EUR.

In contrast, the difference between the groups in sales growth is statistically significant. The average sales of firms that did not distribute dividends have grown significantly faster than the average sales of dividend-distributing firms. The average real sales growth of non-dividend firms in the review period has been 1.77 percentage points faster than that of dividend-distributing firms.

The profit variables (operating profit and profit for the financial year) and the profitability indicators (operating margin and total profit margin) are statistically significantly higher among dividend-distributing firms. Both operating profit and total profit relative to sales have been on average about 10 percentage points higher among the dividend-distributing firms. According to the data, average total profit among dividend-distributing firms in 1994–2004 was about 213,000 EUR, while among non-dividend firms it was 57,000 EUR.

According to the data, the average number of personnel in both dividend-distributing and non-dividend firms is about 18 people. Average wage expenses are higher in non-dividend firms than in dividend-distributing firms However, when wage expenses are proportioned to the number of personnel or sales, the statistical significance of the differences between the averages is reduced: nevertheless, the difference is still at a significance level of about 5–10% statistically significant. Broadly speaking, we can state that in firms that do not distribute dividends, more money is spent on wages than in firms that pay dividends.

Non-dividend firms invested statistically significantly more than firms that distributed dividends. Average gross investments among non-dividend firms were 241,000 EUR in the review period, while the corresponding figure for firms that distributed dividends was 171,000 EUR. This finding also applies to investments as a proportion of sales: the average gross investment/sales figure for non-dividend firms (25%) is statistically significantly higher than the corresponding figure for firms that distributed dividends (11%).

Value added and value added per employees do not show a statistically significant difference between dividend-distributing firms and those that did not distribute dividends. This means that dividend-distributing and non-dividend firms on average generated the same amount of value added. Due to deficiencies in the data, value added has been calculated simply as *sales* minus *purchases*.

Profitability indicators – EBITDA margin and return on equity – were statistically significantly higher among firms that distributed dividends than among those that did not. On average, firms that distributed dividends were also, according to these indicators, more profitable than non-dividend firms. For example the average return on equity among firms that distributed dividends in 1994–2003 was 23%, against only 5% for firms that did not distribute dividends.

Dividend-distributing firms are also on average more solvent than non-dividend firms. The difference in solvency as measured by equity ratio was 9 percentage points in the data used: a statistically significant difference.

The findings can be interpreted as indicating that the dividend-distributing firms are in a different phase of growth from the non-dividend firms.[42] The distribution of dividend is clearly linked to a firm's other financial decisions. Based on the findings, we can draw the conclusion that firms distributing dividends are mature firms whose productive investment targets and thus growth opportunities have been reduced. On the other hand, firms that distributed dividends are stable, profitable and productive market participants. These firms have solid market positions but do not seek any significant increase of market share. The findings indicate that dividends are distributed to a small extent at the expense of the personnel and wages. On the other hand, in firms that distribute dividends, recruitment and competition for employees may not be as intense as among firms that do not distribute dividends.

3.4. Stability of dividends in listed and non-listed firms

We next compare the stability of dividend distribution by listed and non-listed firms: the probability of beginning and ceasing distribution of dividends, probability of increasing or decreasing the dividends distributed, and the proportion of dividends of the profit for the period. With respect to the hypotheses presented in Section 3.2, the focus of analysis is Hypothesis 2.

The review is based on similar matching of firms as for the analyses in the previous section. This means that, for each listed firm, we seek to find a pair in the group of non-listed firms. This task is more challenging than the pairing in the previous section because the differences between

[42] The age of a corporation would be an interesting control variable in the matching stage, but the data does not allow age to be taken into account.

listed and non-listed firms are considerably larger than the differences between firms that did or did not distribute dividends.

In the matched pairs method, the treatment and control groups are formed so that the groups are similar in terms of certain characteristics. If they have similar characteristics, then the resulting difference between two matched observations is theoretically the treatment effect, the effect of listed status. In other words, other characteristics of firms in two groups should be roughly the same to ensure the sample is randomly determined or exogenously given. The establishment of matched pairs becomes increasingly harder as the number of variables that should be similar for the pair increases. Rosenbaum and Rubin (1983) solved the problem by showing that if controlling every observable factor eliminates the difference due to systematic selection between the treatment group and the control group, it is enough to control the probability of belonging to the treatment group. Therefore, instead of the comparative pairs having to be similar with respect to a large number of variables, it is enough that they are similar in terms of the probability reviewed. This probability can be easily estimated for the whole data, and comparative pairs can be selected whose estimated probability is as similar as possible.

A matched pairs method based on probabilities is an effective way to summarise differences between firms in a large group of variables into a one-dimensional indicator, which allows us to find a comparative match for each firm that is as equal to it as possible. The matched pairs are on average equal in terms of the desired factors.

The controlled factors are sales growth, profitability as measured by EBITDA relative to balance sheet, and solvency as measured by debt stock relative to balance sheet. The objective is that listed and non-listed firms are in the same growth phase as closely as possible and as similar in terms of profitability and solvency as possible. Logarithm of the number of personnel is also included as one of the controls in the estimation, but in Finland there are not many non-listed firms as large as listed firms, and as a result the requirement for similar size in terms of number of personnel is fairly loose.

A similar study based on dividend data from US firms has been conducted by Michaely and Roberts (2006). According to their findings, both listed and non-listed firms aim to avoid ceasing distribution of dividends and cutting the amount of dividends. Particularly in listed firms, fluctuations in profit level are scarcely visible in the distribution of dividends. In contrast, non-listed firms tend to be more prone to increase dividends in connection with positive shocks. According to their findings, listed firms distribute a larger proportion of their profits as dividends than non-listed firms.

In the present study, the *propensity score matching* estimator is based on the *nearest neighbour* method. The results of the estimation are presented in Table 3.7. The estimation utilises firm panel data from the years 1994–2004. Year dummy and sector dummy variables have been used in the estimation as controls. The first column of the table reports the results as estimated from the original data. The second column presents the results of estimating the model with data comprising only the matched pairs. If matching of the comparative pairs according to the desired variables has been successful, the coefficients in the second column should be considerably lower than in the estimation results based on the whole data.

***TABLE 3.7:** Results of probit estimation*

PROBIT estimation results	Before	After
Sales growth rate (%)	0.299 (0.0320)**	0.0000837 (0.00018)
EBITDA$_t$/balance sheet$_t$	-0.186 (0.0499)**	0.0000457 (0.000023)
Debt$_t$/balance sheet$_t$	-0.411 (0.395)**	-0.0037 (0.00403)
ln(Employment)	2.755 (0.147)**	0.921 (0.116)**
Agriculture, hunting and forestry	-0.328 (0.274)	-2.175 (0.749)
Mining and quarrying	0.549 (0.252)*	-0.998 (0.727)
Manufacture of food products, beverages and tobacco	1.231 (0.0981)**	0.389 (0.682)
Manufacture of textiles	0.536 (0.1414)**	0.857 (0.694)
Manufacture of leather and leather products	-	-
Manufacture of wood and wood products	0.537 (0.1312)**	-0.620 (0.694)
Manufacture of pulp, paper and paper products	1.507 (0.120)**	0.419 (0.691)
Publishing, printing and reproduction of recorded media	0.853 (0.0968)**	-0.225 (0.680)
Manufacture of coke, refined petroleum products and nuclear fuel	1.473 (0.416)**	0.587 (0.697)
Manufacture of chemicals, chemical products and man-made fibres	1.265 (0.118)**	0.613 (0.691)
Manufacture of rubber and plastic products	1.095 (0.113)*	-0.500 (0.697)
Manufacture of other non-metallic mineral products	0.751 (0.139)**	-0.017 (0.716)
Manufacture of basic metals	1.225 (0.161)**	-0.543 (0.682)
Manufacture of fabricated metal products, except machinery and equipment	0.604 (0.104)**	0.145 (0.679)
Manufacture of machinery and equipment n.e.c.	1.057 (0.0944)**	0.488 (0.680)
Manufacture of electrical and optical equipment	1.258 (0.0942)**	-0.337 (0.703)
Manufacture of transport equipment	0.789 (0.140)**	-0.967 (0.712)
Manufacturing n.e.c.	0.207 (0.185)	-0.0122 (0.696)
Electricity, gas and water supply	0.659 (0.123)**	-1.242 (0.681)
Construction	0.0608 (0.106)	-0.824 (0.685)
Sale, maintenance and repair of motor vehicles and motorcycles	0.325 (0.111)**	-0.695 (0.677)
Wholesale trade and commission trade, except of motor vehicles	0.428 (0.0915)**	-0.907 (0.681)
Retail trade, except of motor vehicles; repair of personal and household goods	0.224 (0.101)*	-1.138 (0.696)
Hotels and restaurants	-	-
Transport, storage and communication	0.121 (0.136)	0.371 (0.685)
Financial intermediation, except insurance and pension funding	0.962 (0.104)**	-0.0034 (0.679)
Insurance and pension funding, except compulsory social security	-	-
Real estate activities	0.602 (0.0927)**	0.369 (0.699)
Renting of machinery and equipmentr and of personal and household goods	0.835 (0.123)**	0.706 (0.680)
Computer and related activities	0.940 (0.093)**	-0.187 (0.677)
Other business activities	0.475 (0.0889)**	-0.522 (0.695)
Year 1994	0.231 (0.0481)**	0.231 (0.0481)**
Year 1995	0.203 (0.0479)**	0.103 (0.0868)
Year 1996	0.219 (0.0459)**	0.067 (0.0844)
Year 1997	0.165 (0.0450)**	0.071(0.0829)
Year 1998	0.143 (0.0454)**	0.037 (0.0833)
Year 1999	0.200 (0.0455)**	0.223 (0.0845)*
Year 2000	0.066 (0.0442)	0.057 (0.0809)
Year 2001	0.0594 (0.0435)	0.029 (0.0810)
Year 2002	-0.101 (0.0483)	-0.196 (0.0876)
Year 2003	-0.081 (0.120)	-0.211 (0.093)
Constant	-3.218 (0.0908)**	-0.745 (0.676)
Number of firms	510648	4170
Number of listed firms	2085	2085
Number of non-listed firms	508563	2085
Log likelihood	-6261.67	-2761.18
Pseudo R2	0.1221	0.0165

In results based on data only including the matched pairs, the explanatory variables are not statistically significant, or statistical significance is much lower than in the results of the estimation based on the whole data. On this basis, the establishment of pairs, matching of listed and non-listed firms according to desired characteristics, has been fairly successful.

The final data contains 4,170 limited firms, half listed and the other half non-listed firms. The different distribution into size categories of the firms within the groups is a problem: the non-listed firms are considerably smaller than the listed firms, and the difference in size category is statistically significant. This may cause bias in the results. On the other hand, the question arises as to whether, with respect to the dividend questions reviewed, such differences in firm size really play much of a role in terms of the impacts analysed. Table 3.8 shows the distribution of listed and non-listed firms into size categories based on the number of personnel. The differences are clear, although taking the number of personnel into account in the estimation has eliminated some of the bias.

TABLE 3.8: *Distribution of listed and non-listed firms into size categories*

Size of personnel	Listed firms	%	Non-listed firms	%	All firms	%
-5	0	0.00	0	0.00	0	0
6-10	0	0.00	31	1.49	31	0.74
11-50	48	2.30	133	6.38	181	4.34
51-251	607	29.11	1088	52.18	1695	40.65
251-	1430	68.59	833	39.95	2263	54.27
Total	2085	100	2085	100	4170	100

The differences between these groups are again analysed with a simple t-test of two independent samples. Equality of the variances is tested with *Levene*'s test, after which a suitable t-test value is chosen. The variables compared are related to the probabilities of beginning or ceasing dividend distribution, the probability of increasing or decreasing dividends and the proportion of dividends relative to the profit for the period.

TABLE 3.9: *T-test results*

Variable		Mean	Difference	T-value	P-value
Pr(beginning dividend distribution)	Listed firm	0.07	-0.20	-23.72	0.000
	Non-listed firm	0.27			
Pr(raising dividends)	Listed firm	0.22	-0.15	-13.91	0.000
	Non-listed firm	0.37			
Pr(ceasing dividend distribution)	Listed firm	0.07	-0.18	-17.45	0.000
	Non-listed firm	0.25			
Pr(cutting dividends)	Listed firm	0.12	-0.11	-4.83	0.001
	Non-listed firm	0.23			
Size of decrease in dividends (relative to dividends_{t-1})	Listed firm	0.11	-0.13	-3.27	0.004
	Non-listed firm	0.24			
Size of increase in dividends (relative to dividends_{t-1})	Listed firm	0.17	-0.14	-3.43	0.003
	Non-listed firm	0.31			
Payout ratio_t	Listed firm	0.21	-0.09	-6.41	0.000
	Non-listed firm	0.30			

The results show that the probability of beginning or ceasing distribution of dividends is statistically significantly higher among non-listed firms than among listed firms. In the data for 1994–2004, the probability was on average 25–27% among non-listed firms and 7% among listed firms – i.e. about 20 percentage points less among listed firms. All in all, the difference is considerable: the decision to distribute dividends in non-listed firms is very unstable over time.

Non-listed firms have also been more likely to raise and cut dividends than listed firms. The probability of a non-listed firm increasing dividends was 37%, while the corresponding probability for listed firms was 22%. The probability of cutting dividends was 22% among non-listed firms and 12% among listed firms. Both differences are statistically significant.

The size of increases or decreases in dividends relative to previous dividends also differs between listed and non-listed firms. According to the data, average changes in the distribution of dividends by non-listed firms have been statistically significantly larger than average changes by listed firms. The average increase in dividends by non-listed firms relative to previous dividends was 31% in 1994–2004, while the average increase by listed firms was 17%. In the same vein, the average dividend cut by non-listed firms was 24%. Among listed firms, the corresponding reduction relative to the previous year's dividends was 11% on average.

The last piece of information presented in the table shows that non-listed firms on average distributed about 30% of their profits to the owners as dividends. For listed firms, the figure is 21%. Hence, non-listed firms on average distribute a higher proportion of their profits to their owners than listed firms. The difference in payout ratios is statistically significant.

The results indicate that there are considerable differences in the dividend policies of listed and non-listed firms. Non-listed firms are more likely than listed firms to begin and cease distributing dividends. Non-listed firms are also more prone to making changes in the amount of the dividends distributed. Furthermore, dividend raises and cuts are on average larger among non-listed firms. The stable dividend policy of listed firms in comparison to non-listed firms can be construed as evidence that dividends distributed by listed firms have information content the markets react to. Listed firms seek to take market reactions into account in their dividend decisions and are reluctant to make material changes to their dividend policies. Hence, the results can be considered to lend support to the dividend signalling hypothesis.

3.5. Dividend policies of Finnish firms: application of Lintner's model

Lintner's model is the most widely known empirical model explaining dividend policy, and it has been tested extensively in dividend studies. The model does not have a theoretical basis; it has been derived from interviews with corporate executives. Lintner found that corporate managers regard it as a negative sign of a firm's quality if the dividend is reduced or skipped.

Lintner's model was presented in Section 2.1. According to Lintner's model, each period's dividends can be explained by the dividends of the previous period and profits. A firm may has a target dividend level to which it adjusts its dividend distribution in the long term. Firm seeks stable dividend distribution, and only a permanent change in profit performance lead to a change in the dividends distributed. In the above section, Hypothesis 7 is tested.

Furthermore, Lintner's model is used as the basis in testing other hypotheses presented in Section 3.2. For this purpose, the model is supplemented with variables relating to firms' economic performance, growth opportunities and ownership.

Economic performance

First, we seek an explanation for the connection between firms' economic performance and dividend distribution. In the estimated model, the economic performance of firms is measured with indebtedness, financial income and return on capital employed. Of the dividend theory based hypotheses in Section 3.2, Hypotheses 3 and 5 are tested.

In addition, we assess whether dividend decisions reflect the capital/labour intensiveness of a business and the efficiency of the business (value added/personnel expenses). However, no hypotheses were formulated in advance for the connection between these factors and a firm's dividend distribution.

Growth opportunities

Secondly, we review the connection between variables describing a firm's growth opportunities and dividend distribution. The estimated Lintner's model is supplemented by the following explanatory variables: sales growth, financial and real investments made and growth in wages paid. Of the dividend theory based hypotheses in Section 3.2, Hypotheses 4 and 6 are reviewed.

Ownership

Thirdly, we review the impact of ownership structure on dividend decisions. As explanatory variables, Lintner's model is supplemented with the ownership share of the main shareholder, interaction term of the type of the main shareholder (domestic, institutional, foreign) and the relative holding of that shareholder type, and number of shareholders. Furthermore, estimation models concerning non-listed firms are supplemented with a dummy variable taking the value 1 when the main shareholder is also a manager in the firm and the value 0 in other cases.[43] With respect to the hypotheses presented in Section 3.2, the focus of analysis is Hypotheses 8 and 9.

Our aim is to draw conclusions about the factors explaining the dividend policies of Finnish firms of different size and market position. Empirical analyses are conducted separately for listed firms, small and medium-sized firms (number of personnel over 5) and micro-firms (number of personnel up to 5).[44] Listed firms can be picked from the data using a variable denoting listed firms. The number of personnel is a somewhat incomplete variable, particularly in the early years of the data.

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[43] With respect to listed firms, the data only provides incomplete indications of the main shareholders' possible management role.

[44] EU has started to standardize the definition of what constitutes micro, small and medium firms. Its current definition categorizes firms with fewer than 10 employees as "micro", those with fewer than 50 employees as "small", and those with fewer than 250 as "medium". However, we deviate from this concept for two reasons. First, we want that two firm categories (micro firms and small and medium-sized firms) are approximately same size measured on the number of observations. Second, we have done the analysis also by distributing firms in several categories (5-6) according to the number of personnel. "Thicker" categorization does not bring any new information to the analysis.

Efforts have been made to review and revise it on the basis of wage data and number of personnel in previous years. The groups have been fixed on the basis of the last personnel figure in the data.[45] The results for each group of firms have been presented in a separate table.
Inclusion of ownership data was possible only for those limited firms that distributed dividends. Furthermore, the data on main shareholder is only available from 1998. Therefore, estimations accounting for data at the level of main shareholder have been made with the panel data for firms that distributed dividends in 1998–2004. Missing of 0 observation values for the dependent variable is a problem and may be reflected as selection bias in the results.

Econometric methods

Lintner's model and its extensions are estimated with panel data covering the years 1994–2004 (1998–2004 for owner variables) using five different methods: *Pooled OLS*, *Fixed Effects (Within-Group*), *Differenced GMM* (*Generalized Method of Moments*), *System GMM*, and the *Robust* estimation method. First, we estimate baseline *OLS* and *Fixed Effects* estimators by assuming that all explanatory variables are strictly exogenous. Second, we estimate dynamic panel data *GMM* estimators to account for the potential endogeneity of a firm's decisions on dividends and other financial decisions.

Simple specification for Lintner's model can be presented as:

$$D_{it} = \alpha + \beta_1 P_{it} + \beta_2 D_{i(t-1)} + \beta_3 X_{it} + \eta_i + \varepsilon_{it}$$
$$\varepsilon_{it} \sim iid(0, \sigma^2);\ i = 1,2,\ldots,N;\ t = 1,\ldots,T$$

where $D_{i,t}$ = dividends to be distributed
P_{it} = profits
X_{it} = control variables
a = constant relative to dividend growth

[45] Findings based on many dividend theories indicate that instead of number of personnel, the data should be grouped by shareholder type or number of shareholders. However, the use of data on ownership is limited by the fact that it is only available for firms that have distributed dividends. Although the connection between number of personnel and number of shareholders is imperfect, number of personnel has been considered the best classification variable among the selection of available variables.

β_1 = factor describing dividend adjustment
η_i = individual firm fixed effect
ε_{it} = idiosyncratic error term

In the equation subscripts, *i* and *t* index firm and time, respectively.

The basis of the econometric analysis is the pooled ordinary least squares method (*Pooled OLS*). The model includes a homogeneity assumption: firms have the same parameter values and same constant term, and hence also a common long-term equilibrium. Unobserved heterogeneity at the firm level results in biased *OLS* estimates. It can be assumed that firms have many different unobserved firm-specific factors: values, knowhow and traditions. These differences may also have an effect on the phenomenon reviewed (dividend distribution behaviour), so the model must also account for the effects of firm-specific factors. These firm-specific factors usually change slowly over time, so in the short term they can be reviewed as constant. One way of solving the problem is to eliminate the firm-specific impact by transforming each variable to be its deviation from its firm mean, i.e. to 'time-demean' the data (within transformation). The estimator thus created is called a *Fixed Effects* (*Within-Group*) estimator. *Fixed Effects* allow us to control for unobserved time-invariant differences in firms. By η_i in Equation 3.1 we control for *this* unobserved heterogeneity between firms. The unobserved firm level effect may also correlate with other independent variables in the model. In this situation, a *Fixed Effects* estimator is more appropriate than, for example, a *GLS* estimator *(Generalised Least Squares)*, which assumes the correlation between the general error term and the independent variables to be zero. The *Fixed Effects* estimator eliminates most forms of unobserved heterogeneity. However, the method does entail certain problems: with *Fixed Effect* regressions we cannot estimate the effects of time-constant covariates. These are all cancelled out by the within transformation. This reflects the fact that panel data do not help to identify the causal effect of a time-constant covariate.

Both *OLS* and *Fixed Effects* estimation methods include the assumption of strict exogeneity: the independent variable and the idiosyncratic error term are uncorrelated. One of the independent variables in Lintner's model is a lagged dependent variable, so the distribution of the error term can no longer be considered independent of the distribution of the lagged independent variable. Under this kind of endogeneity, *OLS* and *Fixed Effects* estimators are inconsistent. The bias of the two estimators does, however, operate in opposite directions. The ordinary least squares estimate of the coefficient on the lagged dependent variable is biased upwards because of the positive correlation between the individual specific effects and the lagged dependent variable. Conversely, the fixed effects estimate is biased downwards because of the negative correlation between the within-transformed error term and the within-transformed lagged dependent variable. The *OLS* and *Fixed Effects* estimates of the coefficient on the lagged dependent variable may thus be viewed as forming upper and lower bounds, respectively, on the true parameter.

However, several alternative consistent estimators have been developed in the econometric literature to estimate dynamic panel data models, as the conventional panel data estimators are inconsistent in the presence of a lagged dependent variable. Most proposed solutions rely on first-difference transformations of the data. The correlation between the difference of the error term and the difference of the lagged independent variable can be eliminated by using an appropriate group of instrument variables. Anderson and Hsiao (1981) suggest to first-difference the model to remove the fixed effects and then instrument the one-period lagged difference of the dependent variable with the two-period lagged level or the two-period lagged difference to eliminate the correlation between the differenced error term and the differenced lagged dependent variable.

The Anderson and Hsiao estimator is a consistent estimator for a dynamic panel data model. However, Arellano and Bond (1991) show that the Anderson and Hsiao estimator is not necessarily an efficient estimator, and that significant efficiency gains may be achieved by using additional instruments. This means that if the lagged instrument (*t-2*) is not correlated with the differenced error term, then any further lagged instrument (*t-3, t-4 etc*) is also not correlated with the differenced error term, and thus constitutes a valid instrument. As a result, Arellano and Bond (1991) suggest taking all available lags as instruments using Hansen's (1982) *Generalized Method of Moments* (*GMM*)[46], and demonstrate in a *Monte Carlo* simulation that this estimation procedure significantly improves the estimation efficiency.

The Arellano and Bond estimation technique has become a standard procedure for analysing dynamic panel data. The *GMM* estimate allows explanatory variables to be correlated with the individual effects η_i. It controls for endogeneity by using the lagged values of the levels of the

[46] A presentation of the *GMM* estimator: Baltagi (2001).

endogenous variables as instruments. Hence, the model may include independent variables determined at the same time as dividends. This technique corrects for bias inherent in estimation of dynamic panel models by ordinary least squares and controls for all effects of fixed firm characteristics. Standard estimators, such as *OLS*, may actually be considered special cases of the *GMM* method.

The only identifying assumption is that the instrument correlates high with explanatory variables but does not correlate with the error term. The consistency of the parameters obtained depends crucially on the validity of the instruments. Arellano and Bond suggest two specification tests. The first test examines the serial correlation of the error term, which tests the null hypothesis that the differenced error term is first-and-second-order serially correlated. Failure to reject the null hypothesis of no second-order serial correlation implies that the original error term is serially uncorrelated and the moment conditions are correctly specified.[47] The second test is a test of the validity of the instruments.[48] Arellano and Bond propose the *Sargan* test (Sargan, 1958) of overidentifying restrictions, which tests the null hypothesis of overall validity of the instruments used. Failure to reject this null hypothesis gives support to the choice of the instruments.

However, it has been recognized that Arellano-Bond estimation can suffer from both bias arising from the use of 'too many' instruments and inefficiency arising from the fact that the first-differencing transformation employed essentially throws away the information contained in the levels of the data. In addition, it is problematic to use lagged levels as instruments because they are usually only correlated with the subsequent first differences of these variables and therefore have weak explanatory power.

Blundell and Bond (1998) have shown that there are situations where the lagged levels of the variables are weak instruments and the Arellano and Bond estimation technique (*GMM-DIFF)* provides a downward-biased estimate of the coefficient on the lagged dependent variable. Using *Monte Carlo* simulations, Blundell and Bond (1998) show that in these situations the *Generalised Method of Moments in System* (*GMM-SYS*)

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[47] See Arellano and Bond (1991) for details.

[48] The central requirement for the validity of an instrument is that the instrument is not correlated with the error terms. If that is not the case, a moment restriction is violated.

provides better estimators than *GMM-DIFF*. The system consists of two types of equations, each of which has its own instruments. The first type of equation is in levels, and the instruments are the lagged differences in the dependent variable and the independent variables. The second type consists of equations in first differences with the levels of the dependent variable and the independent variables as instruments.

In addition to the effects in Equation 3.1, we also explore the dynamic effects of economic performance and growth variables by both *GMM* methods. Financial decisions are dynamic in nature and the effects on dividend decision may be realized with a lag. Lintner's model estimated with dynamic panel-data *GMM* estimation strategies takes the following form:

$$D_{it} = \alpha + \beta_1 D_{it-1} + \beta_2 P_{it} + \beta_3 P_{it-1} + \beta_4 X_{it} + \beta_5 X_{it-1} + \eta_i + \varepsilon_{it} \tag{3.2}$$

$$\varepsilon_{it} = \eta_i + \upsilon_{it};\ \upsilon_{it} \sim iid(0, \sigma^2);\ \ i = 1,2,\ldots,N;\ t = 2,3,\ldots,T. \tag{3.3}$$

The presence of individual effects η_i in the error term ε_{it} implies that the lagged dependent variable D_{it-1} is positively correlated with ε_{it}. If error terms v_{it} are serially uncorrelated, it can be shown that the *OLS* estimator for β_1 is inconsistent.

In differenced *GMM,* an instrument variable matrix is constructed, where the lagged levels of explanatory variables are used as instruments for the corresponding first-differenced variables. In system *GMM*, an estimator is also assumed where the levels of explanatory variables are uncorrelated with individual effects η_i and predetermined with respect to the error term υ_{it}. Thus we use lagged first-differences of explanatory variables as instruments for the *GMM*-level equations.

Since the data used is exceptionally extensive and the group of firms is very heterogeneous, in addition to the methods presented above, estimations are also conducted using a *Robust* estimation method. In *Robust* estimation, the data is weighted so as to reduce the weight of extreme observations relative to observations close to the median. In analysis of the data used, problems are caused by the heterogeneity of the group of firms and a few outlying observations, whose effect on the results easily becomes significant. In robust estimation, the significance of incorrect observations is also reduced. The *Robust* estimator used is *Huber's M* estimator (Huber, 1981). The estimation results of *Robust* models are presented in Appendix 3. In addition, Appendix 2 presents the correlation matrixes of the variables used in the estimations.

***TABLE 3.10:** Estimation results for listed firms*

	OLS				FE			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$Dividends_{t-1}$ (D)	0.7410	0.7016	0.7297	0.8699	0.5521	0.6298	0.6328	0.7305
	(0.0089)**	(0.0098)**	(0.0133)**	(0.0190)**	(0.0154)**	(0.0236)**	(0.0192)**	(0.0135)**
$Profit_t$ (P)	0.0951	0.0789	0.0856	0.0797	0.0799	0.0566	0.0638	0.0821
	(0.0048)**	(0.0065)**	(0.0052)**	(0.0086)**	(0.0066)**	(0.0082)**	(0.0075)**	(0.0062)**
$Profit_{t-1}$								
ECONOMIC PERFORMANCE								
$Debt_t$ (De)		-0.0097				-0.0085		
		(0.0037)**				(0.0040)**		
$Debt_{t-1}$								
$Efficiency_t$ (Ef)		-7283.6				-8251.2		
		(1324.6)**				(2619.2)**		
$Efficiency_{t-1}$								
Operating $profit_t$ /Employed $capital_t$ (ROE)		331334.8				288705.5		
		(51128.6)**				(53455.1)**		
Operating $profit_{t-1}$ /Employed $capital_{t-1}$								
Net finance $returns_t$ (NFR)		0.0036				0.0029		
		(0.0033)				(0.0025)		
Net finance $returns_{t-1}$								
Capital $Intensity_t$ (K/L)		9747.8				17535.9		
		(2312.5)**				(4989.1)**		
Capital $Intensity_{t-1}$								
GROWTH								
Sales $growth_t$ (Gr)			-23956.7				-23033.4	
			(33723.4)				(37516.4)	
Sales $growth_{t-1}$								
Financial $investments_t$ (Finv)			0.0007				0.0004	
			(0.0038)				(0.0051)	
Financial $investments_{t-1}$								
Real $investments_t$ (Rinv)			-0.0045				-0.0057	
			(0.0177)				(0.0228)	
Real $investments_{t-1}$								
Wages $growth_t$ (WGr)			-69424.9				-57377.8	
			(20700.5)**				(23179.1)**	
Wages $growth_{t-1}$								
OWNERSHIP								
Largest ownership $share_t$ (Large)				-132998.1				-96121.7
				(21693.4)**				(21903.5)**
Number of $shareholders_t$ (NS)				517.8				422.6
				(399.6)				(341.8)
Domestic $ownership_t$ (DO)				30757.8				22634.6
				(7776.4)**				(8011.9)**
Foreign $ownership_t$ (FO)				-212885.5				-169051.3
				(6316.4)**				(7692.7)**
Institution $ownership_t$ (IO)				-40768.3				-35777.1
				(9883.9)**				(11241.6)**
CONTROLS								
$Sales_t$ (S)	0.0003	0.0002	0.0002	0.0003	0.0001	0.0001	0.0001	0.0001
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Total $Assets_t$ (TA)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
$Ln(Employment)_t$ (lnE)	4512.7	3659.7	3399.1	4361.8	3266.1	3001.3	3901.0	3771.2
	(1125.5)**	(1419.9)**	(1278.2)**	(1036.4)**	(1431.0)**	(1391.8)**	(1561.2)**	(1489.7)**
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-47556.9	-5108.3	-83581.4	12111.6	-31522.1	-6912.5	-72314.7	3331.4
	(5656.7)**	(1911.2)**	(32112.9)**	(2442.3)**	(8382.4)**	(2783.8)**	(15614.7)**	(2517.3)
Number of observations	1786	1556	1007	824	1786	1556	1007	824
Adj. R^2	0.670	0.753	0.721	0.819	0.472	0.449	0.501	0.553
m1 (p-value)								
m2 (p-value)								
Sargan (p-value)								
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
Instruments								

DIF-GMM						SYS-GMM					
(1)	(2)	(2)'	(3)	(3)'	(4)	(1)	(2)	(2)'	(3)	(3)'	(4)
0.6517	0.6432	0.5980	0.6789	0.6214	0.8455	0.7014	0.7323	0.7017	0.7566	0.7225	0.8038
(0.0121)**	(0.0173)**	(0.0154)**	(0.0214)**	(0.0204)**	(0.0247)**	(0.0092)**	(0.0125)**	(0.0116)**	(0.0103)**	(0.0118)**	(0.0164)**
0.0807	0.0481	0.0382	0.0575	0.0446	0.0630	0.0919	0.0614	0.0482	0.0581	0.0408	0.0703
(0.0074)**	(0.0071)**	(0.0070)**	(0.0066)**	(0.0063)**	(0.0089)**	(0.0051)**	(0.0064)**	(0.0055)**	(0.0056)**	(0.0051)**	(0.0042)**
		0.0022		0.0013				0.0035		0.0021	
		(0.0006)**		(0.0004)**				(0.0008)**		(0.0006)**	
	-0.0047	0.0042					-0.0064	-0.0055			
	(0.0023)*	(0.0028)					(0.0030)**	(0.0025)**			
		0.0007						0.0010			
		(0.0052)						(0.0060)			
	4161.6	3154.2					5209.0	4889.5			
	(2084.8)*	(1071.6)*					(2272.7)**	(2099.4)**			
		1227.9						2208.5			
		(1006.4)						(1648.3)			
	22727.3	31638.5					22501.9	36745.7			
	(6167.3)**	(7015.2)**					(5781.2)**	(7846.9)**			
		-5972.4						-90625.0			
		(2259.3)**						(32328.7)**			
	0.0009	0.0005					0.0031	0.0023			
	(0.0020)	(0.0017)					(0.0024)	(0.0015)			
		0.0003						0.0011			
		(0.0008)						(0.0019)			
	7457.9	5829.4					8622.4	7482.2			
	(3268.7)**	(2531.6)**					(3700.2)**	(2814.3)**			
		-1152.7						-2305.7			
		(1968.3)						(2211.8)**			
			1458.9	1884.3					1767.8	2158.6	
			(2463.7)	(2781.0)					(2891.6)	(3251.8)	
				-5127.5						-8063.5	
				(15628.3)						(11277.9)	
			-0.0002	-0.0003					0.0005	-0.0004	
			(0.0055)	(0.0063)					(0.0043)	(0.0079)	
				0.00008						0.0002	
				(0.0037)						(0.0055)	
			0.0011	0.0019					0.0040	0.0031	
			(0.0207)	(0.0245)					(0.0200)	(0.0223)	
				-0.0005						-0.0002	
				(0.0103)						(0.0101)	
			-216151.8	-211644.6					-119259.8	-110658.1	
			(100591.4)**	(9501.5)**					(63411.9)	(57723.8)	
				-3901.7						-36714.6	
				(1184.8)**						(8438.4)**	
					-83152.6						-97732.6
					(30479.1)**						(32153.4)**
					-376.9						-391.3
					(357.1)						(352.7)
					26908.4						19535.2
					(8812.0)**						(6029.3)**
					-1315613.4						-2013412.8
					(10857.0)**						(9193.3)**
					-26778.2						-29903.2
					(16648.7)						(17391.5)
0.0001	0.0001	0.0001	0.0001	0.0001	-0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
0.0001	-0.0001	-0.0001	0.0001	0.0001	0.0001	0.0001	-0.0001	-0.0001	0.0001	0.0001	-0.0001
(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
2681.1	3207.5	2329.7	3443.9	5381.0	4112.7	2873.5	3619.6	2739.5	4106.7	7053.6	3569.3
(1995.3)	(1662.4)*	(1403.9)*	(2009.1)	(2819.7)	(1571.9)**	(1515.7)	(1571.2)**	(1299.6)**	(2044.6)*	(4184.3)	(1661.4)**
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
-60838.1	-5512.3	-23916.6	-48395.6	-11392.5	7683.0	-17791.7	-6392.9	-12395.3	-55889.0	-33957.7	15100.8
(20335.7)**	(4028.6)	(26183.7)	(24112.6)*	(17293.9)*	(5513.9)	(7822.6)**	(3345.1)	(8739.1)	(21739.1)**	(15397.1)**	(7449.9)*
1491	1303	914	808	752	777	1491	1303	914	808	752	777
0.002**	0.050*	0.103	0.023*	0.126	0.003**	0.004**	0.085	0.112	0.035*	0.148	0.009**
0.098	0.184	0.241	0.082	0.289	0.038*	0.117	0.256	0.274	0.095	0.323	0.076
0.347	0.561	0,772	0.555	0,805	0.016*	0.428	0.598	0.817	0526	0.849	0.150
0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, D_{t-2}, $large_{t-2}$, NS_{t-2}, DO_{t-2}, FO_{t-2}, IO_{t-2}, S_{t-2}, TA_{t-2}, lnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔDe_{t-2}, ΔEf_{t-2}, ΔROE_{t-2}, ΔNFR_{t-2}, $\Delta K/L_{t-2}$, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔDe_{t-2}, ΔEf_{t-2}, ΔROE_{t-2}, ΔNFR_{t-2}, $\Delta K/L_{t-2}$, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔGr_{t-2}, $\Delta Finv_{t-2}$, $\Delta Rinv_{t-2}$, ΔWGr_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔGr_{t-2}, $\Delta Finv_{t-2}$, $\Delta Rinv_{t-2}$, ΔWGr_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, D_{t-2}, $large_{t-2}$, NS_{t-2}, DO_{t-2}, FO_{t-2}, IO_{t-2}, S_{t-2}, TA_{t-2}, lnE_{t-2}, ΔP_{t-2}, ΔD_{t-2}, $\Delta large_{t-2}$, ΔNS_{t-2}, ΔDO_{t-2}, ΔFO_{t-2}, ΔIO_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies

TABLE 3.11: Estimation results for small and medium-sized firms

	OLS				FE			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Dividends$_{t-1}$ (D)	0.6241	0.6024	0.5438	0.6926	0.4417	0.4356	0.4155	0.5252
	(0.0236)**	(0.0282)**	(0.0321)**	(0.0178)**	(0.0399)**	(0.0423)**	(0.0445)**	(0.0404)**
Profit$_t$ (P)	0.3111	0.2311	0.2504	0.3412	0.1701	0.1437	0.1449	0.2538
	(0.0001)**	(0.0005)**	(0.0001)**	(0.0001)**	(0.0011)**	(0.0022)**	(0.0027)**	(0.0009)**
Profit$_{t-1}$								
ECONOMIC PERFORMANCE								
Debt$_t$ (De)		-0.0321				-0.0248		
		(0.0032)**				(0.0039)**		
Debt$_{t-1}$								
Efficiency$_t$ (Ef)		-716.4				-661.5		
		(591.0)				(516.7)		
Efficiency$_{t-1}$								
Operating profit$_t$ /Employed capital$_t$ (ROE)		15599.3				18671.2		
		(4074.2)**				(4588.6)**		
Operating profit$_{t-1}$ /Employed capital$_{t-1}$								
Net finance returns$_t$ (NFR)		0.0048				0.0055		
		(0.0032)				(0.0039)		
Net finance returns$_{t-1}$								
Capital Intensity$_t$ (K/L)		660.1				548.5		
		(455.1)				(460.7)		
Capital Intensity$_{t-1}$								
GROWTH								
Sales growth$_t$ (Gr)			-73979.6				-53355.1	
			(21412.9)**				(26588.3)*	
Sales growth$_{t-1}$								
Financial investments$_t$ (Finv)			0.0012				0.0017	
			(0.0004)**				(0.0008)*	
Financial investments$_{t-1}$								
Real investments$_t$ (Rinv)			-0.0719				-0.0659	
			(0.0188)**				(0.0203)**	
Real investments$_{t-1}$								
Wages growth$_t$ (WGr)			-38117.2				-29784.4	
			(12141.6)**				(16036.7)	
Wages growth$_{t-1}$								
OWNERSHIP								
Largest ownership share$_t$ (Large)				-31743.6				-26398.0
				(4341.4)**				(5162.8)**
Number of shareholders$_t$ (NS)				777.0				801.4
				(303.6)**				(381.8)**
Domestic ownership$_t$ (DO)				7878.9				9006.8
				(1125.5)**				(2318.7)**
Foreign ownership$_t$ (FO)				-19855.5				-17979.4
				(5471.2)**				(5119.9)**
Institution ownership$_t$ (IO)				-27690.3				-22005.8
				(5445.6)**				(5819.1)**
Manager$_t$ (M)				20083.7				15573.0
				(3362.9)**				(3074.8)**
CONTROLS								
Sales$_t$ (S)	0.0007	0.0005	0.0006	0.0007	0.0006	0.0006	0.0005	0.0006
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Total Assets$_t$ (TA)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Ln(Employment)$_t$ (lnE)	334.8	264.1	295.4	361.8	505.8	471.3	449.9	543.1
	(284.4)	(200.9)	(265.8)	(277.1)	(301.1)	(333.6)	(279.2)	(371.9)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-891.0	-1728.1	-361.9	418.6	-756.4	-2604.6	-441.8	317.9
	(531.4)	(804.1)**	(351.6)	(147.7)**	(236.8)**	(988.9)**	(318.1)	(199.1)
Number of observations	699572	643999	582117	545785	699572	643999	582117	545785
Adj. R^2	0.592	0.611	0.603	0.627	0.216	0.241	0.229	0.307
m1 (p-value)								
m2 (p-value)								
Sargan (p-value)								
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
Instruments								

DIF-GMM						SYS-GMM					
(1)	(2)	(2)'	(3)	(3)'	(4)	(1)	(2)	(2)'	(3)	(3)'	(4)
0.4701	0.5382	0.4898	0.4155	0.3996	0.5463	0.5641	0.6024	0.5815	0.4986	0.4561	0.7160
(0.0309)**	(0.0354)**	(0.0291)**	(0.0322)**	(0.0303)**	(0.0402)**	(0.0139)**	(0.0184)**	(0.0177)**	(0.0165)**	(0.0163)**	(0.0262)**
0.1777	0.1424	0.1288	0.1352	0.1221	0.2649	0.2218	0.1981	0.1727	0.2136	0.2017	0.2924
(0.0012)**	(0.0015)**	(0.0011)**	(0.0019)**	(0.0014)**	(0.0010)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0006)**
		0.0016		0.0027				0.0020		0.0031	
		(0.0003)**		(0.0008)**				(0.0004)**		(0.0008)**	
	-0.0101	-0.0119					-0.0209	-0.0256			
	(0.0042)**	(0.0049)**					(0.0047)**	(0.0051)**			
		0.0088						0.0047			
		(0.0016)**						(0.0014)**			
	85.7	79.4					168.1	109.6			
	(83.4)	(91.5)					(160.5)	(134.8)			
		49.3						62.6			
		(102.8)						(85.3)			
	10991.8	16981.2					9295.1	21264.9			
	(4613.4)**	(7028.4)**					(4455.0)**	(9127.2)**			
		-5914.3						-10382.5			
		(2005.9)**						(3993.0)**			
	-0.0016	-0.0019					0.0026	0.0034			
	(0.0033)	(0.0041)					(0.0037)	(0.0050)			
		0.0001						0.0009			
		(0.0012)						(0.0022)			
	-15.60	-10.04					57.8	61.7			
	(49.2)	(35.6)					(63.3)	(70.6)			
		-3.83						-9.4			
		(19.9)						(24.5)			
			-4302.7	-5182.3					-50591.4	-74761.9	
			(3344.7)	(4257.8)					(32002.1)	(50112.8)	
				892.7						12231.7	
				(1497.1)						(9046.5)	
			0.0005	0.0007					0.0010	0.0017	
			(0.0006)	(0.0010)					(0.0008)	(0.0011)	
				-0.00007						-0.0009	
				(0.0004)						(0.0006)	
			-0.0598	-0.0647					-0.0648	-0.0823	
			(0.0253)**	(0.0279)**					(0.0211)**	(0.0252)**	
				0.0093						0.0164	
				(0.0032)**						(0.0071)**	
			-21598.7	-33991.0					-25481.3	-29194.6	
			(10946.0)*	(10267.8)**					(14539.5)	(16047.8)*	
				10063.7						8162.4	
				(7717.9)						(6044.7)	
					11879.3						10033.9
					(6532.6)						(5481.6)
					-628.4						-588.1
					(411.7)						(338.0)
					6699.3						10112.1
					(1536.8)**						(2641.2)**
					-13011.4						-11930.1
					(6749.1)						(5225.7)**
					-16921.5						-18012.9
					(6383.8)**						(7152.4)**
					14996.2						16321.6
					(4175.9)**						(4227.5)**
0.0005	0.0004	0.0002	0.0003	0.0002	0.0003	0.0006	0.0005	0.0004	0.0004	0.0003	0.0005
(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
561.4	461.7	289.4	558.1	191.5	671.6	611.1	499.5	829.6	538.7	304.6	644.8
(351.7)	(288.5)	(199.1)	(357.8)	(226.4)	(339.9)	(367.2)	(318.4)	(500.6)	(298.6)	(204.7)	(381.0)
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
-771.0	-1565.2	-1274.8	-211.9	-397.8	300.7	-582.9	-1262.6	1802.4	-255.0	-779.5	368.8
(391.4)	(483.5)	(891.9)	(208.5)	(278.5)	(221.0)	(311.8)	(549.9)	(885.3)	(166.7)	(528.4)	(128.1)**
6336712	602744	539014	551998	492664	521312	6336712	602744	539014	551998	492664	521312
0.078	0.114	0.187	0.040*	0.125	0.001**	0.095	0.138	0.222	0.057	0.151	0.046*
0.104	0.177	0.256	0.099	0.161	0.006**	0.124	0.190	0.287	0.136	0.184	0.050*
0.459	0.511	0.757	0.448	0.807	0.009**	0.481	0.545	0.733	0.480	0.795	0.069
0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, D_{t-2}, $large_{t-2}$, NS_{t-2}, DO_{t-2}, FO_{t-2}, IO_{t-2}, S_{t-2}, TA_{t-2}, lnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔDe_{t-2}, ΔEf_{t-2}, ΔROE_{t-2}, ΔNFR_{t-2}, $\Delta K/L_{t-2}$, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔDe_{t-2}, ΔEf_{t-2}, ΔROE_{t-2}, ΔNFR_{t-2}, $\Delta K/L_{t-2}$, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔGr_{t-2}, $\Delta Finv_{t-2}$, $\Delta Rinv_{t-2}$, ΔWGr_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔGr_{t-2}, $\Delta Finv_{t-2}$, $\Delta Rinv_{t-2}$, ΔWGr_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, D_{t-2}, $large_{t-2}$, NS_{t-2}, DO_{t-2}, FO_{t-2}, IO_{t-2}, S_{t-2}, TA_{t-2}, lnE_{t-2}, ΔP_{t-2}, ΔD_{t-2}, $\Delta large_{t-2}$, ΔNS_{t-2}, ΔDO_{t-2}, ΔFO_{t-2}, ΔIO_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies

TABLE 3.12: Estimation results for micro-firms

	OLS				FE			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$Dividends_{t-1}$ (D)	0.2590	0.1221	0.1098	0.3213	0.1441	0.0867	0.0921	0.1532
	(0.0236)**	(0.0308)**	(0.0341)**	(0.0197)**	(0.0399)**	(0.0378)**	(0.0408)**	(0.0171)**
$Profit_t$ (P)	0.5091	0.4253	0.4509	0.7156	0.4191	0.3172	0.2877	0.5856
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0011)**	(0.0011)**	(0.0038)**	(0.0014)**	(0.0015)**
$Profit_{t-1}$								
ECONOMIC PERFORMANCE								
$Debt_t$ (De)		-0.1439				-0.1199		
		(0.0088)**				(0.0079)**		
$Debt_{t-1}$								
$Efficiency_t$ (Ef)		-914.5				-847.5		
		(136.2)**				(151.2)**		
$Efficiency_{t-1}$								
Operating $profit_t$ /Employed $capital_t$ (ROE)		7052.9				7869.4		
		(2323.1)**				(3081.0)**		
Operating $profit_{t-1}$ /Employed $capital_{t-1}$								
Net finance $returns_t$ (NFR)		0.0083				0.0078		
		(0.0017)**				(0.0021)**		
Net finance $returns_{t-1}$								
Capital $Intensity_t$ (K/L)		3347.5				2940.8		
		(375.6)**				(418.7)**		
Capital $Intensity_{t-1}$								
GROWTH								
Sales $growth_t$ (Gr)			-41321.6				-37756.7	
			(6328.1)**				(5427.5)**	
Sales $growth_{t-1}$								
Financial $investments_t$ (Finv)			0.0454				0.0573	
			(0.0093)**				(0.0163)**	
Financial $investments_{t-1}$								
Real $investments_t$ (Rinv)			-0.1638				-0.1592	
			(0.0101)**				(0.0133)**	
Real $investments_{t-1}$								
Wages $growth_t$ (WGr)			-927.9				-994.8	
			(559.3)				(610.1)	
Wages $growth_{t-1}$								
OWNERSHIP								
Largest ownership $share_t$ (Large)				7557.1				6601.6
				(3221.0)**				(3651.8)
Number of $shareholders_t$ (NS)				3741.6				3201.4
				(3182.6)				(3077.5)
Domestic $ownership_t$ (DO)				17445.1				21097.3
				(2289.4)**				(2688.3)**
Foreign $ownership_t$ (FO)				-25189.8				-20192.7
				(3115.3)**				(3004.7)**
Institution $ownership_t$ (IO)				-7767.9				-6855.3
				(1249.4)**				(1644.2)**
$Manager_t$ (M)				14298.5				11472.3
				(2255.6)**				(2739.0)**
CONTROLS								
$Sales_t$ (S)	0.0009	0.0007	0.0006	0.0008	0.0007	0.0006	0.0006	0.0006
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Total $Assets_t$ (TA)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
$Ln(Employment)_t$ (lnE)	51.8	45.6	42.9	55.5	39.8	40.7	29.1	47.8
	(34.1)	(37.8)	(29.5)	(38.6)	(30.1)	(25.2)	(27.6)	(33.1)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-411.3	-2552.5	-609.1	212.2	-502.6	-1711.2	-565.1	300.5
	(333.6)	(1409.5)	(422.6)	(181.3)	(417.3)	(1102.1)	(447.6)	(205.6)
Number of observations	411287	265661	364816	325286	411287	265661	364816	325286
Adj. R^2	0.704	0.747	0.711	0.815	0.194	0.237	0.261	0.378
m1 (p-value)								
m2 (p-value)								
Sargan (p-value)								
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
Instruments								

	DIF-GMM						SYS-GMM					
	(1)	(2)	(2)'	(3)	(3)'	(4)	(1)	(2)	(2)'	(3)	(3)'	(4)
	0.1553	0.1006	0.0926	0.1298	0.1105	0.3476	0.1641	0.09754	0.09328	0.1425	0.1339	0.4671
	(0.0115)**	(0.0074)**	(0.0070)**	(0.0221)**	(0.0206)**	(0.0101)**	(0.0139)**	(0.0080)**	(0.0075)**	(0.0171)**	(0.0162)**	(0.00122)**
	0.4224	0.3301	0.2916	0.3618	0.3148	0.7018	0.4618	0.3418	0.3279	0.3098	0.2853	0.6211
	(0.0018)**	(0.0016)**	(0.0013)**	(0.0041)**	(0.0038)**	(0.0031)**	(0.0008**	(0.0006)**	(0.0007)**	(0.0007)**	(0.0005)**	(0.0028)**
			0.0009		0.0017				0.0012		0.0023	
			(0.0002)**		(0.0004)**				(0.0003)**		(0.0006)**	
		-0.0862	-0.1293					-0.1222	-0.1418			
		(0.0091)**	(0.0115)**					(0.0086)**	(0.0096)**			
			0.0064						0.0080			
			(0.0027)**						(0.0034)**			
		-750.1	-1215.8					-636.2	-894.3			
		(166.9)**	(248.7)**					(250.7)**	(196.4)**			
			138.9						85.8			
			(58.3)**						(40.9)**			
		1909.4	1311.8					4822.8	4077.5			
		(588.0)**	(447.4)**					(1354.9)**	(1709.1)**			
			-772.6						-497.3			
			(589.0)						(412.8)			
		0.0025	0.0025					0.0070	0.0082			
		(0.0010)**	(0.0011)**					(0.0030)**	(0.0039)**			
			-0.0005						-0.0010			
			(0.0002)*						(0.0003)**			
		2138.3	2883.6					1234.6	1364.7			
		(487.7)**	(551.8)**					(449.5)**	(477.0)**			
			-363.4						-193.8			
			(386.7)						(242.6)			
				-21096.5	-33205.8					-26289.4	-40289.6	
				(7473.1)**	(9784.6)**					(7550.3)**	(15076.4)**	
					8712.4						12945.5	
					(2554.9)**						(4729.2)**	
				0.0324	0.0375					0.0290	0.0339	
				(0.0134)**	(0.0159)**					(0.0120)**	(0.0142)**	
					-0.0071						-0.0048	
					(0.0032)**						(0.0022)**	
				-0.1228	-0.1565					-0.1302	-0.1853	
				(0.0165)**	(0.0173)**					(0.0147)**	(0.0175)**	
					0.040						0.152	
					(0.0162)**						(0.0561)**	
				20.0	27.2					-772.9	-711.6	
				(38.8)	(42.9)					(699.5)	(648.3)	
					-71.8						18.5	
					(113.7)						(74.4)	
						2032.5						4329.3
						(2219.7)						(2801.6)
						-2221.7						-2583.8
						(4122.5)						(4033.7)
						15512.9						19903.5
						(2900.1)**						(3147.6)**
						-18990.7						-28486.1
						(4695.4)**						(5112.8)**
						-4267.0						-5161.2
						(1959.2)**						(1750.4)**
						9097.8						10538.5
						(2063.4)**						(2462.8)**
	0.0003	0.0005	0.0004	0.0004	0.0004	0.0007	0.0006	0.0006	0.0005	0.0005	0.0004	0.0005
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
	44.3	51.9	28.9	60.7	26.1	51.3	51.4	47.2	84.9	55.1	103.8	58.8
	(39.0)	(47.2)	(30.5)	(41.6)	(27.3)	(48.1)	(35.2)	(40.3)	(66.2)	(48.0)	(77.4)	(31.9)
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	-513.6	-1997.4	-1582.9	-600.1	-2048.4	617.5	-455.7	-2027.1	-1582.5	-576.8	-1805.9	531.3
	(361.6)	(599.1)**	(616.4)**	(459.2)	(827.3)**	(477.0)	(443.8)	(771.0)**	(719.4)**	(500.0)	(836.6)**	(362.9)
	396153	240152	179336	329746	270365	290628	396153	240152	179336	329746	270365	290628
	0.037*	0.030*	0.114	0.004**	0.088	0.005**	0.061	0.077	0.185	0.045*	0.151	0.009**
	0.078	0.065	0.186	0.065	0.137	0.007**	0.104	0.136	0.327	0.118	0.238	0.013*
	0.245	0.221	0.303	0.192	0.286	0.021*	0.417	0.503	0.661	0.367	0.679	0.062
	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, industry and year dummies	P_{t-2}, D_{t-2}, $large_{t-2}$, NS_{t-2}, DO_{t-2}, FO_{t-2}, IO_{t-2}, S_{t-2}, TA_{t-2}, lnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔDe_{t-2}, ΔEf_{t-2}, ΔROE_{t-2}, ΔNFR_{t-2}, $\Delta K/L_{t-2}$, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3}, De_{t-2}, De_{t-3}, Ef_{t-2}, Ef_{t-3}, ROE_{t-2}, ROE_{t-3}, NFR_{t-2}, NFR_{t-3}, K/L_{t-2}, K/L_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔDe_{t-2}, ΔEf_{t-2}, ΔROE_{t-2}, ΔNFR_{t-2}, $\Delta K/L_{t-2}$, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3},Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔGr_{t-2}, $\Delta Finv_{t-2}$, $\Delta Rinv_{t-2}$, ΔWGr_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, P_{t-3}, D_{t-2}, D_{t-3},Gr_{t-2}, Gr_{t-3}, $Finv_{t-2}$, $Finv_{t-3}$, $Rinv_{t-2}$, $Rinv_{t-3}$, WGr_{t-2}, WGr_{t-3}, S_{t-2}, S_{t-3}, TA_{t-2}, TA_{t-3}, lnE_{t-2}, lnE_{t-3}, ΔP_{t-2}, ΔD_{t-2}, ΔGr_{t-2}, $\Delta Finv_{t-2}$, $\Delta Rinv_{t-2}$, ΔWGr_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies	P_{t-2}, D_{t-2}, $large_{t-2}$, NS_{t-2}, DO_{t-2}, FO_{t-2}, IO_{t-2}, S_{t-2}, TA_{t-2}, lnE_{t-2}, ΔP_{t-2}, ΔD_{t-2}, $\Delta large_{t-2}$, ΔNS_{t-2}, ΔDO_{t-2}, ΔFO_{t-2}, ΔIO_{t-2}, ΔS_{t-2}, ΔTA_{t-2}, ΔlnE_{t-2}, industry and year dummies

In the Tables:

- Dependent variable: Paid dividends
- The values in parenthesis are robust standard errors.
- and ** indicate significance at the 5% and 1% levels, respectively.
- Time and industry dummies are included in each regression but are not reported.
- *GMM* results are two-step estimates. *GMM-DIF* and *GMM-SYS* refer to the *GMM* difference estimators suggested by Arellano and Bond (1991) and Blundell and Bond (1998), respectively.
- All variables are differenced in the *GMM-DIFF* estimations.
- *m1* is statistics for second order autocorrelation of error terms, and has a normal distribution of *N(0,1)*.
- *m2* is statistics for second order autocorrelation of error terms, and has a normal distribution of *N(0,1)*.
- The *Sargan test* is a statistical test for testing over-identification, asymptotically $\chi 2$ distributed. Under the null hypotheses the instruments are valid and the model is correctly specified.
- The *Wald test* is a test of the joint significance of reported coefficient estimates, asymptotically $\chi 2$ distributed under the null hypotheses.

The great differences in the number of observations between different estimation methods are due to the shortcomings in the data. Regarding some variables, there may be plenty of measured values missing. The utilized data is not a balanced panel. The use of a balanced panel would have eliminated remarkable amounts of information from the material.

Estimation results

Agency problems, asymmetric information and taxes are reasons why corporate dividend policies deviate from that prescribed by Miller and Modigliani's irrelevance theorem.

For the purpose of the above estimations, the relevant issue is whether these alternative factors are significant for dividend policy in Finland and whether they can explain differential dividend behaviour of different-sized firms.

First, let us review whether Finnish firms of different sizes and with different market positions follow dividend policies in line with Lintner's model. In other words, we consider whether firms smooth their dividend distributions over time, targeting a fixed dividend rate. The results based on Lintner's model are presented in column (1) in the results of the different estimation methods. The first clear conclusion is that listed firms smooth dividends over time more markedly than non-listed firms: the dividends of listed firms are affected most by dividends distributed in the previous period. The connection between previous period dividends and the current dividend decision is not as clear for the other groups of firms studied. The clearest difference in the smoothing of dividends was found between listed firms and micro-firms. Secondly, the results show that in the smallest firms, distribution of dividends is most closely linked to profits: profit for the period is the most significant explanatory variable for dividends in small enterprises. Dividend decisions by listed firms do not show as strong a link between profits and dividends as in small non-listed firms. This observation can be interpreted as showing that external shocks transmitted through profits are shown more responsively in dividends distributed by small enterprises than in the dividends of listed firms seeking stable dividend payouts.

The results show that Lintner's model explains fairly well dividend distribution by Finnish listed firms. Hence, support for Hypothesis 3 is found in analyses of data on Finnish listed firms. The smaller the firms the model is applied to, the weaker is its explanatory power for dividend behaviour. Based on the estimation results, it is possible to calculate a long-term target payout ratio according to Lintner's model. A calculation of averages from the results produced by the different estimation methods results in the following target payout ratios for the groups of firms reviewed: listed firms 0.257, small and medium-sized firms 0.464 and micro-firms 0.553.

Based on the estimation results, we can also calculate the speed, according to Lintner's model, at which firms of different size adjust their dividend payouts to the target level. The average speed calculated on the basis of the different estimation methods is 0.338 for listed firms, 0.475 for small and medium-sized firms and 0.819 for micro-firms. The results show that decision-making by micro-firms is very responsive to external shocks. Unexpected shocks have a much more subdued effect on listed firms.

Based on the results, we can calculate that immediately after profit increases unexpectedly by 1 unit, listed firms increase their payout by 0.0869 units, small and medium-sized firms by 0.220 units and micro-firms by 0.453 units. The dynamic effects of the shock on dividend decisions by the groups of firms under review are illustrated in Figure 3.1. Whereas the effects of the shock are eliminated in micro-firms in three years, the shock has an effect on the dividend decisions of listed firms even after 6–7 years.[49]

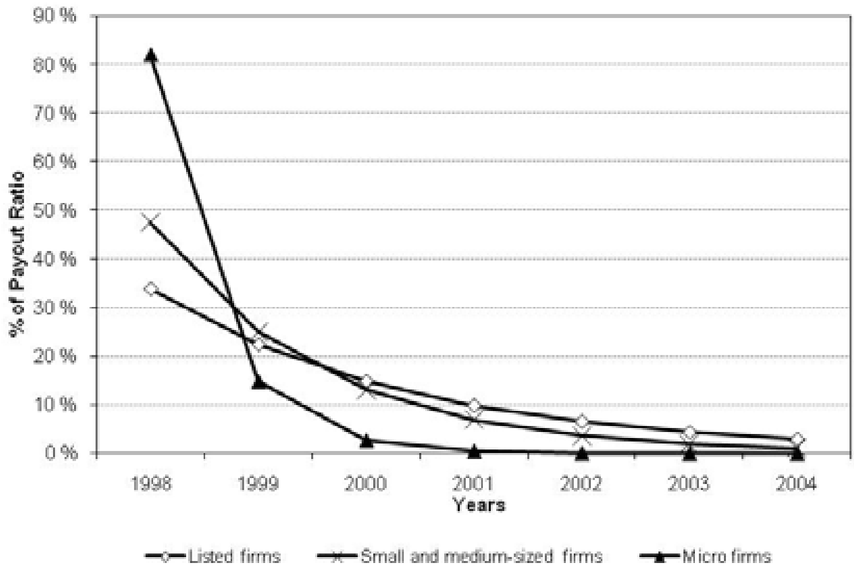

***FIGURE 3.1:** Shocks and dynamic behaviour of dividends*

Next, we consider the effects of a firm's economic performance on its dividend decision. Lintner's model is supplemented here with variables measuring the economic performance of the firm: leverage, operative efficiency, net financial income (financial income minus financial expenses) and return on capital employed. Furthermore, the model reviews the connection between capital intensity and dividends distributed. The results are presented for each estimation method in column (2). The model is estimated with *GMM* methods also in a dynamic form, taking into account the dynamic nature of corporate finance and its lagged effects.

Financial income and return on capital employed are expected to have a positive effect on the dividends distributed: a higher rate of economic yield allows dividend payout to grow. High net financial income presumably has the same effect. These effects should be stronger in small

[49] See similar review in Michaely and Roberts (2006).

firms, if small firms are more prone to adapt their dividend policies to fluctuations in profit. There is a clear positive association between return on capital employed and dividends distributed. This finding applies to all groups of firms, and differences between the groups are small. In contrast, net financial income has an effect only on dividend decisions by micro-firms. In dividend decisions by listed firms as well as small and medium-sized firms, net financial income has no statistically significant effect. This finding may be partly explained by the fact that financial operations are a major part of the activities of many small firms.[50] That, in turn, may be related to Finland's dual income tax system. The findings also support the observation above that dividend payouts by small firms tend to follow profitability developments more closely than payouts by large and listed firms.

The findings on leverage are clear: in all groups of firms, there is a statistically significant negative association between debt and dividends: firms with a higher level of debt pay out lower dividends. This negative connection is strongest in the results for micro-firms. For them, the most likely reason for the negative association between debt and dividends is the budget constraint: a high debt ratio increases financing costs, thus reducing the distributable funds of the firm. Indebtedness has a direct negative effect channelled through the budget constraint on the firm's financial decisions. It is often easier for large firms to make use of the financial markets, so the availability of external finance is more flexible and less costly. As regards large firms, the negative association between dividends and debt may actually be better explained by the substitution of dividends and debt as a means of monitoring corporate management. As stated in previous chapters, both high dividends required by the owners and high leverage of the firm act as alternative mechanisms to restrict the possible discretion of managers with free cash flows. This is a possible explanation, particularly for listed firms and firms with a large and heterogeneous ownership. Hence, analyses of data on Finnish firms provide at least some support for Hypothesis 5.

There was no pre-formulated hypothesis for a connection between dividends and the efficiency of business operations as measured by the ratio between value added and personnel expenses. Efficiency does not show a statistically significant association to the dividends distributed in

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[50] It is quite common that entrepreneurs – due to tax advantage – make financial investments via his company rather than privately.

the small and medium-sized firms and micro-firms. For listed firms, there is a positive significant connection: according to the estimation results large dividends are paid by firms with the most efficient business operations (as measured by the ratio between value added and personnel expenses).

The fifth variable included in the estimation model was the capital intensity of the firm. Capital intensity is measured simply as the ratio between capital employed and personnel expenses. The results indicate that in the estimation results based on the *OLS* and *SYS-GMM* methods, the association between dividends and capital intensity is positive and statistically significant: hence, with respect to listed firms, we found weak support for the assertion that capital-intensive firms distribute larger dividends than labour-intensive listed firms. In contrast, a similar connection for small and medium-sized firms cannot be observed. In small and medium-sized firms, dividend payout does not change as the degree of capital intensity changes. In micro-firms, the link between capital intensity and dividends is the strongest: capital-intensive micro-firms distribute statistically significantly more dividends than labour-intensive firms. This finding is partially truistic, taking account the fact that the personnel expenses of such firms are by definition low. The finding may also be approached from a taxation perspective. Many studies have postulated that the Nordic dual income tax system provides an incentive for wealthy individuals to incorporate their assets and accumulate incorporated wealth. Infirm can be used as a tax shelter in dual income tax systems (Gordon and Slemrod, 2000; Sørensen, 2003; Alstadsæter, 2007).

Column (3) presents the estimation results from a model in which Lintner's model has been supplemented with indicators measuring the growth of business operations. The purpose of the analysis is to explore the connection between growth phase and dividends distributed. The dynamic effects of growth are accounted for by also adding lagged explanatory variables to the model and estimating the dynamic model thus created with *GMM* methods. It is typically suggested that a firm in a growth phase will have many profitable projects with high net present value, make large profits, have high capital expenditure due to a high degree of leverage, have low free cash flows and experience rapid growth in its earnings. Growth is measured by sales growth, financial and real investments and growth in the wage sum. Hence, the model measures separately the real growth of the firm and growth based on financial capital.

Compared to dividends, investments are an alternative way to expend a firm's earnings. According to the neoclassical investment theory, a firm will keep investing its funds as long as the marginal return on investment exceeds the marginal costs. If it has many profitable investment alternatives, it may refrain from distributing dividends so as to fund investment. This is the case at least in situations where the expected return on investment is higher than the benefits from distributing dividends. Particularly for small firms, in the context of Hypothesis 4 this was even thought to be probable. The estimation results lend support to this hypothesis: the connection between dividends and real investments of micro-firms is negative and statistically highly significant. A statistically significant negative association can also be seen based on the results between the dividends and real investments of small and medium-sized firms. In contrast, based on the estimation results, listed firms make investment decisions separately from dividend decisions.

A firm's growth prospects can also be measured using sales growth and growth in the wage sum. Even if a firm is equipped for profitable growth, it will still need funds to finance the growth. Hypothesis 6 assumed that firms with a high growth rate distribute either little or no dividends. Funding growth through internal finance directly reduces the funds available for dividend payouts, in accordance with the firm's budget constraint. The harder it is for a firm to make use of the financial markets and obtain external capital, the closer dividend distribution will be tied to its other financing needs.

The results show that in listed firms, there is no statistically significant association, at least a robust one, between sales growth rate and dividends. All in all, the estimation results show that dividend decisions by listed firms are largely separate from their other financial decisions and growth phase. One interpretation of the observations made has already been presented above: dividend distribution by Finnish listed firms complies with Lintner's model relatively well. We can also state that listed firms probably have much more extensive and better opportunities than small firms to find different alternatives to cover their financing needs.

Dividend distribution by small and medium-sized firms is negatively associated with sales growth. However, not all models lend support to the statistical significance of the association, i.e. the result is not robust. We can still conclude that as firm size decreases, Hypothesis 6 receives more empirical support: growth opportunities are funded partly at the expense of dividends.

The estimation results for micro-firms lend the strongest support to Hypothesis 6. The rate of sales growth of micro-firms has a negative and statistically highly significant association with dividends. Rapidly growing firms use internal finance for growth and either refrain from paying out dividends or at least cut the size of dividends distributed. The operation of such firms is normally the most closely tied to the budget constraint: they do not necessarily have alternatives other than to invest in profitable growth by saving on dividends.

The growth phase model, according to which firms begin to distribute or increase dividends only after they have run out of profitable investment opportunities and can no longer grow profitably, would seem to describe the dividend policy of non-listed Finnish firms. We would suggest there is a transition phase in which a non-listed firm's investment opportunities start to shrink, its growth begins to slow, capital expenditures decline, and the firm starts generating larger free cash flows. Those free cash flows are increasingly directed to shareholders in the form of dividend payments.

What is particularly noteworthy about listed firms (and partly also about small and medium-sized firms) is the strong negative and statistically significant association between the wage sum and dividends. As a conclusion, we can state that in listed firms (and partly also in small and medium-sized firms) dividends have a negative association with both investments in fixed capital and business growth by hiring new personnel. This finding is interesting because it also raises the question of whether it is possible that some firms increase dividends at the expense of wages or recruitment.

In addition to real growth, firms can use financial investments to increase their financial assets, thus growing in this way, too. Profitable financial investments can generate capital gains for a firm, increase its total profits and thus also become strategically important to its operations. Our results show that, although financial investments have a positive association with the dividend decisions of almost all groups of firms, the association is statistically significant only in micro-firms. It is easy to find taxation-based explanations for the connection. The tax treatment of non-listed firms in the Finnish dual income tax system is based on net assets:

the higher its net assets, the larger the dividends a firm can distribute tax free. In addition to real investments, firms also can increase their net assets with financial investments. Hence, the tax treatment of dividends in Finland creates incentives to increase firms' net assets through financial investments. As stated above, the Nordic dual income tax system encourages wealthy individuals to both incorporate their assets and accumulate wealth in the firm. Tax planning related to the distribution of dividends may partly explain the statistically significant association between dividends and financial investments.[51]

Finally, we consider what kind of connection ownership – and thus the results of agency theory – has on the dividend policy of a firm in Finland. Lintner's model is supplemented with variables measuring the ownership of a firm: ownership share of the main shareholder, relative significance of the ownership type (domestic, institutional, foreign) and the number of shareholders. Furthermore, estimation models concerning non-listed firms are supplemented with a dummy variable taking the value 1 when the main shareholder is also a manager in the firm and the value 0 in other cases.[52] The variables concerning ownership seek to review agency theoretical aspects and the *tax clientele* hypothesis in light of extensive Finnish firm data. Agency problems and asymmetric information are suggested to be one of the main reasons why corporate dividend policies deviate from that prescribed by Miller and Modigliani's irrelevance theorem. Results of the estimation models are presented for each estimation method in column (4). As stated already above, the firm data used lacks zero observations on dividends, because ownership data is only available on firms that have distributed dividends.

Agency theory is founded on the idea that corporate management has incentives to use firm assets to its own benefit or to make investments that are unprofitable from the owners' point of view. According to the agency theory, owners could monitor the management through dividends by requiring any surplus funds for themselves as dividends. Particularly in a small and heterogeneous group of owners with strong shareholder rights, monitoring of the management through dividends could be an effective way of reducing agency costs. Hypothesis 8 assumed that concentration of

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[51] For example, Kari and Karikallio (2007).

[52] Main shareholder is also a manager of the firm if he belongs to self-employed person's *pension insurance system (YEL)*. A person with a leading position in a limited company and who owns more than 50% of the shares has to be insured in accordance with the Self-Employed Persons' Pensions Act (YEL).

ownership reduces the need of the owners to use dividends as a means of monitoring management activities. The degree of concentration is measured in the estimations by the proportional ownership of the main shareholder, the number of shareholders and (in non-listed firms) the owner-manager dummy variable.

The relevant issue is whether these ownership factors are relevant for dividend policy and whether they can explain the differential dividend behaviour of different-sized firms. The results show that the ownership share of the main shareholder has a negative association with dividends paid by listed firms: the lower the holdings of the main shareholder, the higher are the dividends paid by the firm. However, this association is statistically significant only in the estimation results for listed firms. In other groups of firms, the result is not so robust. Agency problems appear to be particularly significant for dividend policy in listed firms, when agency problems are measured by the ownership share of the main shareholder. Diversification of ownership is related to higher dividends. In Finland, minor shareholders have rights too, which are also effectively used by them in monitoring firm management. Smaller firms seem to suffer fewer agency problems. In contrast, no statistically significant connection between the number of shareholders and dividends is observed in the groups of firms studied. When the agency aspects are reviewed in light of the connection between the number of shareholders and dividends, based on the estimation results, agency theory is not supported in Finland.

Dividend payout is negatively associated with the presence of large shareholders, but is not related to the number of shareholders. The results lend support to the agency theory in the dividend distribution behaviour of Finnish listed firms. All in all, agency costs and asymmetric information have a significant effect on the dividend policies of listed firms. However, we cannot decide whether signalling explanations or agency cost explanations predominate in explaining dividend policies for listed firms. In non-listed firms, asymmetric information and agency theoretical aspects seem to be irrelevant.

When the main shareholder of a non-listed firm is also its managing director, we can assume there is no asymmetric information at all in the firm. Hence, dividends have no value as a signalling tool or means of monitoring management. The results show that if an owner also functions as a manager in a firm, this has a positive and statistically significant connection with dividends in non-listed firms. When asymmetric information and the principal-agent problem can be ignored, a firm will decide to distribute higher dividends. In such firms, taxation is perhaps the most important factor causing bias in dividend payouts, so significant tax planning may be involved in the distribution of dividends. More attention on taxation in the context of the dividend decisions is also probable, since, as discussed above, the dual income tax system has been shown to create clear incentives for the distribution of dividends by Finnish non-listed firms.

The model also tests the connection between type of shareholder and distribution of dividends. There are three types: domestic individual, domestic institution and foreign shareholder. The type of shareholder is a dummy variable based on the firm's main shareholder that also takes account of the share of that type in the ownership structure. In other words, in the explanatory factor, the main shareholder type dummy is multiplied by the relative share of that type of shareholder in the total ownership of the firm. In Finland, the taxation of dividends received by domestic individuals is different from the taxation of dividends received by institutions and foreign shareholders. In addition, the avoir fiscal tax credit was not granted to foreign shareholders. Differences in taxation of dividends raise the question of *tax clientele* effects in the dividend decisions of Finnish firms: do firms whose investors have a relatively low marginal tax rate distribute more profits as dividends to their shareholders than firms whose shareholders have a higher marginal tax rate? Hence, domestic investors may have tax-based incentives to become owners in firms that distribute more profits as dividends. The interaction may also work in the opposite direction: firms change their dividend payout to match their shareholders' tax-based preferences. In general, due to the avoir fiscal system, the tax burden on dividends received by individual investors was lighter in Finland than the taxation of capital gains.[53] In contrast, institutions and foreign investors have tax incentives that imply a greater degree of indifference between capital gains and dividends.

The estimation results are interesting: in all groups of firms, institutional and foreign ownership are related to lower dividend payouts, whereas domestic ownership has a clear positive association with the dividends distributed by a firm. Hence, the estimation results lend clear

[53] For more on the dual income tax system, see Sørensen (1994, 1998 and 2005) and Boadway (2004).

support to the *clientele* effect in Finland: there are differences in the distribution of dividends when the type of main shareholder and the relative importance of the holdings of that owner type in the firm are taken into account. While individual shareholders may prefer dividends because of the tax advantages, we find evidence that foreign and institutional ownership have a negative impact on dividend payouts.

This finding is valid in the estimation results for all groups of firms reviewed. The most probable explanation for the observed connection is the different dividend tax treatment of the shareholder types: in the review period, dividends have, from a taxation perspective, been an advantageous means of profit distribution to domestic individuals, and often clearly preferable to capital gains. In contrast, the advantageousness of the tax treatment in respect of dividends paid to foreign and institutional shareholders has not been as evident.

In assessing the connection of ownership structure and dividend distribution behaviour we should note that ownership patterns are not necessarily exogenously given or randomly determined. For example, Demsetz and Lehn (1985) state that ownership choices are endogenous outcomes of value-maximizing behaviour. Under this situation, the usual *OLS* and *Fixed Effects* estimators are biased and misleading. *GMM* methods may also be problematic: variables describing ownership tend to remain fairly stable over time and the instrumentation of owner variables based on ownership-level variables from previous periods may be insufficient and ineffective. In the estimations, the instrument variables on ownership are lagged to the point *t-2* because the panel is fairly short in time. Statistical analysis shows that the identification of instrument variables in *GMM* estimations has not been entirely successful.

Robust checking and statistical analysis

A comparison of results obtained with different estimation methods shows that the estimations have been completed without major problems. The models also perform fairly well in statistical analysis. This improves the reliability of the results. Furthermore, the *GMM* results are qualitatively quite similar to the *OLS* results. The seemingly low bias in our framework is probably caused by the large amount of data and relatively long sample period.

The *OLS* estimates are, however, likely to suffer from biases due to unobserved heterogeneity, and possible endogeneity of the regressors. The *Fixed Effects (Within Group)* estimator suggests that it is important to take unobserved firm-specific characteristics into account, but the *Fixed Effects* estimator may still be affected by an endogeneity bias. The fact that the *OLS* estimator is likely to be biased upwards and the fixed effects estimator is likely to be biased downwards can be useful information in assessing that a consistent estimator lies between the *OLS* and *Fixed Effects* estimators. In many estimation results, we actually do observe this pattern. For this reason, we do not have to suspect severe finite sample bias or inconsistency (Bond, 2002).

The use of simple *OLS* and *Fixed Effects* with panel data may lead to biased estimates in dynamic models with short-term panels (Nickell, 1981). Taking these potential problems into account we also study our panel with a statistically coherent panel estimation methods (*Generalized Method of Moments (GMM)* estimators) that allow both the use of lags and the use of explanatory variables with endogenous features. Assuming that the idiosyncratic error term is serially auto-correlated, the endogenous variables of the model lagged at least twice can be used as exogenous instruments.

GMM methods would seem to yield statistically significant coefficients with right signs on. The empirical estimation results give *GMM-DIFF* estimates that are close to the *GMM-SYS* estimates. Our diagnostic test statistics indicate that both dynamic panel data models *GMM-DIFF* and *GMM-SYS* work quite well. The latest lag exploited in each cross-section is *t-3* and the equations do not exhibit second-order serial correlation according to the reported *m2* statistics: the instruments are not correlated with the error term. The reported Sargan statistics for overidentifying restrictions suggest the instruments are valid and the model is correctly specified. With *GMM* estimators, which take the two biases simultaneously into account, the estimated coefficient on the lagged dependent variable lies mostly between the corresponding estimates obtained using the *OLS* and *Fixed Effects* estimators. This suggests that our *GMM* estimators are unlikely to suffer from a weak instrument bias.

Only in estimations using shareholder-level variables in a relatively short sample period does statistical analysis show that the instruments of *GMM* estimations are correlated with the error term and the model may not be correctly specified. The latest lag exploited in these analyses is *t-2*, and according to the reported *m2* the equations exhibit second-order serial correlation in some cases.

The Wald test is a test that accepts joint significance of reported coefficient estimates in all estimations.

Bludell and Bond (1998) have shown that simple first-differenced *GMM* estimator can have poor finite sample properties when the lagged level of the series are only weakly correlated with subsequent first differences, so that instruments of the estimation become weak. They suggested that finite-sample bias should be eliminated with the use of a generalized system *GMM* estimator that incorporates more informative moment conditions that are valid under reasonable stationary restrictions on the initial conditions process. In essence, this means the use of lagged first-difference as an instrument for equations in levels, in addition to the usual lagged levels as instruments for equations in first-differences. It seems that the additional instruments of *SYS-GMM* only slightly improve the precision of the estimates. The additional precision value from using the more complicated *SYS-GMM* is quite low.

4. Conclusion

The Miller-Modigliani theorems can be seen as cornerstones of modern corporate finance. They are irrelevance propositions that provide conditions under which a firm's financial decisions do not affect its value. Modigliani (1980) explains the theorems as follows: '*with well-functioning markets (and neutral taxes) and rational investors, who can 'undo' the corporate financial structure by holding positive or negative amounts of debt, the market value of the firm – debt plus equity – depends only on the income stream generated by its assets. It follows, in particular, that the value of the firm should not be affected by the share of debt in its financial structure or by what will be done with the returns – paid out as dividends or reinvested (profitably).*'

On the other hand, John Lintner was one of the first supporters of the relevance of dividends in creating shareholder wealth. He suggested the dividend decision is anything but irrelevant to managers and markets. In 1956, Lintner developed his famous theory based on following observations about dividend policy: (1) firms have long-term target dividend payout ratios, (2) managers focus more on dividend changes than on absolute levels, (3) managers tend to 'smooth' dividends so that changes in transitory earnings are unlikely to affect dividend payments over the short term, and (4) managers are reluctant to make changes to dividends that might have to be reversed.

Since these two models, numerous theories have been developed to explain the dynamics of dividends. Allen and Michaely (2002) summarize these theories and conclude that five imperfections of the capital market can influence a firm's dividend policy: taxes, asymmetric information, incomplete contracts, institutional constraints, and transaction costs. For example, the dividend decision has been suggested as providing the missing piece of information to the markets. In some studies, dividend payouts are seen as keeping firms in the capital market, where monitoring of managers is available at lower cost. However, the actual dividend set is still mostly puzzling.

This study presents a review of dividend theories and their conclusions about the factors that influence dividend payouts by firms.

Our study focused on the research question: what determines a firm's dividend payouts? A key point of departure for the review was to test the explanatory power of Lintner's model in dividend payouts by Finnish firms. We also tested hypotheses motivated by agency problems, asymmetric information and tax clientele effects.

Dividend models were tested in three groups of firms: listed firms, small and medium-sized firms (non-listed firms with a personnel numbering more than 5) and micro-firms (non-listed firms with a personnel of up to 5). Our results show that listed firms and non-listed firms highlight in some respects quite different factors in their dividend decisions.

We find that dividend patterns in listed firms are highly consistent with the partial adjustment model suggested by Lintner (1956). A listed firm's level of dividend payout is significantly positively associated with current earnings and, particularly, past payouts by the firm. Scrutiny by the public capital market induces public firms to smooth dividends according to Lintner's model.

The empirical results show that it is difficult to find financial factors other than the dividends of previous periods and profitability variables which would show a statistically significant association with dividend distribution by listed firms. One explanation for this is that dividend distribution by Finnish listed firms complies well with Lintner's model. Secondly, we should also note that listed firms usually have much more extensive and better opportunities than small firms to find different alternatives to cover their financing needs.

We also find that listed firms' dividends are negatively associated with the presence of large block holdings and the leverage of the firm. These results are consistent with the predictions of the agency cost explanation of dividends. Both block holdings and leverage can perform as substitutes for the dividend payouts as a mechanism of corporate governance. All in all, agency costs and asymmetric information have a significant effect on the dividend policies of listed firms.

Thus, based on our findings, we can state that dividends are not irrelevant for the stock markets in Finland: they have information content the market responds to. Firms seek to anticipate in their dividend decisions the impacts of dividend payouts on the markets. Dividends are also a tool used by minor shareholders to control the activities of corporate management. In Finland, minor shareholders also have rights, and they use them effectively in monitoring firm management. This argument is supported by the fact that diversification of ownership is related to higher dividends.

In contrast, the dividends issued by private (non-listed) firms – micro-firms in particular – are closely linked to their profit performance: dividend decisions in small firms are sensitive to both positive and negative earnings shocks. Dividend distribution in the previous period has a considerably smaller effect on dividend payouts by non-listed firms in comparison to listed firms. Therefore, the results of Lintner's model on the smoothing of dividends get only weak support from non-listed firms.

In micro-sized firms where ownership is more concentrated and agency problems largely irrelevant, we observe relatively higher dividend payout rates and greater sensitivity of dividends to earnings and investment opportunities. This is a case where dividends behave at least to some extent like a residual decision and the Miller-Modigliani assumptions are close to being true. However, it must be noted that Miller and Modigliani assumed perfect capital markets and disregarded the effects of taxation. The estimation results can be interpreted in many respects from a taxation point of view: non-listed firms seem to respond strongly in their dividend decisions to incentives founded on the Finnish system of dual income taxation. Furthermore, based on our results, the smallest firms can be assumed to be bound by financial frictions. Small firms, who suffer the fewest agency problems, exhibit the highest sensitivity to investment needs. Thus, dividends are strongly negatively correlated with investment opportunities for those firms where agency problems are largely irrelevant.

Based on our results, the lifecycle model of the firm can be seen to be supported empirically by non-listed firms. We suggest it is possible to find a transition phase in which a non-listed firm's investment opportunities start shrinking, its growth begins to slow, capital expenditures decline, and the firm starts generating larger amounts of free cash flows. Those free cash flows are increasingly directed to shareholders in the form of dividend payments.

We find that ownership is one of the important variables that influence dividend payout policies: in all groups of firms institutional and foreign ownership are related to lower dividend payouts, whereas domestic ownership has a clear positive connection with the dividends distributed by the firm. One explanation is the lighter taxation of individual dividend income relative to capital gains. The tax burden on dividends received by the different types of owners studied (households, foreign owners and institutions) is different, and, taxation-wise, dividend income received by Finnish households is clearly in the most favourable position. While individual shareholders may prefer dividends because of the tax advantages, we find evidence that foreign and institutional ownership have a negative impact on dividend payouts. We provide supportive evidence for the static tax clientele model that firms adjust dividend policy to fit the tax preferences of their investors.

We argue that the contradictory results on firms' dividend distribution behaviour are the consequence of at least the following four factors: (1) firms' different market positions and market responses to dividend payouts, (2) the different ownership structures of different firms (3) limitations in the opportunities of some firms to make use of external financial markets and (4) growth phase and investment opportunities of the firm.

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Appendix 1: Descriptive statistics

All firms

Variable	Definition	N	Mean	Median	Std dev	Min	Max
Dividends	*dividend paid*	959035	158324	0	2200622	0	1896063616
Sales	*turnover as appear on the Income statement*	1021251	2201856	132627	26050964	0,01	22888801726
Profit	*profit after taxes as appear on the Income statement*	996829	129858	4187	51164836	-2231302400	4730935296
EBITDA	*operating income + depreciation*	1080638	201671	11404	58401766	-2784619780	4953199616
Real investments	*counted as inclusion of expenditure residue*	978288	121441	4255	6480747	0	8431261184
Wages	*total wages paid*	991788	227910	32086	8088913	0	1172063635
Employment	*number of employees*	1021251	15	2	583,4	0	50033
Debt	*total debt as appear on the Balance sheet*	969020	1166307	49402	43400883	0,1	50896670208
Equity	*total equity as appear on the Balance sheet*	995994	868739	45263	35135236	561	10924708016
Total Assets	*current + non-current assets*	995311	3108879	97553	42719323	1233	55821378224
Net wealth	*assets - liabilities*	941458	620188	20629	24349307	-570446451	16103121920
Value added	*turnover - raw materials and services*	1019237	1112934	81716	30118947	-610549312	13586089984
Financial investments	*financial assets $_t$ - financial assets $_{t-1}$*	939931	50775	2556	1457482	0	1104735992
Efficiency	*value added / wages*	929548	3,7	2,3	10169	-443	10724
Operating profit /Employed capital	*operating profit /employed capital*	954991	0,067	0,028	2,53	-1,77	7,83
Net finance returns	*Net finance returns as appear on the Income statement*	921649	23785	3371	316739	-72494426	353907034
Sales growth	*(turnover $_t$ - turnover $_{t-1}$) / turnover $_{t-1}$*	874902	0,048	0,027	17,21	-0,87	314,1
Wages growth	*(wages $_t$ - wages $_{t-1}$) /wages $_{t-1}$*	833093	0,042	0,019	12,75	-0,66	127,54
Largest ownership share	*dividend received by the main shareholder/total dividends distributed*	355024	0,63	0,55	0,09	0,01	1
Number of shareholders	*number of shareholders of the company*	355024	25,4	3	20067	1	127898
Capital Intensity K/L	*employed capital /total personnel costs*	948032	159	6,86	74670	0	193987

Listed firms

Variable	Definition	N	Mean	Median	Std dev	Min	Max
Dividends	*dividend paid*	3864	19265682	2016122	98717581	0	1896063616
Sales	*turnover as appear on the Income statement*	4131	219771747	24735434	100892866	1821667	22888801726
Profit	*profit after taxes as appear on the Income statement*	3986	37477313	2811751	241200492	-2231302400	4730935296
EBITDA	*operating income + depreciation*	3920	31309011	3177430	200924216	-2784619780	4953199616
Real investments	*counted as inclusion of expenditure residue*	3917	15201329	4361438	66559124	557290	8431261184
Wages	*total wages paid*	3927	19809372	4540717	59927689	5666667	1172063635
Employment	*number of employees*	3931	985	378	1147	50	50033
Debt	*total debt as appear on the Balance sheet*	4098	200031713	19081485	698424180	82033536	50896670208
Equity	*total equity as appear on the Balance sheet*	4099	203889819	16496543	789928342	41301884	10924708016
Total Assets	*current + non-current assets*	4098	434627784	43980882	1497920054	15875325	55821378224
Net wealth	*assets - liabilities*	3942	60689567	7297051	23548240	-11699476	16103121920
Value added	*turnover - raw materials and services*	3922	119402931	16225293	521672812	-610549312	13586089984
Financial investments	*financial assets $_t$ - financial assets $_{t-1}$*	3905	9750775	4292556	59095116	0	1104735992
Efficiency	*value added / wages*	3915	3,2	2,4	3,02	-4,80	7,60
Operating profit /Employed capital	*operating profit /employed capital*	3895	0,059	0,048	0,94	-0,34	0,68
Net finance returns	*Net finance returns as appear on the Income statement*	3856	1688903	372800	8985831	-72494426	353907034
Sales growth	*(turnover $_t$ - turnover $_{t-1}$) / turnover $_{t-1}$*	3701	0,034	0,028	0,76	-0,38	0,87
Wages growth	*(wages $_t$ - wages $_{t-1}$) /wages $_{t-1}$*	3677	0,038	0,033	0,46	-0,29	0,42
Largest ownership share	*dividend received by the main shareholder/total dividends distributed*	3347	0,14	0,08	0,01	0,01	0,069
Number of shareholders	*number of shareholders of the company*	3347	15429	7091	12967	893	127898
Capital Intensity K/L	*employed capital /total personnel costs*	3560	118	5,94	959	0,09	3125

Small and medium-sized firms

Variable	Definition	N	Mean	Median	Std dev	Min	Max
Dividends	*dividend paid*	410724	232830	0	1039938	0	693668480
Sales	*turnover as appear on the Income statement*	437362	3155146	470442	12793044	0	1679992832
Profit	*profit after taxes as appear on the Income statement*	426922	259506	26016	20714225	-471780992	847739904
EBITDA	*operating income + depreciation*	462989	336105	40469	23698284	-233455196	883199616
Real investments	*counted as inclusion of expenditure residue*	418980	225842	9637	3350486	0	727995456
Wages	*total wages paid*	424780	680489	97507	7351987	0	495638184
Employment	*number of employees*	437448	21	8	20,76	0	249
Debt	*total debt as appear on the Balance sheet*	414916	2556755	461627	32537541	0,10	7896670208
Equity	*total equity as appear on the Balance sheet*	426515	2192786	401878	27299351	4561	5798879744
Total Assets	*current + non-current assets*	426222	5844763	1369325	37833275	5233	10095349752
Net wealth	*assets - liabilities*	403132	989522	120309	14308664	-570446451	7294571520
Value added	*turnover - raw materials and services*	436585	2171291	220440	21188642	-343901312	716632576
Financial investments	*financial assets $_t$ - financial assets $_{t-1}$*	402491	88952	6341	889531	0	234907868
Efficiency	*value added / wages*	398022	4,1	2,6	67,2	-25,6	143,2
Operating profit /Employed capital	*operating profit /employed capital*	408971	0,082	0,045	2,93	-0,62	2,79
Net finance returns	*Net finance returns as appear on the Income statement*	394651	39228	12261	203436	-40086893	189908732
Sales growth	*(turnover $_t$ - turnover $_{t-1}$) / turnover $_{t-1}$*	374616	0,051	0,037	5,39	-0,48	61,9
Wages growth	*(wages $_t$ - wages $_{t-1}$) /wages $_{t-1}$*	356649	0,059	0,048	7,22	-0,39	52,79
Largest ownership share	*dividend received by the main shareholder/total dividends distributed*	151221	0,23	0,14	0,06	0,01	1
Number of shareholders	*number of shareholders of the company*	151221	89,1	16	290	1	5132
Capital Intensity K/L	*employed capital /total personnel costs*	406123	109	2,26	35185	0	3125

Micro firms

Variable	Definition	N	Mean	Median	Std dev	Min	Max
Dividends	*dividend paid*	544447	10277	0	232462	0	22298880
Sales	*turnover as appear on the Income statement*	579758	98199	18119	9297884	0,01	76973088
Profit	*profit after taxes as appear on the Income statement*	565921	40711	1841	17104822	-40616960	10271936
EBITDA	*operating income + depreciation*	613729	-403373	6280	20453834	-27846197	13293952
Real investments	*counted as inclusion of expenditure residue*	555391	53007	562	2347269	0	42672734
Wages	*total wages paid*	563081	33057	17000	1315079	0,10	5638184
Employment	*number of employees*	579872	1,69	1	1,316	0	5
Debt	*total debt as appear on the Balance sheet*	550006	187164	25000	11890163	0,1	296670208
Equity	*total equity as appear on the Balance sheet*	565380	152685	19699	13042388	561	448023851
Total Assets	*current + non-current assets*	564991	250264	47260	12322808	1233	714692159
Net wealth	*assets - liabilities*	534384	121656	11279	1354223	-180762621	544337920
Value added	*turnover - raw materials and services*	578730	121805	36414	1944097	-101964453	169091584
Financial investments	*financial assets $_t$ - financial assets $_{t-1}$*	533535	11935	1096	529774	0	114735992
Efficiency	*value added / wages*	527611	3,4	1,5	9764	-443	10724
Operating profit /Employed capital	*operating profit /employed capital*	542125	0,049	0,015	3,41	-1,77	7,83
Net finance returns	*Net finance returns as appear on the Income statement*	523142	6667	1095	145611	-52494426	121557908
Sales growth	*(turnover $_t$ - turnover $_{t-1}$) / turnover $_{t-1}$*	496585	0,076	0,024	14,88	-0,87	314,1
Wages growth	*(wages $_t$ - wages $_{t-1}$) /wages $_{t-1}$*	472767	0,033	0,014	11,90	-0,66	127,54
Largest ownership share	*dividend received by the main shareholder/total dividends distributed*	200456	0,75	0,68	0,07	0,01	1
Number of shareholders	*number of shareholders of the company*	200456	6,7	2	122	1	671
Capital Intensity K/L	*employed capital /total personnel costs*	538349	219	7,84	55912	0	193987

Appendix 2: Correlation Matrixes

All firms

	Dividends	Profit	Equity	Debt	Operating profit /Employed capital	Net finance returns	Financial investments	Sales growth	Wages growth	Real investments	Wages	Efficiency	Capital Intensity K/L	Largest ownership share	Number of shareholders
Dividends	1	0.685**	0.665**	0.343**	0.604**	0.459**	0.516**	-0.204**	-0.123**	0.2378**	0.346**	0.055	0.265**	0.335**	0.209**
Profit		1	0.533**	0.455**	0.801**	0.749**	0.605**	0.076**	0.241**	0.615**	0.306**	0.361**	0.354**	0.118**	0.294**
Equity			1	0.687**	0.393**	0.540**	0.789**	-0.164**	0.068	0.664**	0.527**	0.022	0.5404	0.185**	0.343**
Debt				1	-0.205**	0.268**	0.521**	0.201**	-0.049	0.809**	0.443**	0.128*	0.4808	0.023	0.361**
Operating profit /Employed capital					1	0.518**	0.702**	0.163**	0.216**	-0.339**	-0.031	0.204**	0.4218	0.136*	0.005
Net finance returns						1	0.831**	-0.124*	0.102*	0.273**	0.094	0.037	0.4945	0.215**	0.076
Financial investments							1	-0.327**	0.087	0.367**	0.100*	-0.051	0.5207	0.309**	0.232**
Sales growth								1	0.126*	0.434**	0.285**	0.432**	0.4015	0.062	-0.002
Wages growth									1	-0.141*	-0.269**	-0.087	-0.1111	0.158*	-0.079
Real investments										1	0.466**	0.389**	0.5059	0.020	0.304**
Wages											1	-0.154*	-0.3415	-0.093	0.401**
Efficiency												1	0.3071	0.231**	-0.048
Capital Intensity K/L													1	0.155*	-0.061
Largest ownership share														1	-0.362**
Number of shareholders															1

Listed firms

	Dividends	Profit	Equity	Debt	Operating profit /Employed capital	Net finance returns	Financial investments	Sales growth	Wages growth	Real investments	Wages	Efficiency	Capital Intensity K/L	Largest ownership share	Number of shareholders
Dividends	1	0.517**	0.594**	0.487**	0.631**	0.472**	0.400**	-0.036	-0.054	0.377**	0.445**	0.024	0.199**	0.228**	0.372**
Profit		1	0.772**	0.583**	0.824*	0.688**	0.557**	0.322**	0.249**	0.485**	0.375**	0.248**	0.287**	0.056	0.337**
Equity			1	0.876**	0.327**	0.456*	0.719*	-0.059	0.043	0.652**	0.702**	0.061	0.379**	-0.023	0.416**
Debt				1	-0.061	0.369**	0.565**	0.053	-0.022	0.748**	0.587**	0.248**	0.461**	-0.055	0.363**
Operating profit /Employed capital					1	0.459**	0.671**	0.207**	0.176**	-0.322**	0.035	0.194**	0.258**	0.027	-0.019
Net finance returns						1	0.828**	0.088	0.097	0.411**	0.327**	0.047	0.523**	0.191**	0.221**
Financial investments							1	-0.273**	0.38	0.495**	0.432**	-0.121*	0.314**	0.209**	0.340**
Sales growth								1	0.108*	0.256**	0.177**	0.308**	0.202**	0.017	-0.015
Wages growth									1	-0.093	-0.191**	-0.089	-0.061	0.176**	-0.032
Real investments										1	0.602**	0.277**	0.391**	-0.042	0.439**
Wages											1	-0.246**	-0.205**	-0.088*	0.391**
Efficiency												1	0.344**	0.111*	0.032
Capital Intensity K/L													1	0.051	-0.067
Largest ownership share														1	-0.149**
Number of shareholders															1

Small and medium-sized firms

	Dividends	Profit	Equity	Debt	Operating profit /Employed capital	Net finance returns	Financial investments	Sales growth	Wages growth	Real investments	Wages	Efficiency	Capital Intensity K/L	Largest ownership share	Number of shareholders
Dividends	1	0.663**	0.641**	0.422**	0.580**	0.357**	0.485**	-0.171**	-0.092	0.297**	0.531**	-0.032	0.154**	0.203**	0.219**
Profit		1	0.587**	0.543**	0.792*	0.718**	0.554**	0.118*	0.281**	0.606**	0.332**	0.409**	0.165**	0.037	0.367**
Equity			1	0.746**	0.422**	0.515*	0.774*	-0.102*	0.075	0.616**	0.651**	-0.070	0.409**	0.051	0.382**
Debt				1	-0.183**	0.299**	0.478**	0.196**	-0.048	0.808**	0.533**	0.171**	0.461**	-0.055	0.407**
Operating profit /Employed capital					1	0.531**	0.688**	0.249**	0.244**	-0.405**	-0.048	0.164**	0.398**	0.041	0.064
Net finance returns						1	0.857**	0.057	0.136**	0.304**	0.348**	-0.026	0.452**	0.145**	0.270**
Financial investments							1	-0.403**	0.021	0.427**	0.378**	-0.054	0.429**	0.221**	0.359**
Sales growth								1	0.139**	0.390**	0.255**	0.374**	0.361**	0.040	-0.027
Wages growth									1	-0.118	-0.254**	-0.077	-0.094	0.186**	-0.063
Real investments										1	0.572**	0.361**	0.444**	0.039	0.392**
Wages											1	-0.188**	-0.234**	-0.018	0.451**
Efficiency												1	0.297**	0.174**	-0.040
Capital Intensity K/L													1	0.066	-0.081
Largest ownership share														1	-0.271**
Number of shareholders															1

Micro firms

	Dividends	Profit	Equity	Debt	Operating profit /Employed capital	Net finance returns	Financial investments	Sales growth	Wages growth	Real investments	Wages	Efficiency	Capital Intensity K/L	Largest ownership share	Number of shareholders
Dividends	1	0.724**	0.688**	0.281**	0.613**	0.509**	0.552**	-0.249**	-0.151**	0.185**	0.221**	0.105*	0.333*	0.417**	0.177**
Profit		1	0.467**	0.391**	0.802**	0.776**	0.639**	0.015	0.221**	0.642**	0.283**	0.357**	0.461**	0.169**	0.251**
Equity			1	0.627**	0.391**	0.568**	0.809**	-0.213**	0.069	0.691**	0.436**	0.062	0.633**	0.287**	0.312**
Debt				1	-0.241*	0.237**	0.536**	0.229**	-0.055	0.820**	0.375**	0.088	0.494**	0.075	0.339**
Operating profit /Employed capital					1	0.522**	0.715**	0.114*	0.209**	-0.309**	-0.034	0.226**	0.461**	0.203**	-0.020
Net finance returns						1	0.820**	-0.251**	0.087	0.235**	-0.071	0.067	0.511**	0.254**	-0.045
Financial investments							1	-0.298**	0.072	0.317**	-0.094	-0.038	0.601**	0.370**	0.152**
Sales growth								1	0.124**	0.487**	0.319**	0.483**	0.455**	0.081	0.012
Wages growth									1	-0.162**	-0.291**	-0.093	-0.128**	0.141**	-0.096
Real investments										1	0.391**	0.422**	0.556**	0.021	0.238**
Wages											1	-0.123**	-0.418**	-0.132*	0.378**
Efficiency												1	0.306**	0.280**	-0.066
Capital Intensity K/L													1	0.217**	-0.051
Largest ownership share														1	-0.443**
Number of shareholders															1

Appendix 3: Results of robust estimation

ROBUST	Listed firms				Small and medium-sized firms				Micro firms			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$Dividends_{t-1}$	0.7209	0.6891	0.6611	0.8832	0.4875	0.4388	0.4933	0.5411	0.2375	0.1109	0.1006	0.2598
	(0.0101)**	(0.0387)**	(0.0224)**	(0.0219)**	(0.0277)**	(0.0285)**	(0.0341)**	(0.0206)**	(0.0287)**	(0.0281)**	(0.0311)**	(0.0172)**
Profit	0.0597	0.0453	0.0501	0.0482	0.2576	0.2183	0.2259	0.3761	0.5776	0.4979	0.5333	0.6191
	(0.0057)**	(0.0061)**	(0.0069)**	(0.0076)**	(0.0003)**	(0.0009)**	(0.0004)**	(0.0001)**	(0.0003)**	(0.0003)**	(0.0002)**	(0.0001)**
ECONOMIC PERFORMANCE												
Debt		-0.0122				-0.0297				-0.1199		
		(0.0050)**				(0.0027)**				(0.0092)**		
Efficiency		-6352.9				-700.9				-1111.1		
		(2774.8)**				(577.8)				(238.7)**		
Operating profit /Employed capital		318934.0				26218.0				7819.7		
		(51515.8)**				(6559.5)**				(2538.5)**		
Net finance returns		0.0029				0.0052				0.0080		
		(0.0030)				(0.0070)				(0.0030)**		
Capital Intensity (K/L)		8586.2				575.0				4044.7		
		(5400.7)				(480.4)				(417.2)**		
GROWTH												
Sales growth			-24411.3				-83466.7				-51162.7	
			(32443.3)				(35499.0)**				(6441.7)**	
Financial investments			0.0005				0.0013				0.0419	
			(0.0027)				(0.0007)				(0.0098)**	
Real investments			-0.0042				-0.0686				-0.1602	
			(0.0174)				(0.0190)**				(0.0122)**	
Wages growth			-161411.1				-30101.7				-1035.3	
			(38236.3)**				(7743.2)**				(617.4)	
OWNERSHIP												
Largest ownership share				-140083.4				-13468.2				8513.6
				(29921.7)**				(8402.5)				(4216.1)
Number of shareholders				667.8				651.9				4225.0
				(424.0)				(281.4)**				(3712.4)
Domestic ownership				26925.6				7390.6				1683.9
				(8351.2)**				(1608.4)**				(2295.8)**
Foreign ownership				-243499.9				-19662.7				-24100.3
				(9658.4)**				(6503.6)**				(4029.7)**
Institution ownership				-58529.1				-23554.4				-7555.1
				(11537.7)**				(6511.8)**				(1240.0)**
$Manager_t$ (M)								18573.9				13627.7
								(3445.8)**				(2618.5)**
CONTROLS												
Sales	0.0002	0.0002	0.0002	0.0002	0.0006	0.0005	0.0005	0.0006	0.0008	0.0007	0.0006	0.0007
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Total Assets	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Ln(Employment)	3857.7	4511.6	2989.0	5157.5	311.8	259.6	281.3	379.2	43.2	36.1	47.3	60.4
	(2625.2)	(1989.1)**	(1072.4)**	(2231.7)**	(271.0)	(179.9)	(231.9)	(288.4)	(30.0)	(29.9)	(32.6)	(41.7)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-34378.1	-30271.5	-28961.1	-11352.7	-1195.2	-902.5	-891.1	-534.7	-483.7	-599.2	-548.0	-302.1
	(7184.3)**	(11682.4)**	(9006.2)**	(7711.9)	(600.7)	(449.6)*	(571.2)	(261.9)*	(359.7)	(421.3)	(411.7)	(226.4)
Number of observations	1786	1556	1007	824	699572	643999	582117	545785	411287	265661	364816	325286
Adj. R^2	0.251	0.226	0.197	0.248	0.202	0.205	0.199	0.214	0.342	0.318	0.331	0.350

ESSAY 2

Taxes and Firms' Financial Decisions: Some Evidence from a Finnish Corporate Panel

1. Introduction

Economists have worked hard to understand the incentive impacts of tax systems on firms' investment and financial decisions. Reviewing the impacts of taxation is important, especially since investments essentially determine the long-term growth and development of the economy; even small impacts from taxation accumulate and may ultimately have very strong impacts on employment, growth and welfare.

The financial policy of a firm covers two important financial decisions. Firstly, the firm must decide the ratio of equity and liability in its capital structure.[54] Secondly, it must decide the extent to which earnings are retained within the firm to meet internal financing needs, how much is paid out as dividends to shareholders and how much external funding is as a consequence raised to cover the internal financing needs. According to Miller and Modigliani's (1958, 1961) theorems, these choices have no impact on the value of the firm or the wealth of its owners. These theorems do not, however, take account of the impacts of taxation on a firm's financial policy. The real and financial decisions of a firm are not

[54] Despite their importance, questions regarding the optimal capital structure of a firm are largely excluded from this study. For an extensive study on issues relating to a firm's capital structure, see e.g. Myers (1984). Different capital structure models of a firm are presented by Harris and Raviv (1991). However, they do not address how the basis of taxation may relate to financial decisions.

independent, and corporate financial decisions should be sensitive to the taxes faced by the firm and its shareholders.

For analysing the influence of taxation on the financial decisions of a firm, King (1974) offers the following point of departure. If the basis of corporate tax covers the return on both equity and debt (i.e. interest on loans is not deductible in corporate taxation) and if all returns on equity capital and debt are subject to the same tax rate, taxation does not distort the financial structure of the firm. However, in the taxation systems that are actually applied in the real world, these conditions are rarely met. Financial policy decisions often amount to choosing the optimal trade-off between distortions to financial policy and the tax benefits such distortions generate.

This present study looks particularly into the impacts of dividend taxation on a firm's financial policy. As regards the impacts of dividend taxation on investments, the choice of the form of finance and the value of the firm in literature, a rough distinction can be made between three different views: the 'traditional' view, the 'new' view and the 'tax irrelevance' view.

The key assumption underlying the 'traditional' view is that shareholders benefit more from dividends than from an appreciation in the value of shares. Since shareholders want the firm to distribute part of its profits as dividends, the firm is left with less earnings to finance its investments. Therefore, the marginal investments of the firm are financed by issuing shares. According to the 'traditional' view, dividend taxation increases a firm's investment costs and hence reduces its fixed investments.

According to the 'new' view, firms seeking to minimise their user cost of equity capital finance their investments with earnings instead of issuing shares. In financing investments with retained earnings, they avoid the taxation of dividends. According to the 'new' view, a reduction in dividend taxation has no impact on the costs of marginal investment or on distribution of profit.

According to the 'tax irrelevance' view, corporate tax only applies to the pure profit from an investment and therefore has no impact on investments or cause deadweight losses. Due to the tax-deductibility of interest expenses on debt, the 'tax irrelevance' view maintains that, from a taxation point of view, debt is more favourable than equity as a form of finance for a firm, and therefore the firm will finance all of its investments with debt.

The theoretical rationale behind the above views and their conclusions are presented in Section 2.2. Section 2.3 reviews whether the conclusions change when the classical corporate tax system is replaced by a taxation system that integrates taxation of limited firms and the income of their owners.[55] There is no general consensus about which of the three views best describes corporate behaviour in the relevant financial decisions. Neither do empirical studies provide a unanimous answer. Arguments and findings for and against the different views are presented in Section 2.4.

The empirical part of the study, Chapter 3, considers whether the findings of the 'new' view are supported by the impacts of corporate taxation on firms' financial policies in Finland. The review largely follows the approach used by Auerbach and Hassett in their study published in 2003 in the *Journal of Public Finance*. The present study aims to explore the relation of dividend distribution to a firm's other financial decisions, particularly income flows and real investments. If the results show that these relations are significant, this can be considered as empirical support for the 'new' view. The review also takes into account that the relations may be different for firms in different financial positions. In addition, the significance of share issues as a form of finance in a firm's financial policy is studied. The 'traditional' view is considered empirically supported if share issue finance shows a stronger association with investments than with the cash flows generated by investments.

Estimation results do not lend unequivocal support to the 'new' view as regards the impacts of dividend taxation on financial decisions by Finnish firms. As a rule, dividend and investment decisions are mutually correlated in line with the findings of the 'new' view, but there are major differences between some firms in the strength of the connrction. The clearest support for the 'new' view is found in firms whose access to external finance is assumed to be both constrained and expensive. The

[55] The *classical corporate tax system* taxes income generated by a limited firm both at the level of the firm and the level of the owner. *Integration of the taxation of the corporation and the owner's income taxation* aims to ensure that the income of a firm is taxed once only. In tax systems integrating the taxation of the firm and the owners, the firm and its owners are treated as a single taxation unit, in contrast to classical corporate taxation where they are considered completely separate tax subjects. See e.g. Kari and Ylä-Liedenpohja 2002.

weakest support for the 'new' view is seen in the financial policies of firms not bound by financial constraints and that can make financial decisions in a flexible manner. However, these results should not be interpreted as meaning the 'new' view cannot describe the impacts of dividend taxation on the financial decisions of financially sound Finnish firms – it is just that the review approach used does not generate empirical support for the 'new' view.

In addition, based on the estimation results, we can state that the probability of finance through share issues is most significantly influenced by a firm's capacity for internal finance. Hence, share issues may be considered one financing alternative and decisions concerning this option are made taking other available forms of finance into account. Thus, the results do not warrant a conclusion that share issues would have a special role as the marginal source of finance for investments, as suggested by the 'traditional' view.

In conclusion, we can state that the better we can manage to isolate a group of firms with limited access to external finance, the better we can consider the validity of the findings of the 'new' view to be supported in Finland. However, it is possible to argue that the interpretations of 'new' view regarding the impacts of dividend taxation on investment and financial decisions by firms include very demanding assumptions and results for which it is difficult to find empirical support, at least if we consider the corporate sector as a whole.

2. Impacts of taxation on firms' financial decisions

2.1. Basis of review: corporate tax and investments

In assessing the impacts of corporate taxation on firms' real investments, neoclassical investment theory may be taken as a useful point of departure.[56] According to this theory, a firm maximising its value – or future profit flows – will employ capital up to the point where the rate of return on the marginal unit of capital is just equal to the user cost of

[56] Used as a point of departure in studies such as Auerbach (1983), Poterba and Summers (1985) and Boadway (1987).

capital. The cost of capital refers to the actual cost of an investment, including not only the financing costs but also the owner's return requirement, depreciation of fixed capital, increase in value and taxes. If taxes are ignored, according to neoclassical economic theory, a firm maximising the present value of its future profits will increase its capital base until $R(K) = q(r + \delta)$, where $R(K)$ is the return on an additional investment of one unit.[57] $R(K)$ is defined as a decreasing function for capital base K. The unit cost of capital is q, and depreciation of fixed capital is described with the symbol δ. Opportunity cost r refers to the return that the owner could receive from an alternative financial investment. If $100b$ per cent of the firm's marginal investments are financed with debt and $100(1 - b)$ with equity (internal cash flow or share issue), the opportunity cost is $r = bi + (1 - b)\rho$, where i is the rate of return required by the lenders and ρ is the return requirement of equity investors. Hence, the last euro invested is subject to a return requirement just enough to cover the depreciation of fixed capital and return requirements of the different investor groups.

Corporate taxation reduces the return on the marginal investment. As a consequence, both the pre-tax return requirement of the marginal investment and the cost of capital increase. The return on additional investment reflecting corporate tax is $R(K)(1 - u)$, where u is the firm's corporate tax rate. However, depreciation and deduction rules related to corporate taxation reduce the cost of capital. For example, interest expenses on debt usually constitute tax-deductible expenses – while deductions related to the return requirement on equity are not allowed.[58] The tax-deductibility of interest expenses on debt lowers the opportunity cost of the investment, which is therefore $r = bi(1 - u) + (1 - b)\rho$. The rate of depreciation and deduction accounted for in taxation is described by the present-value term Z, which reduces the effective after-tax cost of capital from level q to $q(1 - uZ)$. For simplicity, we ignore risk and inflation. The firm will keep investing until the after-tax marginal return on the investment corresponds to its cost of capital, i.e. $R(K)(1 - u) = q(r + \delta)(1 - uZ)$, or correspondingly

[57] The symbols used are the same as in the source McKenzie and Thompson (1996).

[58] The rationale behind the ACE (*Allowance for Corporate Equity*) taxation model is that in addition to the interest expenses on debt, equity costs, i.e. the normal return requirement on capital (normal profit), are also deductible in taxation and tax only applies to the proportion of profit that exceeds the normal profit (*economic rent*). The ACE model was presented by Bruce and Boadway in *Journal of Public Economics* in 1984.

$$2.1 \qquad R(K) = q(r + \delta)[(1 - uZ) / (1 - u)].$$

The right side of the equation represents the firm's cost of capital. If the corporate tax payable is higher than the depreciations and other deductions accounted for in taxation, corporate tax will increase the cost of capital for the firm and thus also its marginal return requirement on the investment. In this case, corporate taxation has a negative influence on the firm's real investment incentives.

Corporate tax has an impact on the cost of capital in at least two ways. For example, a reduction in the corporate tax rate leads to an increase in the after-tax return on investments, which in turn reduces the cost of capital. On the other hand, a reduction in the tax rate may increase the effective cost of investments by decreasing the tax savings from deductions and depreciations, which serves to increase the cost of capital related to investments. In making very realistic assumptions about a firm's financial structure, market interest rate and other factors with an influence on the cost of capital, we can reasonably take the view that a reduction in the corporate tax rate will also reduce the cost of capital for the firm. An increase in the corporate tax rate would produce the opposite conclusions.

In considering the final impacts of the cost of capital on investments, we must take account of cost-of-capital elasticities, or the sensitivity of investments to changes in the cost of capital. These are influenced in particular by the opportunities of a firm to make foreign direct investments. If taxation increases the cost of capital for domestic investments, a firm is likely to increase its investments abroad. The opportunities of a firm to make foreign direct investments can be considered to increase the sensitivity of domestic investments to changes in the cost of capital.

In addition to changes in the corporate tax rate, changes in the tax deduction and depreciation rate (Z) also have an impact on the capital costs of investments. Increasing the depreciation rate reduces the effective acquisition cost of investments by increasing the present value of depreciations and deductions: through the effective acquisition cost, the change reduces the cost of capital.

As Equation 3.1 shows, corporate tax has a direct impact on the cost of capital. In contrast, taxes levied on dividend income received by shareholders and capital gains on sales have an indirect impact on the cost of capital through the opportunity cost of equity finance *(r)*. The impacts of shareholders' income taxation on the total financing costs of a firm depend on the assumptions made about the financial markets and the marginal source of funding for the firm. There is no universally accepted theory about the behaviour of a firm in financial questions; theories have failed to give a satisfactory answer to the question of why some firms distribute no dividends at all, not to mention how dividend taxation affects investments and other financial solutions of a firm.

2.2. Three viewpoints on impacts of dividend taxation

The model presented herein on the impacts of dividend taxation on firms' financial decisions is primarily based on Auerbach's (2001) article *'Taxation and Corporate Financial Policy'*.[59] The model is derived in Appendix 1. It is based on maximisation of the value of a firm based on the Lagrange method and assumes a classical corporate tax system; a taxation system integrating the taxation of limited firms and their shareholders is presented in Section 3.5.

According to the model, the optimum value of a firm is

2.2 $$V_t = \int_t^{\infty} e^{-\int_t^s \frac{\rho}{(1-c)(1-\lambda_v p)} dv} \left(1 - \frac{\mu_s}{1-\lambda_s p}\right) G_s ds \,,$$

where V_t = value of the firm at time t
τ = income tax rate of the firm
c = effective tax rate on capital gains
θ = effective tax rate on dividend income
ρ = discount rate set by the owner
p = dividends' share of the total earnings of the firm
λ = multiplier of a constraint related to the policy maximising the value of the firm (shadow price)
μ = multiplier of a constraint related to the policy maximising the value of the firm (shadow price)
G_s = net income from the firm (D_s - S_s) at time s
S_s = new shares issued at time s
D_s = distribution of dividend at time s.[60]

[59] A similar point of departure is also used in studies by King (1974, 1977) and Auerbach (1979, 1983, 1984), among others.
[60] The symbols correspond to those used in the source.

Multipliers λ_s and μ_s are related to constraints faced by the firm in the pursuit of value maximisation. These multipliers are bound by the condition: $\lambda_s + \mu_s = 1 - (1 - \theta) / (1 - c)$. Under the classical corporate tax system $\theta > c$, which entails that at least one of the multipliers λ_s and μ_s must be other than zero. This leads to three regimes depending on whether λ_s, μ_s or both (intermediate case, not discussed here) are positive. These are also the basis of the 'traditional' and 'new' views on the impacts of taxation on the financial policy of a firm. Although the stance of the firm may change over time between the regimes, the following section comprises a static review of each regime. The regimes differ from each other to the effect that they lead to different marginal sources of finance. In other words, they end up using different sources of finance when the firm increases its investments by one unit. Furthermore, the regimes differ in terms of the impacts of taxation changes on investments, distribution of dividends and value of the firm (total earnings).

2.2.1. The 'traditional' view

The minimum dividend constraint (Equation A.5 Appendix 1) requires that dividends correspond at least to proportion p of the total earnings of the firm. If only the minimum dividend constraint is valid ($\mu = 0$), Equation 2.2 is reduced to

2.3
$$V_t = \int_t^{\infty} e^{-\frac{\rho}{[1-(1-p)c-p\theta]}(s-t)} G_s ds\ .$$

According to this equation, the value of a firm equals the present value of the net income flows to be received from the firm (corresponds to net share issues and dividends) discounted with a rate that takes taxes into account. The tax factor of the discount rate has been calculated as a weighted average of the tax rates on dividends and capital gains. Proportion p of the return on the marginal investment is paid out as dividends and taxed at rate θ. The remaining proportion of earnings remains in the firm and is subject to a tax equal to the capital gains tax rate c.

This regime is known as the 'traditional' view of the impacts of taxation on firms' financial decisions. According to this view, both the dividend tax rate and the capital gains tax rate increase the discount rate applicable to a firm's future income flows, $\rho \ / \ [1 - (1 - p)c - p\theta]$. The minimum dividend constraint requires that the firm pays out as dividends at least proportion p of its total earnings. According to the 'traditional' view, the payout ratio and the tax rates on dividends and capital gains have an impact on the share price, in other words, the total return requirement on the share.

The value of a firm is maximised when it invests until the point where the value to the owner of an investment of one euro is also one euro. At that point the marginal return merely compensates for the extra tax on dividends relative to interest income. The firm pays out a fixed proportion of its profits to the owners and, when necessary, uses share issues to raise more equity capital to finance investments. Hence, the marginal source of finance for the firm is a new share issue, although this is a disadvantaged source of finance from a taxation point of view. The separate taxation of a corporation and its owner and the consequent double taxation of dividends increase the firm's investment costs and hence reduce fixed investments. Tightening of dividend taxation reduces real investments further by increasing the cost of capital. According to the 'traditional' view, the cost of capital applying to a firm's investments is, due to dividend taxes, considerably higher than the market interest rate, and reduction of the dividend tax has a significant stimulating impact on investments.

The 'traditional' view considers dividends to be an uneconomical means of profit distribution due to taxation. However, the key assumption is that shareholders benefit more from dividends than from appreciation in the value of shares.[61] In making a dividend decision, a firm takes into

[61] Proponents of the 'traditional' view (e.g. Harberger (1962, 1966), Poterba and Summers (1985)) justify the high appreciation of dividends in three ways. Firstly, due to imperfect information in the financial markets, dividends have an important role as a means of signalling. Secondly, dividends can be used to monitor the actions of management, which reduces the owners' agency costs. Thirdly, dividends often constitute a certain and regular flow of income to the shareholders, which is easy to take into account in consumption decisions. According to the 'traditional' view, a firm will pay dividends to receive these benefits even if it has access to more advantageous means to distribute profits from a taxation point of view. In the optimum case, the benefits received from distribution of dividends correspond exactly to the taxation consequences.

account the benefit to the owner and the higher tax costs resulting from the distribution of dividends.

2.2.2. The 'new' view

When only the constraint on share repurchases ($S_t = D_t - G_t \geq 0$) is binding *($\lambda = 0$)*, Equation 2.2 is reduced to

$$2.4 \qquad V_t = \int_t^{\infty} e^{-\frac{\rho}{1-c}(s-t)} \left(\frac{1-\theta}{1-c}\right) G_s ds \,.$$

This equation has two noteworthy characteristics. Firstly, the discount rate applied, $\rho / (1 - c)$, is no longer influenced by the tax rate on dividend income and hence not by dividend income either. Secondly, net income flows from a firm are influenced by multiplier $(1 - \theta) / (1 - c) < 1$, because $\theta > c$. Based on these two factors, we can deduce that the return requirement on additional investment is no longer influenced by the owner's dividend tax rate. Hence, dividends and their tax rate have no impact on a firm's investments. In contrast, the dividends to be distributed and taxation do have an impact on the value of the firm. These findings are called the 'new' view on the impacts of taxation on the financial decisions of a firm.

Since the constraint on share repurchases is binding in the regime, according to this view a firm will not repurchase its own shares or issue new shares. By financing investments only with retained earnings, firms can avoid the taxation of dividends. The income flows from marginal investments are paid out entirely as dividends to the owners despite their disadvantageous tax treatment because the firm ultimately has no alternative uses for its earnings. This also means that internal cash flow is a marginal source of finance for the firm and dividends can be seen as a residual remaining after other financial obligations have been met.[62]

Due to the residual nature of dividends, taxation of dividends has no impact on the firm's financial policy. The payout ratio is determined

[62] Proponents of the 'new' view include King (1974, 1977), Bradford (1981) and Auerbach (1979, 1983).

independently. Neither has dividend tax has any impact on the cost of capital or real investments of the firm. However, dividend tax does have an impact on the value of the firm. According to this view, shareholders cannot avoid dividend taxation under any circumstances: a rise in the value of shares always includes an implicit dividend tax. Although taxation does not take place immediately at the moment profits are generated, the tax is capitalised immediately in the price of the share. Similarly, changes in taxation are immediately passed on to share prices. This is called the taxation-based *trapped equity* argument. According to this, additional tax or tax breaks on dividend payouts are capitalised on the price of the share, because the dividend distribution is ultimately the only way to channel the cash flow generated by a corporation to its owners. Thus, additional tax on dividend payouts is also paid when earnings are retained in the firm to finance investments. Hence, changes in dividend taxation have a direct impact on shareholders' wealth.

2.2.3. The 'tax irrelevance' view

Proponents of both the 'traditional' and 'new' views argue that the financial markets 'punish' shares paying high dividends with higher total return requirements if dividends are taxed more rigorously than capital gains. In contrast, the 'tax irrelevance' view[63] considers that a marginal investor's capital gains and dividend income are always subject to a tax of zero per cent. Therefore, dividend taxation cannot have an impact on a firm's investments or value.

This view can be justified in at least two ways. In the first place, if taxes are ignored, investors are indifferent about a firm's financial decisions – dividend and debt finance decisions. This is due to the fact that shareholders are able to compensate for any impacts of the firm's financial policy on their own portfolios through their personal investment and borrowing decisions. This also means that different corporate finance policies are equally attractive from the investor's point of view in a world without taxes. When taxation is taken into account, firms should choose the form of finance with the most favourable taxation consequences.

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[63] Proponents of the 'tax irrelevance' view include Stiglitz (1973), Miller (1977), Miller and Scholes (1978) and Boadway and Bruce (1992).

Stiglitz (1973) proposed that when retained earnings are a more favourable form of finance than debt, a firm will invest in real capital until the marginal return rate corresponds to the market interest rate. Thereafter, it will shift into investments in financial capital. It will abstain entirely from paying out dividends and use its marginal revenues in financial investments if dividends are punished in taxation and its own financial investments are subject to more lenient taxation than shareholders' financial investments. These findings correspond to a case where debt finance is the most advantageous form of finance from a taxation point of view. In both cases, the opportunity cost is the market interest rate. The cost of capital equals the interest rate and corporation tax falls only on inframarginal investments with returns above the market interest rate.

As a second justification for this view, we can take differences in dividend tax rates: dividend income received by different types of investors is subject to a varying tax burden. Therefore, customer groups based on tax factors *(tax clienteles)* emerge in the financial markets that prefer shares paying different dividend incomes.[64] Investors with high tax rates prefer shares paying low dividend incomes, while, correspondingly, investors with low tax rates will invest in shares paying high dividend incomes. If the markets function perfectly, investments are made solely on the basis of tax rates. If the markets are imperfect, investors differ not only in terms of taxes but also risk preferences and transaction costs. Investors may then utilise investments that are sub-optimal from a tax perspective but offer certain diversification benefits. In this case, it is also possible to map the marginal investor group that is indifferent to whether they own shares in a certain firm or invest in another target with different taxation consequences. The tax rate on the dividend income of the marginal investor determines the cost of capital for the firm and the impact of taxation on the value of the share on the financial markets. Many groups of investors pay no taxes on dividends or capital gains. This applies particularly to institutional investors. If these investors constitute the marginal investor group on the financial markets or have a key impact on share prices, dividend taxation will have no impact on the value of a firm or its cost of capital.

[64] Miller and Modigliani (1961) were the first to postulate that investors choose to invest in firms whose dividend payout ratio is optimal for them.

Thus, according to the tax indifference view, taxation does not have an impact on investments or cause deadweight losses. This outcome requires that interest expenses on debts are completely deductible, capital tax rates are harmonised and taxation is based on firms' actual profits. When the interest expenses on debts are tax-deductible and equity finance is subject to a double tax burden, the use of debt is a more economical form of finance for a firm than equity. Hence, the classical dividend taxation system encourages debt finance at the expense of equity.

Proponents of the 'traditional' and 'new' views criticise the emphasis on debt finance in the 'tax irrelevance' view: indebtedness increases the probability of default, which is why firms must finance at least part of their investments with equity. However, the choice between debt and equity as the form of finance is not a straightforward financial decision under the 'traditional' or 'new' views either. When debt finance and related interest expenses are introduced in the problem of optimising the value of a firm (Appendix 1, A7), a new constraint becomes valid, according to which the return on an investment of one euro increasing the equity of the firm should after taxes correspond to the after-tax return of a euro borrowed by the firm. This condition is rarely met under the given tax parameters, and an optimal financial policy for the firm cannot usually be reached through an internal solution. In the classical taxation system where interest expenses from debt finance are tax-deductible but equity investors' return requirements are not, the 'traditional' and 'new' views also reach a corner solution where the firm will use debt as its sole form of finance.

At the aggregate level, however, the largest proportion of firms' capital is equity.[65] A simple explanation as to why debt finance is not used more extensively is the non-tax-related costs involved in using debt. The constraints and high costs related to the use of debt are explained by the *adverse selection* and *moral hazard* problems resulting from asymmetric information on the financial markets.[66]

2.3. Significance of integrated taxation of firms and owners

Classical corporate taxation taxes the earnings of a firm twice: first, the firm is taxed, and then the owners are taxed on dividend income and capital gains. This overlap is considered the disadvantage of classical corporate taxation, as it is thought to hinder the raising of equity finance and cause deadweight losses to the whole economy.

To eliminate the disadvantages of classical corporate taxation, the emphasis in taxation was shifted to integrating the income taxation of firms and their owners in order to eliminate the double taxation of profits paid out by a firm. The most frequently used ways of integrating the taxation of a firm and its owners are the *split-rate system* and the *avoir*

[65] Miller (1977) showed that differences between investors' marginal tax rates lead some investors to prefer firms using equity finance, others prefer firms using debt finance and some are indifferent about the main form of finance used by a firm. Hence, the question of the capital structure of a firm is irrelevant because, in the equilibrium, the costs to the firm from different forms of finance are equal. Therefore, debt finance does not involve net tax benefits. Neither is there any taxation-based optimal capital structure for a firm. These findings are known as the *'Miller equilibrium'*. DeAngelo and Masulis (1980) expanded Miller's point of view and, in addition to tax deductions for loan interest, also took into account other deductions generally related to corporate taxation. They showed that firms always have an 'internal optimum level' for debt if other tax deductions can be considered as substitutes for tax deductions that are made for interest on debt finance. According to DeAngelo and Masulis, there is a negative association between the available tax shields and debt. Firms can be considered to be making trade-offs between interest deductions and other deductions allowed in taxation. Due to the tax shield, the capital structure is not irrelevant to the firm after all, and therefore taxation does have an impact on the capital structure of the firm.

[66] In the *adverse selection problem*, financiers with their imperfect information are unable to make an accurate assessment of the risk involved in a firm and its investments. Therefore, the risk premium increases and ultimately only high-risk firms apply for debt finance. In the *moral hazard problem*, firms have an incentive to make risky investments because they are not responsible for the total risk, as a part of it is transferred to the debt financiers.

fiscal system. The split-rate system integrates the taxation of firms and owners by imposing a lighter tax on earnings paid out as dividends than earnings retained in the firm. However, the present review concentrates more on the avoir fiscal system applied in Finland, in which the income tax paid by a corporation is credited in the taxation of profits distributed to the owners.[67]

If taxation is integrated without firm-level taxation, the owners could accumulate earnings in a firm that would be outside the reach of the tax authorities. Since the taxation of capital gains at the level of the shareholder takes place in connection with the realisation, not the accumulation, of earnings, corporate taxation has a role as a withholding tax in respect of the owners' earnings.

Under the avoir fiscal system, dividends paid cannot exceed the net earnings of a firm without tax consequences. This ensures the tax credit received by an owner is related to an actual payment of corporate tax. If dividends paid exceed profits, the excess portion is subject to additional tax, if no tax has been paid previously on this portion.

Integrating the income taxation of firms and their shareholders reduces the total tax burden on dividends: the impacts of tax integration depend on the change in the effective tax rate on dividends. If the effective

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[67] The avoir fiscal system is often considered the opposite of the classical system. Kröger (2003) finds the following differences between the classical corporate tax and avoir fiscal systems:

- The avoir fiscal system treats equity and debt finance equally because debt interest is deductible and firms are not taxed for dividends distributed. The classical taxation system favours debt finance since dividends are taxed at the level of both the firm and the owner.
- The avoir fiscal system treats different forms of investment neutrally. In contrast, the classical taxation system encourages investment in targets other than equities.
- Under the avoir fiscal system, the difference between the corporate tax rate and the owner's tax rate may have an impact on the amount of dividends distributed. The system encourages firms to retain earnings if the corporate tax rate is lower than the tax rate of the shareholder. In the opposite situation, it encourages the distribution of dividends. The classical tax system does not create such incentives.
- In the avoir fiscal system, a neutral tax treatment of different firm forms can be achieved. This is achieved when the shareholders of a limited firm are taxed on the same grounds as the owners of other forms of enterprise. In this situation, the classical system favours enterprises operating in a form other than a limited firm.
- The avoir fiscal system does not have an impact on the manner in which an owner-entrepreneur takes compensation for his work from his firm (salary or dividend). The classical system as a rule encourages the payment of a salary.
- The avoir fiscal system discriminates against foreign investors, since they are not granted the tax credit. The classical system treats all investors equally.

dividend tax rate remains higher than the effective tax rate on capital gains even after the avoir fiscal credit, the above conclusions remain valid. If, on the other hand, the effective dividend tax rate is, due to the avoir fiscal credit, lower than the effective tax rate on capital gains, the constraints are no longer binding, and the number of relevant regimes is one. In this situation, a firm is able to reduce the taxes payable by raising new capital through a share issue, which is then used for the dividend distribution. This type of tax arbitrage can be prevented if the maximum amount of dividends is linked to the profits of a firm. This results in the following constraint:

2.5 $$D_t + \dot{V}_t - S_t \geq D_t.$$

When this constraint is applied, the problem of maximising the value of a firm can be presented as

2.6

$$V_t = \int_t^{\infty} e^{-\int_t^s \frac{\rho}{(1-c)(1-\lambda vp)} dv} \frac{1}{1+\gamma_s}[G_s(1+\gamma_s) + D_s(\frac{1-\theta}{1-c} - 1 - \gamma_s)]ds\,,$$

where γ is a multiplier (*shadow price*) related to constraint 2.5. When the equation is maximised for D_s, the last term in parentheses disappears and $\gamma_s = (1 - \theta) / (1 - c) - 1$. Equation *2.6* may now be expressed as

2.7 $$V_t = \int_t^{\infty} e^{-\frac{\rho}{1-\theta}(s-t)} G_s ds\,.$$

As long as the dividend tax rate θ is lower than the capital gains tax rate c, the reduction in the cost of capital due to integration of the taxation of a firm and its owners is limited according to the 'traditional' view. According to the 'new' view the cost of capital does not decrease at all. When $\theta = c$ has been reached, integration has the same impact in all three regimes: the cost of capital related to investment decreases.

Hence, the impacts of integrating the income taxation of a firm and its owners on capital costs for the firm and investment incentives remain fairly limited. For example, according to the 'traditional' view, tax relief should be targeted through firms' new share issues since they use new issues as a marginal source of finance. Tax treatment also has an impact on share repurchases. Share repurchases are used in corporate finance, although they are not as common as could be assumed based on taxation factors alone.

The avoir fiscal system is usually only applied to domestic shareholders. This constraint turns it into classical corporate taxation for foreign holdings. Hence, the incentives under an avoir fiscal system become similar to the incentives under classical corporate taxation.[68] According to the 'new' view, avoir fiscal credit is not capitalised in the share price.[69]

2.4. Criticism and empirical testing of the views

The three views presented above offer very different answers to the impacts of dividend taxation on the financial decisions of a firm. Both the 'new' view and the 'tax irrelevance' view maintain that dividend taxation has no significance in a firm's investment decisions. According to the 'traditional' view, on the other hand, taxation of dividends reduces the fixed investments made by a firm. According to the 'traditional' view, tightening of dividend taxation is expected to reduce the dividend distribution while the 'new' and 'tax irrelevance' views do not expect an increase in the tax rate to have any impact on the dividends to be distributed. Furthermore, the 'traditional' and 'new' views consider

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[68] It is significant particularly for small open economies that foreign investors are treated differently in taxation to domestic investors. Typically, foreign dividend recipients are not granted avoir fiscal credits; they are subject to double taxation. Boadway and Bruce (1992) showed that when an open economy tries to eliminate double taxation of domestic investors, foreign investors may, however, emerge as a marginal investor group, in which case the avoir fiscal system becomes similar to classical corporate taxation in terms of incentives.

[69] The impacts of the avoir fiscal system have also been studied empirically. For example, Pattenden and Twite (2008) argue that it increases firms' incentives to pay out dividends. Pattenden and Twite reviewed the impacts of the avoir fiscal system implemented in 1987 in Australia on firms' dividend policies. According to their findings, there was a considerable increase in firms' payout ratios due to the avoir system. In Pattenden and Twite's study, incentives to distribute dividends were also influenced by a firm's investment opportunities, expectations of future profitability and effective tax rates. In addition, a firm's financial position was considered to have an influence on the dividends it distributed. The highest dividends in gross terms were paid by firms which may have had relatively low profits but had high book values, high equity ratios and low gearing ratios.

dividend taxation to have a negative impact on the value of shares. In contrast, the 'tax irrelevance' view does not see a connection between dividend taxation and the value of a share.

As the biggest difference relative to the other views, the 'tax irrelevance' view maintains that, for the marginal investor, the effective tax rate on both dividends and capital gains is the same, and close to zero.

We could consider the biggest drawback of the 'new' view to be its assumption that firms have no other means of distributing profits to their owners than dividends. It has been shown in practice that restrictions on, for example, share repurchases can be avoided easily, and share repurchases have emerged as a significant means of profit distribution.[70]

The fact that dividends are defined as a residual item – the part of cash flow that remains after a firm has financed its investment needs – has been identified as another drawback of the 'new' view. Particularly new and rapidly growing firms typically lack the possibility to generate cash flows that could suffice to cover all profitable investment opportunities. For such firms, a share issue may be the only marginal source of finance. In this case, dividend taxation may have a negative impact on firms' investment decisions. According to the proponents of the 'new' view, the marginal source of finance for investments is cash flow from operations, which may well hold true for firms with established market positions. We could, therefore, consider that the 'new' view does not apply to the entire lifecycle of a firm, but only to mature firms that have run out of profitable investment opportunities. The residual nature of dividends should also indicate that dividends distributed would vary periodically more than a firm's investment expenditure. However, Poterba (1987) showed that exactly the opposite was the case in the United States.

The most pungent criticism of the 'traditional' view concerns the assumption that dividends have characteristics that per se increase their attractiveness. Proponents of the 'traditional' view are often considered to provide insufficient justification for this assumption. For example, dividends are often considered an expensive means of signalling, and agency arguments are also not considered to carry enough weight.

Another problem with the 'traditional' view relates to the assumption about the source of finance for marginal investments. According to this view, marginal investment is financed either with a new share issue or by a combination of a share issue and internal cash flow, depending on the

[70] Early evidence on trend in repurchases see Bagwell and Shoven (1989)

underlying assumptions. However, the use of share issues as a form of corporate finance is very minor relative to overall equity finance. However, Zodrow (1991), for example, emphasised that even though share issues are not an important form of finance at the aggregate level, they may still have an important role to play as a marginal source of finance.

According to Sinn (1991), both the 'new' and 'traditional' views give an incorrect representation of the determination of the cost of equity in the early stages of a firm. For immature and rapidly growing firms, the actual costs may be higher than either of these views suggests. If retained earnings are taxed more lightly than dividends, a firm would be well advised to only use equity finance for obtaining a small amount of initial capital. Thereafter, it should use internal finance, which is more advantageous from a taxation point of view to build the firm to an optimum size. Sinn argues that the tax system may delay investments during the growth phase of a firm, and raising initial capital through share issues is more limited than would be expected on the basis of investment opportunities. Hence, tightening of dividend taxation encourages new firms to restrict their equity finance, which on the other hand protracts their growth phase. The greater the tax discrimination against dividend distributions relative to retentions, the lower should be the initial injection of equity, and the greater should be the number of investments financed by retentions in the growth phase. The growth phase ends when additional investments no longer yield higher than normal rates of return. In the maturity phase, the arguments of the 'new' view apply and dividend tax becomes neutral. Hence, Sinn proved that the 'new' view holds true in the long term: the growth phase of the firm is protracted, but the long-term optimum amount of capital remains unchanged. According to Sinn, a high cost of capital at the time a firm is set up most hurts growing firms that do not distribute dividends – not those that do. Furthermore, according to Sinn, more attention should be paid to how taxation affects entrepreneurship: the establishment of new firms and the development of young ones.

Sinn's ideas presented above are known as the '*nucleus theory of the firm*'. This reflects the observation that, due to dividend taxation, a new firm should start with a small 'nucleus' of equity and, in the subsequent growth phase of the firm, finance projects with relatively high returns by retained earnings.

Literature on the connection between taxation and investments includes publications that, based on their findings, are difficult to place in any of the three basic views. These articles model taxation systems in more detail and account for different provisions in corporate law. As an example, we can mention Keen and Schiantarelli (1991) as well as Huber (1994), who reviewed the avoir fiscal systems applied in Great Britain and Germany. These articles show that the impacts of these systems may deviate from the 'traditional' and 'new' views. In addition, Kanniainen and Södersten (1995) accounted in their model for accelerated depreciation (the economic depreciation rate and the depreciation rate allowed for tax purposes differ from each other), constraints on the distribution of dividends based on corporate law, and asymmetric information. According to their findings, under certain assumptions, changes in corporate taxes have no impact on investments.

The views have also been assessed empirically by testing the impacts of dividend taxation on firms' behaviour in investment and financial decisions. Challenges to empirical testing have been posed by both data restrictions and assumptions related to the models used.[71]

Poterba and Summers' (1985) empirical study lends support to the 'traditional' view. Based on Tobin's *Q* theory, their study reviews the impacts of changes in dividend taxation on investments in the United Kingdom in 1950–1981. More recent empirical studies supporting the 'traditional' view include Hines (1996) and Poterba (2004). Both studies utilise data on American firms.

In contrast, the 'new' view is supported by Auerbach and Hassett (2002). Their research material comprises data on US-based non-financial firms in 1982–1998. The idea underlying Auerbach and Hassett's study is that the 'new' view gets empirical support if, when controlling for the value of the firm, dividend distribution is influenced by the cash flows and investments of the firm. Based on this, Auerbach and Hassett deduced that to finance marginal investment, firms use retained earnings. The sensitivity of dividends to a firm's cash flows, investments and indebtedness, according to the study, depended among other things on the firm's position on the financial markets. Furthermore, according to Auerbach and Hassett, finance raised through a share issue was equally influenced by investments and changes in income flows. They considered

[71] A comparison between the 'new 'and 'traditional' view based on empirical results by McLure and Zodrow (1994).

this, too, to contradict the 'traditional' view, which assumes that share issues react more readily to investment needs than to fluctuations in earnings.

In addition, Desain and Glosbee (2004) support the 'new' view on the impacts of dividend taxation. Recent studies have utilised policy reforms to isolate the causal impacts of tax policy. Evidence is available for the Anglo-Saxon countries in particular. Bond, Deveraux and Klemm (2007) found support for the 'new' view in recent UK data, and Auerbach and Hassett (2007) in US data.

Recent studies have particularly highlighted the importance of agency models in explaining the dividend distribution behaviour of listed firms. Since agency aspects have been considered to have a link with the dividend distribution behaviour of firms, pure testing of the 'traditional' and 'new' views is difficult. Chetty and Saez (2005) conducted an analysis of the 2003 US dividend tax cut and found a rapid increase in dividend payments. The increase was stronger among firms with high levels of accumulated assets and firms with strong owners. As they argued in Chetty and Saez (2007), this is more line with an agency cost model of dividend behaviour.

Korinek and Stiglitz (2008) analysed the dynamic effects of dividend taxation on macroeconomic variables, investments and output, using Sinn's nucleus model of capital-constrained firms. Information asymmetry in the capital markets means that firms prefer internal financing for new investment projects. In the model, they start out by issuing equity and in the second stage accumulate more funds through retaining their earnings. When they reach the mature stage, they pay out dividends. The arguments of the 'traditional' view apply in the first stage, while the 'new' view applies in the second and mature stages. Korinek and Stiglitz found that unanticipated dividend tax changes have only small effects on aggregate investments by firms in the second stage. An announced tax change will, in contrast, induce firms to participate in intertemporal income shifting through the timing of dividend payments. This has an effect on firms' cash holding, and hence also on investments. Korinek and Stiglitz argue that short-term timing effects can have long-term real effects on the economy through the effect on the cash holding in credit-constrained firms.

All in all, firms have different opportunities and willingness to react – through dividends, share issues and other financial decisions – to changes occurring in the economy. Taxation is not the only factor steering corporate financial decisions. Therefore, it is impossible to present a precise model to describe the impacts of taxation.

2.5. Neutrality of taxation of organizational forms

There is an interesting question related to taxation and the choice of organizational form: What is the impact of taxation on the choice of company form? Taxation is not necessarily an exogenous factor from the firm's viewpoint, but a firm can exert at least some influence on its taxation through the selection of organizational form. In general, the starting point is the idea that different company forms are largely intersubstitutable. Hence, differences in the taxation of different company forms may have an influence on the choice of organizational form.

Gravelle and Kotlikoff (1989) identified distortion of the choice of organizational form as one of the efficiency/deadweight losses caused by corporate taxation. However, empirical studies have shown taxation to have only a small – albeit significant – influence on the choice of company form. For example, Gordon and Mackie-Mason (1991) and Ayers, Cloyd and Robinson (1996) noted that flexibility in the choice of organizational form relative to taxation was low. In contrast, Goolsbee (2002) arrived at the opposite conclusion: according to this view, corporate taxation in the United States has a considerable negative influence on the decision to incorporate a business. Gordon and Mackie-Mason (1994) stated that US tax rules create an incentive for firms whose profits are taxed at very high or low rates to select a firm form other than limited company.

The choice of company form with a view to taxation has also been reviewed in the Nordic countries. Alstadsaeter (2003) reviewed the influence of Norwegian rules on dual income taxation on what is the most favourable company form for business activities. According to Alstadsaeter, entrepreneurs whose tax rate on earned income differs significantly from the tax rate on capital income have an incentive to incorporate their business. Through this arrangement, earned income can be converted into capital income, enabling higher net earnings from the business activities.

The Norwegian results apply in many respects to Finland as well. Another related aspect is that it may be beneficial even for a wealthy individual to establish a limited company as a savings and tax planning vehicle. For example, Fuest, Huber and Nielsen (2001) suggest this is worthwhile in countries where *income shifting*, or conversion of earned income into capital income, is possible.

3. Marginal source of finance for investments: Is there support for the 'new' view in Finland?

The empirical part of this study considers whether the findings of the 'new' view are supported by the impacts of corporate taxation on firms' financial policies in Finland. The review largely follows the approach described briefly above and used by Auerbach and Hassett in their study published in 2003 in *Journal of Public Finance*. The present chapter aims to explore the relation of dividend distribution to a firm's other financial decisions, income flows and real investments in particular. If the results show that these relations are significant, this can be considered as empirical support for the 'new' view. The review also takes into account that the relations may be different for firms in different financial positions. In this case, support for the 'new' view may not be found for every firm. In addition, Section 3.6 reviews the significance of share issues as a form of finance in a firm's financial policy. The 'traditional' view has empirical support if finance from share issues shows a stronger connection with investments than the cash flows generated by investments. The Finnish dividend tax rules have been shown to exert a steering influence on firms' financial decisions. Section 3.1 briefly presents the kind of framework taxation provides for financial decisions by Finnish firms.

3.1. Institutional framework of review: Characteristics of the Finnish dividend taxation system

Before the corporate and capital income tax reform that entered into force at the beginning of 2005, taxation of dividends in Finland was based on dual income taxation and an avoir fiscal system.[72]

Under a dual income tax system, income is divided into earned income and capital income. The main rule is that capital income comprises return on assets, capital gains from the sale of assets and other income that may be considered accrued on the basis of wealth. Income that has not been stipulated as capital income is earned income. Earned income is subject to a progressive tax scale.[73]

The avoir fiscal credit system that was in force in Finland in 1991–2004 linked the taxation of a corporation and its owners in connection with dividend distribution. Under the Finnish avoir fiscal system, taxes paid by a firm on profits distributed were credited entirely in the owners' taxation. If dividend income was taxed entirely as capital income, the shareholder paid no taxes on the dividends received, since the tax rate on capital income was the same as the corporate tax rate.

Before the tax reform at the beginning of 2005, dividends from a listed firm were taxed entirely as the dividend recipient's capital income. Since dividends from listed firms were also granted the avoir fiscal credit, they were in practice tax-free. Dividends from other firms and related avoir fiscal credits were regarded as capital income up to an amount corresponding to an imputed return rate determined in the Finnish Net Wealth Tax Act on the mathematical value of the share (net wealth per share).[74]

It has been postulated that the dual income tax system may achieve neutrality in the taxation of capital income and thus prevent inefficient allocation of capital. However, there remains a lack of neutrality between the taxation of earned income and capital income. The lighter taxation of

[72] The review concerns dividend taxation before the tax reforms, since the empirical analyses here are related to the period prior to the 2005 reform.

[73] For presentation of the Finnish taxation system, see for example Hjerppe, Kari, Kiander and Poutvaara (eds.) (2003).

[74] The imputed return rate from 1999 onwards was 13.5%. When dividends distributed corresponded to a return of 9.585% on the net wealth, they were taxed entirely as capital income. Dividends exceeding the capital income limit were taxed progressively as earned income.

capital is supported by the free movement of capital and the consequent tax competition between countries. In addition, inflation tightens the taxation of capital income, while earned income is better protected against changes in the value of money.

The problems of the dual income taxation system consist in the large gap between the highest marginal tax rates on earned income and the capital income tax rate as well as the formulaic division of business income and dividends from small limited firms into earned income and capital income. When capital income is taxed more lightly than earned income, the system encourages the conversion of earned income into capital income, such as dividends or capital gains. The amount of taxes paid by a taxpayer depends not only on their total income but also on the allocation of income to capital and earned income. This creates a foundation for tax arbitrage, since small business owners in particular can reduce their taxes if they are able to convert their earned income into capital income. The dual income tax model is therefore susceptible to tax planning.

Behavioural impacts of the dual income tax scheme have been studied in the Nordic countries primarily at a theoretical level. A great deal of interest has been attached to the impacts of dual income taxation on firms' investment behaviour, financial decisions and the position of different organizational forms.[75]

Firms' tax-based investment incentives are due to the distribution model in the dual income taxation scheme. When the capital income proportion is calculated on the basis of the net wealth of a firm, an incentive emerges for shareholders to invest more assets generating net wealth in the firm. It has been calculated that in Finland, at the highest marginal tax rates, the investment incentive is very significant.[76] In contrast, taxation will dampen investment if the tax rate on earned income is lower than the capital income tax rate. Tax-based incentives depend significantly on the marginal tax rate on the entrepreneur's earned income. Due to taxation, the cost of capital varies across firms. Therefore, taxation distorts the allocation of investments in the economy. In

[75] For example Kari (1999), Lindhe, Södersten and Öberg (2002, 2004), Hietala and Kari (2006), Kanniainen, Kari and Ylä-Liedenpohja (2007). For a discussion on the impact of taxation on the choice of firm form, see Alstadæter (2003).
[76] See Kari (1999).

addition, the investment target, form of finance and type of financier all have an impact on the return requirement (cost of capital).

3.2. Basis of empirical review and hypotheses tested

Some of the most important questions concerning corporate taxation relate to how firms finance their new investments and how taxation affects this decision. The 'new' view on the impact of dividend taxation maintains that dividend tax is capitalised fully in the price of the share and therefore the taxation of dividends has no impact on firm decisions concerning dividend distribution or investment. Cash flow is considered a firm's marginal source of finance; in financing investments with retained earnings only, firms avoid dividend taxes. Dividends are a residual item remaining after other financial obligations have been covered. In contrast, the 'traditional' view assumes that dividend tax causes owners to assign higher return requirements on their shares. Tightening of dividend tax is considered to decrease the size of dividends. An increase in the dividend tax rate also increases the cost of capital for a firm, thus reducing its real investments. Due to the preferences attached to dividends, firms nevertheless distribute a fixed proportion of their earnings as dividends regardless of their other financing needs. Hence, according to this view, a firm's investment decisions and dividend decisions are not interconnected. According to the 'traditional' view the marginal source of finance for a firm is the issuing of shares.

In Section 3.4 we note that integration of the taxation of a firm and its owners does not change the findings regarding the impacts of dividend taxation on financial solutions if, after avoir fiscal credit, the taxation of capital gains is harsher than dividend taxation. In Finland, due to the avoir fiscal system, dividends have been subject to single taxation and capital gains to double taxation. Furthermore, in Finland, dual income taxation and the related allocation system (allocation of dividend on an imputed basis to capital income and earned income) have a crucial impact on determination of the tax burden.

Auerbach and Hassett (2000) empirically tested the conclusions of the various views using US firm data. They reported an association between distribution of dividends and a firm's investments and cash flows.

They considered this finding to support the ‘new’ view on the impacts of dividend taxation. In addition, Auerbach and Hassett noted that signalling benefits from constant distribution of dividends do not preclude the validity of the ‘new’ view. In order to keep dividends at a constant level, a firm may allow its leverage ratio to vary according to its financing needs. Increasing leverage enables it to use a financing alternative where it does not have to resort to share issues even as a marginal source of finance. However, for some firms, the signalling benefits of dividends do not necessarily cover the costs incurred by borrowing. Therefore, dividends also have to be adjusted at least to some extent to the financial position of the firm. According to Auerbach and Hassett, the identified associations between dividend distribution and investment as well as dividend distribution and income flows are the stronger, the harder and more expensive it is to obtain external finance.

These issues and findings are the basis of the hypotheses tested empirically in this study. The ‘new’ view is supported if, when controlling for the value of a firm, dividends distributed are associated positively with the income flows of the firm and negatively with real investments. The ‘new’ view maintains that borrowing can be used to increase the finance required by a constant dividend policy when internal finance is insufficient. Adjustments in borrowing can be considered to enable at least a partial separation of the investment and dividend decisions. However, the opportunity to utilise the financial markets varies on the basis of the financial position and solvency of the firm. According to the ‘new’ view, leveraged firms also have to adjust their dividends at least to some extent to match their financial position. According to the ‘new’ view, it is likely that the association of dividends with investment and income variables varies according to a firm’s indebtedness – i.e. the feasibility of their utilising the financial markets.

This section tests whether the ‘new’ view describes the behaviour of Finnish firms. If the answer is in the affirmative, this is evidence that firms use retained earnings as a marginal source of finance and the impacts of dividend taxation on distribution of dividends and investments are minor. The association of dividends with investment decisions and income flows is estimated by controlling simultaneously for the financial development of the firm (value, amount of debt). The review method is similar to that used in Auerbach and Hassett’s (2003) study. The review also takes Auerbach and Hassett’s conclusions into account: for firms in different financial positions these associations – and thus the impacts of dividend taxation – may be different.

3.3. Data used

The empirical review is based on the Government Institute for Economic Research's firm database, which holds data on Finnish taxable firms. The data has been gathered by the tax Administration on the basis of firms' tax returns. The database used contains information on firms' income statements, balance sheets, taxation, depreciations and provisions as well as public subsidies received. The study utilises data from the period 1994–2004.

The strengths of the database include the large amount of data and good coverage in terms of both firms and variables. The data used are comprehensive, in that it covers the whole population of Finnish firms. Hence, it also covers the smallest enterprises, which constitute a significant majority in the Finnish corporate sector. On the other hand, the weaknesses of the database include partial structural discontinuity from year to year, and an occasionally large variation in data quality. The objective was to build as extensive and comprehensive a body of data as possible with as little elimination of observations as possible. However, firms have been eliminated from the data if a piece of data on them important for the estimation was lacking or where an important piece of information was identified as clearly inaccurate.

For the purposes of the review presented here, limited firms have been selected from the firm data. The only constraint is that the balance sheet total of the firm exceeds 5,000 EUR in the first year the firm is included in the data. Similar analyses are typically conducted with data on listed firms. For example, Auerbach and Hassett used data on listed firms. Non-listed firms are an important group of firms and their inclusion in the review adds value. However, accounting for small enterprises is not entirely problem free: for example, it is not possible to identify the market value of such firms in the same way as for listed firms. However, we can assume that the owners and potential owners of such firms calculate the value of the firm similarly to how the markets value listed firms. Nevertheless, the process is not as transparent as in the case of listed firms.

Table 3.1: describes the variables employed.

***TABLE 3.1:** Descriptive statistics (all variables calculated relative to the balance sheet total).*

Variable	Definition	N	Mean	Median	Std dev	Min	Max
Dividends	*distributed dividends*	1112844	0,0433	0	0,366	0	0,999
Investments	*counted as inclusion of expenditure residue*	1084119	0,0856	0,0116	0,474	0	1,634
Value	*capital employed = total assets less current liabilities*	993784	0,749	0,882	0,162	0,221	1
Earnings	*(EDBITDA) operating income + depreciation*	1149368	0,0578	0,0346	0,524	-0,779	1,872
Debt	*long term + short term debt*	1105531	0,581	0,608	0,235	<0,001	0,999
New issue	*new issue + capital loans*	872624	0,00652	0	0,031	0	1,998
Equity ratio <20%							
Dividends	*distributed dividends*	325628	0,0356	0	0,334	0	0,967
Investments	*counted as inclusion of expenditure residue*	322943	0,0512	0,0084	0,421	0	1,144
Value	*capital employed = total assets less current liabilities*	320618	0,744	0,836	0,151	0,230	1
Earnings	*(EDBITDA) operating income + depreciation*	334714	0,0364	0,0263	0,503	-0,779	1,236
Debt	*long term + short term debt*	329378	0,774	0,681	0,189	0,124	0,999
New issue	*new issue + capital loans*	286182	0,00704	0	0,033	0	1,998
Equity ratio 20%-35%							
Dividends	*distributed dividends*	503801	0,0411	0	0,351	0	0,992
Investments	*counted as inclusion of expenditure residue*	466665	0,0942	0,0137	0,465	0	1,225
Value	*capital employed = total assets less current liabilities*	371493	0,781	0,855	0,156	0,221	1
Earnings	*(EDBITDA) operating income + depreciation*	512208	0,0582	0,0366	0,515	-0,651	1,654
Debt	*long term + short term debt*	474230	0,547	0,575	0,201	0,036	0,947
New issue	*new issue + capital loans*	314953	0,00691	0	0,029	0	1,562
Equity ratio >35%							
Dividends	*distributed dividends*	300415	0,0524	0	0,396	0	0,999
Investments	*counted as inclusion of expenditure residue*	294511	0,135	0,0138	0,497	0	1,634
Value	*capital employed = total assets less current liabilities*	301673	0,811	0,913	0,147	0,235	1
Earnings	*(EDBITDA) operating income + depreciation*	302446	0,0836	0,0517	0,491	-0,381	1,872
Debt	*long term + short term debt*	301923	0,478	0,526	0,223	<0,001	0,861
New issue	*new issue + capital loans*	271489	0,00633	0	0,027	0	1,113

Investments have been calculated as real gross investments. The income flows of a firm measure the operating income plus depreciations according to plan. Value is measured by the amount of capital invested in the firm.

3.4. The model and econometric methods

The dividends of a firm are explained in the estimations by investment decisions in the two preceding periods, income flows, the value of the firm and short-term and long-term debt.

The estimated model can be presented in general form as follows:

3.1 $$D_{it} = \alpha + \beta_1 Inv_{it-1} + \beta_2 Inv_{it-2} + \beta_3 P_{it-1} + \beta_4 P_{it-2} + \beta_5 V_{it-1} + \beta_6 V_{it-2} + \beta_7 Debt_{it-1} + \beta_8 Debt_{it-2} + \beta_9 Z_{it} + \varepsilon_{it}$$
$$\varepsilon_{it} \sim iid\ N(0, \sigma^2);\ i = 1,2,\ldots,n;\ t = 3,4,\ldots,T$$

In the equations

$D_{i,t}$ = dividends to be distributed
Inv_{it} = gross investments
P_{it} = profits
V_{it} = value of firm
$Debt_{it}$ = debt
Z_{it} = control variables
α = constant term
ε_{it} = error term

In the equation, subscripts i and t index the firm and time, respectively. All continuous variables have been calculated relative to the balance sheet total.

The model includes assumptions of homoskedasticity and normality of the error term: firms have the same parameter values and same constant term, and hence also a common long-term equilibrium. In reality, however, firms have many tacit firm-specific characteristics: These differences may also have an effect on the phenomenon reviewed (dividend distribution behaviour), so the model must account for the effects of such firm-specific factors. Unobserved heterogeneity at the level of the firm results in biased parameter estimates.

Fixed effects allow us to control for unobserved time-invariant differences in firms. The fixed-effects estimator (within-group estimator) removes inconsistency by transforming each variable into its deviation from the firm mean.

3.2 $$D_{it} = \alpha + \beta_1 Inv_{it-1} + \beta_2 Inv_{it-2} + \beta_3 P_{it-1} + \beta_4 P_{it-2} + \beta_5 V_{it-1} + \beta_6 V_{it-2} + \beta_7 Debt_{it-1} + \beta_8 Debt_{it-2} + \beta_9 Z_{it} + \varepsilon_{it.}$$

3.3 $$\varepsilon_{it} = \eta_i + \upsilon_{it};\ \upsilon_{it} \sim iid\ N(0, \sigma^2);\ \ i = 1,2,\ldots,n;\ t = 3,4,\ldots,T.$$

By η_i we control for this unobserved heterogeneity among firms.

Since the value set of the dependent variable is constrained between zero and one, the model is also estimated with the Tobit regression, which takes the restricted nature of the value set into account. In addition, the Tobit model accounts for the considerably high frequency of zero observations. Tobit is a nonlinear model based on the maximum likelihood method.

Underlying the Tobit model is assumption of the existence of a latent factor D^*_{it} as follows:

$$D^*_{it} = \beta' X_{it} + \varepsilon_{it}, \tag{3.4}$$

where X_{it} is the vector of the independent variables and control variables, and the error term ε_{it} is *iid* $N(0, \sigma^2)$ distributed under the condition X_{it}. The latent variable D^*_{it} can be conceptualised as the tendency of a firm to distribute dividends. The latent variable is observed if $D^*_{it} > 0$. When the actual independent variable, or the ratio of dividends and balance sheet, is indicated by D_{it}, the Tobit model can be defined as follows:

$$D_{it} = max[0, D^*_{it}], \tag{3.5}$$

where D^*_{it} is the value of observation i of the latent variable in year t and depends in a linear fashion on the independent variables and the error term ε_{it}.

However, the Tobit model is even more sensitive than linear models to the underlying assumptions, such as the homoskedasticity of the error term and the shape of the distribution (normal distribution).

All these introduced estimation methods include the assumption of strict exogeneity: the independent variable and the idiosyncratic error term are uncorrelated. Since the explanatory variables have been lagged once or twice, the endogeneity problem does not actualise in the estimations. However, if we are also interested in the immediate reactions in dividend distribution to shocks in investments and income flows, these estimators are likely to suffer from biases due to the possible endogeneity of the explanatory variables.

We relax the strict exogeneity assumption on explanatory variables and estimate IV Tobit models. In these estimations, we are interested in the immediate – not lagged – connections of investments and income flows with dividend distribution: both the dependent dividend variable and the independent investment and income flow variables in the model are data from the same period. All right-hand-side variables are now treated as endogenous. For instruments, we use once, twice and three times lagged values of investments and cash flow and twice and three times lagged values of value and debt.

To deal with inconsistency in the linear model, we also apply the system GMM estimator. This allows explanatory variables to be correlated with individual effects. It controls for endogeneity by using the lagged values of the levels and differences of the endogenous variables as instruments. The assumptions are that initial conditions of explanatory variables are predetermined, i.e. they are uncorrelated with the subsequent error terms, and that the error term is serially uncorrelated. In the system GMM estimating method, the system consists of two types of equations, each of which has its own instruments. In the first type, the equations are in levels and their instruments are the lagged differences in the endogenous variables. The second type consists of equations in first differences with the levels of the lagged endogenous variables as instruments. We adopt the system GMM estimation procedure since first-difference GMM may suffer from weak instruments problems (Blundell and Bond (1998).

The direct connection of dividends and investments as well as dividends and income flows is also reviewed with the system GMM estimation method. The instruments of the model must correlate with the corresponding explanatory variables, but must not correlate with the error term. Here, the instruments have been selected so that at the level of investments and income flows they are from periods *t-1, t-2* and *t-3,* and the instruments in difference form are from periods *t-1* and *t-2*. Correspondingly, the level-form instruments for value and debt variables are from periods *t-2, t-3* and *t-4*, and the difference-form instruments from periods *t-2* and *t-3*. The system GMM estimator assumes that there is no second-degree serial correlation in the stochastic error terms. If the errors are in fact serially correlated, the estimator loses its consistency. Therefore, it is important that in reporting the results, in addition to the estimated parameter values, the validity of the instrument variables is also presented.

Since zero observations on dividends are emphasised in the data, system GMM is also not a problem-free estimation method. The system GMM model is applied separately to the data on mature firms (firms that have not paid any dividends in any of the review years are eliminated) and the data without zero-dividend observations. These limitations are aimed to increase the suitability of the estimation method. The results of system GMM estimation are presented in Appendix 2.

All estimations have been performed on firm panel data comprising the information on years 1994–2004. In addition, all estimations include size, industry and year dummies as control variables. The size dummies have been established on the basis of percentiles based on balance sheet totals.

From debt financiers' point of view, not all firms are as attractive as financing objects. It may be assumed that utilisation of the financial market becomes increasingly easy as the solvency of a firm improves. In this review, the opportunities of a firm to utilise external debt capital markets are measured by its equity ratio. According to the equity ratio classification, the solvency of a firm is solid if its equity ratio is at least 35%. Similarly, solvency is considered moderate if the equity ratio is 20–35% and weak if it is below 20%. In line with this classification, estimations are performed separately for each solvency category. Hence, we can address the question whether the connections between dividend distribution and the explanatory variables vary when we take into account that firms have differing opportunities to obtain debt capital for their financing needs.

The estimations are also made separately for groups of firms including firms that have paid dividends in at least one year in the review period. In the data, 37% of firms have not paid dividends in any of the review years. However, measured by balance sheet total, the proportion of such firms only amounted to 12%. When these firms are eliminated from the data, we can assume that the estimates are less biased and the estimates produced by the different models would converge. All in all, the limitation is aimed at increasing the reliability of the estimation results.

Tables 3.2–3.5 present the results of the estimations. They have been presented first for the entire group of firms and subsequently for groups assigned by financial position. In addition, the results are presented in the aforementioned groups estimated separately on the total data and on partial data from which non-dividend-distributing firms have been eliminated.

3.5. Results and interpretations

***TABLE 3.2:** OLS, FE, Tobit and IV- Tobit estimation results / All firms*

	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
$Investment_t$ (Inv)							-0.0254 (0.00259)**
$Investment_{t-1}$	-0.0099 (0.00080)**	-0.0226 (0.00247)**	-0.0125 (0.00216)**	-0.0093 (0.00087)**	-0.0220 (0.00252)**	-0.0108 (0.00241)**	
$Investment_{t-2}$				-0.0005 (0.00013)**	-0.0011 (0.00029)**	-0.0008 (0.00022)**	
$Earnings_t$ (P)							0.0347 (0.00128)**
$Earnings_{t-1}$	0.0211 (0.00132)**	0.0370 (0.00284)**	0.0256 (0.00297)**	0.0196 (0.00140)**	0.0357 (0.00290)**	0.0229 (0.00299)**	
$Earnings_{t-2}$				0.0008 (0.00022)**	0.0015 (0.00029)**	0.0010 (0.00035)**	
$Value_{t-1}$	0.0003 (0.00003)**	0.0006 (0.00004)**	0.0005 (0.00008)**	0.0003 (0.00003)**	0.0005 (0.00004)**	0.0005 (0.00009)**	0.0009 (0.00005)**
$Value_{t-2}$				0.0001 (0.00006)*	0.0004 (0.00012)**	0.0002 (0.00011)	
$Debt_{t-1}$	-0.0033 (0.00005)**	-0.0052 (0.00017)**	-0.0038 (0.00029)**	-0.0030 (0.00005)**	-0.0046 (0.00021)**	-0.0035 (0.00037)**	-0.0044 (0.00020)**
$Debt_{t-2}$				-0.0007 (0.00013)**	-0.0014 (0.00025)**	-0.0011 (0.00050)*	
Dummies							
Industry	yes	yes	yes	yes	yes	yes	yes
Size	yes	yes	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes	yes	yes
No. of observations	981640	981641	981642	907151	907152	907153	941558
Adj. R^2 / Pseudo R^2	0.163	0.115	0.102	0.342	0.326	0.298	
Wald	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.008**
z(2) (p-value)							0.041*
Hansen J-stat (p-value)							0.047*

Mature firms	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
$Investment_t$ (Inv)							-0.0311 (0.00223)**
$Investment_{t-1}$	-0.0164 (0.00065)**	-0.0241 (0.00132)**	-0.0181 (0.00190)**	-0.0159 (0.00061)**	-0.0232 (0.00142)**	-0.0178 (0.00215)**	
$Investment_{t-2}$				-0.0006 (0.00012)**	-0.0010 (0.00018)**	-0.0007 (0.00013)**	
$Earnings_t$ (P)							0.0386 (0.00151)**
$Earnings_{t-1}$	0.0245 (0.00121)**	0.0414 (0.00317)**	0.0267 (0.00254)**	0.0249 (0.00127)**	0.0407 (0.00333)**	0.0258 (0.0027)**	
$Earnings_{t-2}$				0.0010 (0.00016)**	0.0014 (0.00032)**	0.0012 (0.00028)**	
$Value_{t-1}$	0.0004 (0.00002)**	0.0005 (0.00004)**	0.0005 (0.00008)**	0.0005 (0.00003)**	0.0004 (0.00005)**	0.0005 (0.00005)**	0.0007 (0.00014)**
$Value_{t-2}$				0.0001 (0.00006)	0.0002 (0.00008)**	0.0001 (0.00007)	
$Debt_{t-1}$	-0.0023 (0.00006)**	-0.0045 (0.00014)**	-0.0040 (0.00030)**	-0.0021 (0.00007)**	-0.0043 (0.00029)**	-0.0032 (0.00042)**	-0.0038 (0.00063)**
$Debt_{t-2}$				-0.0008 (0.00010)**	-0.0019 (0.00017)**	-0.0010 (0.00036)**	
Dummies							
Industry	yes	yes	yes	yes	yes	yes	yes
Size	yes	yes	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes	yes	yes
No. of observations	583112	583113	583114	562142	562143	562144	570856
Adj. R^2 / Pseudo R^2	0.245	0.206	0.186	0.397	0.361	0.215	
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.025*
z(2) (p-value)							0.087
Hansen J-stat (p-value)							0.105

TABLE 3.3: *OLS, FE, Tobit and IV- Tobit estimation results / Firms with equity ratio <20%*

	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
Investment$_t$ (Inv)							-0.0417
							(0.00183)**
Investment$_{t-1}$	-0.0275	-0.0437	-0.0308	-0.0264	-0.0431	-0.0297	
	(0.00027)**	(0.00145)**	(0.00141)**	(0.00030)**	(0.00152)**	(0.00162)**	
Investment$_{t-2}$				-0.0022	-0.0030	-0.0029	
				(0.00016)**	(0.00021)**	(0.00036)**	
Earnings$_t$ (P)							0.0628
							(0.00144)**
Earnings$_{t-1}$	0.0369	0.0557	0.0429	0.0330	0.0539	0.0389	
	(0.00112)**	(0.00261)**	(0.00328)**	(0.00131)**	(0.00273)**	(0.00343)**	
Earnings$_{t-2}$				0.0025	0.0019	0.0027	
				(0.00018)**	(0.00023)**	(0.00036)**	
Value$_{t-1}$	0.0008	0.0009	0.0005	0.0008	0.0008	0.0009	0.0013
	(0.00001)**	(0.00002)**	(0.00007)**	(0.00003)**	(0.00003)**	(0.00007)**	(0.00004)**
Value$_{t-2}$				0.0001	0.0001	0.0002	
				(0.00003)**	(0.00004)**	(0.00012)	
Debt$_{t-1}$	-0.0067	-0.0083	-0.0058	-0.0064	-0.0079	-0.0057	-0.0067
	(0.00004)**	(0.00024)**	(0.00040)**	(0.00005)**	(0.00023)**	(0.00046)**	(0.00012)**
Debt$_{t-2}$				-0.0019	-0.0025	-0.0023	
				(0.00008)**	(0.00017)**	(0.00061)**	
Dummies							
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	284162	284162	284162	262847	262848	262849	270773
Adj. R^2 / Pseudo R^2	0.218	0.189	0.173	0.234	0.195	0.181	
Wald	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.029*
z(2) (p-value)							0.124
Hansen J-stat (p-value)							0.288

Mature firms	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
Investment$_t$ (Inv)							-0.0642
							(0.00169)**
Investment$_{t-1}$	-0.0330	-0.0522	-0.0381	-0.0325	-0.0493	-0.0361	
	(0.00025)**	(0.00120)**	(0.00129)**	(0.00035)**	(0.00167)**	(0.00156)**	
Investment$_{t-2}$				-0.0017	-0.0033	-0.0027	
				(0.00013)**	(0.00024)**	(0.00040)**	
Earnings$_t$ (P)							0.0655
							(0.00131)**
Earnings$_{t-1}$	0.0395	0.0563	0.0458	0.0377	0.0560	0.0419	
	(0.00102)**	(0.00234)**	(0.00321)**	(0.00143)**	(0.00218)**	(0.00338)**	
Earnings$_{t-2}$				0.0026	0.0024	0.0031	
				(0.00015)**	(0.00021)**	(0.00035)**	
Value$_{t-1}$	0.0009	0.0010	0.0007	0.0008	0.0007	0.0009	0.0016
	(0.00002)**	(0.00002)**	(0.00006)**	(0.00002)**	(0.00003)**	(0.00004)**	(0.00004)**
Value$_{t-2}$				0.0001	0.0002	0.0002	
				(0.00002)**	(0.00003)**	(0.00009)**	
Debt$_{t-1}$	-0.0077	-0.0090	-0.0068	-0.0060	-0.0078	-0.0058	-0.0072
	(0.00005)**	(0.00022)**	(0.00032)**	(0.00005)**	(0.00022)**	(0.00036)**	(0.00015)**
Debt$_{t-2}$				-0.0021	-0.0028	-0.0027	
				(0.00006)**	(0.00020)**	(0.00054)**	
Dummies							
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	146384	146384	146384	133647	133648	133649	140446
Adj. R^2 / Pseudo R^2	0.266	0.221	0.196	0.281	0.147	0.207	
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.058
z(2) (p-value)							0.162
Hansen J-stat (p-value)							0.271

TABLE 3.4: *OLS, FE, Tobit and IV- Tobit estimation results / Firms with equity ratio 20–35%*

	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
Investment_t (Inv)							-0.0206
							(0.00224)**
Investment_{t-1}	-0.0078	-0.0189	-0.0135	-0.0076	-0.0183	-0.0119	
	(0.00071)**	(0.00193)**	(0.00228)**	(0.00077)**	(0.00214)**	(0.00242)**	
Investment_{t-2}				-0.0005	-0.0016	-0.0010	
				(0.00015)**	(0.00031)**	(0.00053)*	
Earnings_t (P)							0.0389
							(0.00193)**
Earnings_{t-1}	0.0178	0.0316	0.0233	0.0173	0.0307	0.0219	
	(0.00118)**	(0.00204)**	(0.00265)**	(0.00116)**	(0.00219)**	(0.00267)**	
Earnings_{t-2}				0.0009	0.0017	0.0014	
				(0.00017)**	(0.00020)**	(0.00034)**	
Value_{t-1}	0.0005	0.0011	0.0009	0.0004	0.0011	0.0008	0.0013
	(0.00003)**	(0.00013)**	(0.00019)**	(0.00008)**	(0.00015)**	(0.00025)**	(0.00011)**
Value_{t-2}				0.0004	0.0004	0.0004	
				(0.00012)**	(0.00019)*	(0.00025)	
Debt_{t-1}	-0.0022	-0.0037	-0.0029	-0.0019	-0.0031	-0.0027	-0.0028
	(0.00016)**	(0.00029)**	(0.00042)**	(0.00015)**	(0.00042)**	(0.00063)**	(0.00017)**
Debt_{t-2}				-0.0011	-0.0023	-0.0029	
				(0.00046)**	(0.00131)	(0.00166)	
Dummies							
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	444559	444559	444559	411332	411332	411332	438995
Adj. R^2 / Pseudo R^2	0.149	0.119	0.094	0.291	0.264	0.233	
Wald	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.011*
z(2) (p-value)							0.096
Hansen J-stat (p-value)							0.075

Mature firms	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
Investment_t (Inv)							-0.0258
							(0.00210)**
Investment_{t-1}	-0.0132	-0.0217	-0.0161	-0.0126	-0.0212	-0.0146	
	(0.00070)**	(0.00178)**	(0.00227)**	(0.00073)**	(0.00181)**	(0.00241)**	
Investment_{t-2}				-0.0006	-0.0013	-0.0012	
				(0.00019)**	(0.00034)**	(0.00048)**	
Earnings_t (P)							0.0422
							(0.00131)**
Earnings_{t-1}	0.0206	0.0351	0.0249	0.0199	0.0339	0.0223	
	(0.00105)**	(0.00122)**	(0.00251)**	(0.00116)**	(0.00151)**	(0.00273)**	
Earnings_{t-2}				0.0007	0.0020	0.0018	
				(0.00015)**	(0.00021)**	(0.00043)**	
Value_{t-1}	0.0011	0.0024	0.0018	0.0008	0.0021	0.0017	0.0015
	(0.00002)**	(0.00013)**	(0.00014)**	(0.00002)**	(0.00019)**	(0.00015)**	(0.00006)**
Value_{t-2}				0.0003	0.0005	0.0002	
				(0.00014)**	(0.00017)**	(0.00013)**	
Debt_{t-1}	-0.0040	-0.0063	-0.0044	-0.0036	-0.0058	-0.0041	-0.0056
	(0.00025)**	(0.00053)**	(0.00074)**	(0.00024)**	(0.00055)**	(0.00091)**	(0.00046)**
Debt_{t-2}				-0.0007	-0.0013	-0.0019	
				(0.00034)**	(0.00176)	(0.00195)	
Dummies							
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	309776	309776	309776	291460	291461	291462	302498
Adj. R^2 / Pseudo R^2	0.167	0.141	0.0126	0.351	0.297	0.260	
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.017*
z(2) (p-value)							0.102
Hansen J-stat (p-value)							0.115

TABLE 3.5: *OLS, FE, Tobit and IV- Tobit estimation results / Firms with equity ratio >35%*

	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
Investment$_t$ (Inv)							-0.0151
							(0.00382)**
Investment$_{t-1}$	-0.0062	-0.0136	-0.0083	-0.0061	-0.0132	-0.0076	
	(0.00075)**	(0.00220)**	(0.00194)**	(0.00073)**	(0.00208)**	(0.00201)**	
Investment$_{t-2}$				-0.0003	-0.0007	0.0006	
				(0.00035)	(0.00058)	(0.00047)	
Earnings$_t$ (P)							0.0285
							(0.00174)**
Earnings$_{t-1}$	0.0153	0.0346	0.0217	0.0151	0.0345	0.0217	
	(0.00128)**	(0.00291)**	(0.00266)**	(0.00120)**	(0.00315)**	(0.00288)**	
Earnings$_{t-2}$				0.0003	0.0006	0.0004	
				(0.00016)**	(0.00021)**	(0.00030)**	
Value$_{t-1}$	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.0003
	(0.00002)	(0.00005)	(0.00009)	(0.00002)	(0.00005)	(0.00010)	(0.00025)
Value$_{t-2}$				0.00001	0.00001	0.00001	
				(0.00003)	(0.00006)	(0.00008)	
Debt$_{t-1}$	0.0005	-0.0004	-0.0003	0.0004	-0.0004	-0.0003	-0.0027
	(0.00045)	(0.00037)	(0.00049)	(0.00053)	(0.00042)	(0.00050)	(0.00073)
Debt$_{t-2}$				-0.0001	0.0001	0.0001	
				(0.00041)	(0.00067)	(0.00055)	
Dummies							
Industry	yes	yes	yes	yes	yes	yes	yes
Size	yes	yes	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes	yes	yes
No. of observations	285451	285451	285451	261497	261497	261497	273356
Adj. R^2 / Pseudo R^2	0.123	0.087	0.068	0.131	0.095	0.083	
Wald	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.004**
z(2) (p-value)							0.005**
Hansen J-stat (p-value)							0.013*

Mature firms	OLS	FE	TOBIT	OLS	FE	TOBIT	IV TOBIT
Investment$_t$ (Inv)							-0.0163
							(0.00324)**
Investment$_{t-1}$	-0.0090	-0.0149	-0.0101	-0.0085	-0.0146	-0.0107	
	(0.00063)**	(0.00189)**	(0.00208)**	(0.00065)**	(0.00196)**	(0.00225)**	
Investment$_{t-2}$				-0.0004	-0.0008	0.0008	
				(0.00029)	(0.00051)	(0.00048)	
Earnings$_t$ (P)							0.0316
							(0.00201)**
Earnings$_{t-1}$	0.0196	0.0351	0.0234	0.0181	0.0348	0.0219	
	(0.00103)**	(0.00267)**	(0.00225)**	(0.00108)**	(0.00290)**	(0.00241)**	
Earnings$_{t-2}$				0.0006	0.0009	0.0013	
				(0.00019)**	(0.00027)**	(0.00032)**	
Value$_{t-1}$	0.00010	0.00008	0.00005	0.00009	0.00006	0.00005	0.0001
	(0.00007)	(0.00006)	(0.00008)	(0.00005)	(0.00006)	(0.00009)	(0.00059)
Value$_{t-2}$				0.00001	0.00001	0.00001	
				(0.00002)	(0.00005)	(0.00006)	
Debt$_{t-1}$	-0.0002	-0.0002	-0.0003	-0.0003	-0.0002	-0.0003	-0.0041
	(0.00026)	(0.00033)	(0.00048)	(0.00030)	(0.00039)	(0.00051)	(0.00058)
Debt$_{t-2}$				-0.0001	-0.0001	0.0001	
				(0.00035)	(0.00050)	(0.00048)	
Dummies							
Industry	yes	yes	yes	yes	yes	yes	yes
Size	yes	yes	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes	yes	yes
No. of observations	131658	131658	131658	117773	117774	117775	121326
Adj. R^2 / Pseudo R^2	0.154	0.097	0.076	0.168	0.113	0.094	
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)							0.009**
z(2) (p-value)							0.022*
Hansen J-stat (p-value)							0.038*

In the Tables:

- Dependent variable: *Paid dividends / Total assets*.
- The values in parenthesis are robust standard errors.
- and ** indicate significance at the 5% and 1% levels, respectively.
- Time, industry and size dummies are included in each regression but are not reported.
- The Wald test is a test of the joint significance of reported coefficient estimates, asymptotically $\chi 2$ distributed under the null hypotheses.

According to the estimation results, the dividend decision generally has a statistically significant negative association with the investment decisions and a statistically significant positive association with the income flows of the firm. This is consistent with the findings of the 'new' view. In light of these results, we can also argue that dividend taxation does not have a significant association with firms' investment decisions in Finland. Furthermore, the negative sign of the debt variable supports the idea underlying the 'new' view that the amount of debt cannot be increased infinitely; other financial decisions must also be adjusted, and the firm must ultimately find other forms of finance to complement debt finance. Auerbach and Hassett proposed that dividends and borrowing are the financial variables that firms most commonly adjust based on their financial needs. Depending on the firm – the signalling benefits of its dividends and its borrowing costs – dividends and borrowing are weighted differently. If the signalling benefits of constant dividend distribution are material, firms will adjust their borrowing as required by their financial position. On the other hand, if borrowing costs are high, firms will adjust their dividend distribution.

In this present review, the opportunities of a firm to utilise external debt capital markets are measured by its equity ratio, which indicates the solvency of the firm. The models were estimated separately for three different solvency categories. The results for each category are presented in Tables 3.3–3.5. It was assumed that it would be easier for highly solvent firms to respond to a financial deficit by increasing debt capital than for firms with weak solvency. Financial decisions by firms with weak solvency are thus linked more closely to their internal financing possibilities.

The differences between categories in the estimation results are interesting. For firms with weak solvency – equity ratio below 20% – the estimation results were most supportive of the 'new' view in regard to the financial policies of Finnish firms. In this group of firms, the negative association between dividends and investments as well as the positive association between dividends and income flows were very strong. In addition, the parameter estimates related to investment and income flow variables are higher than in other solvency categories. The result was in line with the expectations: these firms find it difficult to raise debt finance and financial decisions are therefore more closely linked to internal finance and other financial decisions. These firms lack at least partially one important way to adjust their finances to changing needs.

The level of debt has a very strong negative association with dividends: for indebted firms, the transaction costs related to distribution of dividends are high. In the category of firms with a 20–35% equity ratio, the associations between investment and income flows and dividends were consistent with the findings of the 'new' view: the association between dividends and investments is negative and the association between dividends and income flows is positive. Both connections were also statistically significant. However, they were not as strong as for the category of firms with the lowest solvency. Furthermore, the statistical significance of debt and the negative multiplier in the results of that solvency category were consistent with the findings of the 'new' view. When highly solvent firms are taken under scrutiny, the results change significantly. For firms with equity ratios above 35%, investment and dividend decisions are separate from each other. Hence, there is no longer a association between dividends and investments, as assumed by the 'new' view. In contrast, the association of income flows and dividends continues to be positive and statistically significant. There is no statistically significant association between borrowing and dividends: this type of firm seems to have many kinds of flexibility in the choice of source of finance, so it is difficult to find statistically significant connections between dividends and other financial variables. Therefore, it is also difficult to prove the 'new' view valid for the category of firms with high solvency.

To conclude our observations, we can state that the 'new' view does not completely describe the impacts of dividend taxation on the financial decisions of Finnish firms. As a rule, dividend and investment decisions have an association explainable by the 'new' view, but there are in some cases considerable differences between firms in the strength of this association. The best empirical support for the findings of the 'new' view is received from firms that presumably have a constraint on the availability of external debt finance. The associations assumed by the 'new' view are weakest for firms where financial decisions can be made without tight constraints. However, we cannot state that the findings of the 'new' view are necessarily invalid for solvent firms with good financing opportunities. Rather, for such firms, the findings of the 'new' view are difficult to prove with the review method used. Furthermore, we can argue that interpretations of the 'new' view about the impacts of dividend taxation on investment and financing decisions by firms include very demanding assumptions and results for which it is hard to find empirical support, at least for the corporate sector as a whole.

Robust checking and statistical analysis

Robust checking of the results shows that differences between the estimation methods used do not generate significant differences in the results: the characteristics of the estimation method do not influence the qualitative interpretation of the results. This improves the reliability of the results. Particularly with results based on data from mature firms, there is significant convergence between the results of different estimation methods. This also shows that the heavy weighting of dividends at the zero value must be taken into account in the empirical analysis. Hence, we may also argue that the Tobit models are the most useful type of estimation method used and the most likely to generate the most reliable results.

If the explanatory variables are endogenous, they correlate with the idiosyncratic error term. Serial correlation of firm-specific residuals over years leads to inconsistent parameter estimates. The dynamic of the models is increased in the estimations by including in the models the once and twice lagged values of the explanatory variables. This helps to eliminate the problem with the endogeneity of the explanatory variables. In addition, standard errors are heteroskedasticity-consistent standard errors (Huber-White standard errors) which are adjusted for correlations of error terms across observations (and heteroskedasticity). These measures can be considered to increase the reliability of the models in which instrument variables have not been used. However, it is still possible the estimates could suffer from biases due to the unobserved heterogeneity and/or endogeneity of the regressors.

In models that look at direct connections, the explanatory variables can be considered endogenous and they are instrumented. Assuming the idiosyncratic error term is serially autocorrelated, the endogenous variables of the model lagged once, twice and three times are used as exogenous instruments. Due to the lack of credible instrument variables, we considered this the best policy. The IV Tobit model and the system GMM method are used as IV methods. The estimated multipliers are somewhat lower than the multipliers estimated with the Tobit, OLS and Fixed Effect models. However, the parameter estimates produced by the IV methods do not deviate significantly from the parameter estimates generated with other methods. Diagnostic test statistics indicate that system GMM works quite well (Appendix 3). The equations do not exhibit second-order serial correlation according to the reported *z2* statistics: the instruments are not correlated with the error term. The reported Sargan statistics for overindentifying restrictions suggest the instruments are valid and the model is correctly specified.

The Wald test accepts joint significance of reported coefficient estimates in all estimations.

3.6. Significance of share issues in a firm's financial policy

The preceding section only looked into the association between, on one hand, investments, income flows and indebtedness and, on the other hand, the dividends distributed by a firm. It completely overlooked the significance of share issues in a firm's financial policy. However, the decision to issue shares may be seen as a financial decision simultaneous with a decision to distribute dividends. Behind the use of share issues as a form of finance may lie either more permanent firm-specific factors or temporary reasons related to the financial position of the firm. However, both reasons have a linkage to the dividend decisions by the firm. A more permanent factor underlying share issues as a form of finance may be a constraint faced by the firm in making use of the external debt capital markets. Compared with the discussion above, utilisation of share issues as a form of finance offers an alternative avenue to study firms facing financial constraints. The costs of share issue finance may also temporarily remain lower than the costs of reduced dividend distribution, in which case the firm may be able to raise a considerable amount of money on a one-off basis and does not have to adjust its other financial decisions.

Regardless of the background factors, when a firm utilises share issues as a form of finance it may not necessarily have to respond to a financial deficit by changing its dividend policy.[77]

The ‘traditional’ view maintains that as the marginal source of finance for investments, share issues play an important role in a firm’s finance. According to this view, shareholders appreciate a constant flow of dividends, and the firm seeks to pay stable dividends under all financial conditions. As internal financing opportunities and financing needs vary, share issues are the form of equity financing ultimately used to respond to fluctuations. This section reviews whether share issue finance has significance in a firm’s financial decisions, as assumed by the ‘traditional’ view. The ‘traditional’ view receives empirical support if share issue finance has a stronger association with investments than the cash flows generated by investments. In that case, we could consider that investments are the factor that steer the utilisation of share issues in a firm’s financial policy. In contrast, if share issues are influenced more by the use of other forms of finance, particularly the availability of internal finance, they can be interpreted as only one of many alternative forms of finance, and therefore they would not have special significance as the marginal source of finance for investments, as assumed in the ‘traditional’ view.

The significance of share issue finance in a firm’s financial policy is reviewed with the bivariate Probit model[78] and the IV Probit model. The explanatory variables are the same as in the dividend analysis in the

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[77] The review presented here still corresponds largely to the approach used in Auerbach and Hassett’s (2003) study. Auerbach and Hassett reviewed, in addition to share issues, the likelihood of share repurchases by a firm. Due to data constraints, we concentrate in this study only on data concerning share issues.

[78] The estimated bivariate probit model may be presented as follows:

$$y^*_i = \beta' X_i + \varepsilon_i$$
$$y_i = 1, \text{ if } y^*_i > 0, \text{ otherwise } y_i = 0.$$

In the model, y^*_i is a dependent variable and y_i an indicator, which is assigned the value 1 if the firm has raised capital by issuing shares. Otherwise, y_i is assigned the value 0. β is a parameter vector, and X_i is a vector of the explanatory variables. The error term ε_i describes random variation, which is assumed to follow a normal distribution. The probability of utilisation of share issues is now

$$P(y_i = 1) = \Phi(\beta' X_i) = \int_{-\infty}^{\beta' X_i} (2\pi)^{-1/2} \exp\{-\{\varepsilon_i^2 / 2\}\} d\varepsilon_i \text{ ,}$$

and the likelihood function to be maximised can be presented as

$$L = \prod_{i=1}^{n} [\Phi(\beta' \mathrm{X}_i)]^{y_i} [1 - \Phi(\beta' \mathrm{X}_i)]^{(1-y_i)} .$$

previous section. The controls are also still the year, industry and size dummies, and in this case also category dummies formed on the basis of the solvency categorisation. By including these dummy variables in the model, we can study how constraints related to access to the external debt capital markets connect with the external raising of equity capital by a firm.

The dependent variable is assigned the value 1 if the firm has raised new equity through share issues and the value 0 in other cases. The share issues variable also covers shareholder loans, which is a more frequently used form of capital injection than actual share issues in small enterprises (which are numerous in the data). Another condition is that the share issues (or shareholder loans) must amount to at least 3% of the equity of the firm. The purpose of this restriction is to focus only on cases where a share issue has actual significance in terms of increasing the financing and equity of a firm.[79]

As in the above analysis, the explanatory variables in the basic model are lagged by one and two periods. The purpose of this is, on one hand, to tackle the dynamic impacts and, on the other hand, to avoid problems related to the endogeneity of the explanatory variables. The IV Probit model is used to analyse direct connections similarly to the IV Tobit model above. The endogeneity of the explanatory variables is taken into account and instrumented by the lagged values of the explanatory variables. However, if there is still autocorrelation in the residuals, the endogeneity argument will invalidate the results from the use of lagged instruments. There are problems related to the use of lagged explanatory variables as instrument variables, but it is hard to find useful instruments from the data.

The results of the estimation are presented in Table 3.6.

[79] An average of 13.8% of firms in the data had observation values higher than zero for the share issue or shareholder loan variable. In 8.3% of firms that employed share issues (incl. shareholder loans), the size of the issue was less than 3% of the equity capital of the firm.

***TABLE 3.6:** Probit and IV Probit estimation results for share issue models*

	Probit	Marginal effects	IV Probit	Marginal effects
$Investment_t$ (Inv)			1.4153	0.2646
			(0.1326)**	(0.0342)**
$Investment_{t-1}$	1.0875	0.1237		
	(0.0897)**	(0.0119)**		
$Investment_{t-2}$	0.0964	0.0136		
	(0.0216)**	(0.00447)**		
$Earnings_t$ (P)			1.2259	0.1778
			(0.1774)**	(0.0205)**
$Earnings_{t-1}$	-0.7285	-0.1189		
	(0.1105)**	(0.0254)**		
$Earnings_{t-2}$	-0.2238	-0.0316		
	(0.0648)**	(0.00957)**		
$Value_{t-1}$	-0.03551	-0.00778	-0.07043	-0.00151
	(0.00585)**	(0.00221)**	(0.02065)**	(0.000653)**
$Value_{t-2}$	0.01573	0.00264		
	(0.00527)**	(0.00103)**		
$Debt_{t-1}$	0.05184	0.00865	0.06626	0.01434
	(0.00562)**	(0.00179)**	(0.00713)**	(0.00307)**
$Debt_{t-2}$	0.02388	0.00357		
	(0.00813)**	(0.00151)**		
Equity ratio ≤ 20%	-0.843	-0.0898	-0.924	-0.0900
	(0.1159)**	(0.0108)**	(0.1375)**	(0.0126)**
Equity ratio > 20% and ≤ 35%	-0.575	-0.0611	-0.709	-0.0758
	(0.1726)**	(0.0148)**	(0.1947)**	(0.0172)**
Dummies				
Industry	yes	yes	yes	yes
Size	yes	yes	yes	yes
Year	yes	yes	yes	yes
No. of observations	811797		827114	
Pseudo R^2	0.286			
Wald (p-value)	0.000**		0.000**	
z(1) (p-value)			0.131	
z(2) (p-value)			0.184	
Hansen J-stat (p-value)			0.122	

In the tables, with respect to both Probit models, the first column presents the multipliers of the model and the second column shows the marginal impacts. In line with the assumptions, the signs of the multipliers are contrary to those used in the dividend models. Large investments, low income flows and high indebtedness increase the likelihood of share issues as a financing alternative for a firm. In addition, when comparing the results with the estimation results for dividend distribution presented above, we can see that share issue finance is more sensitive to the financial position of a firm than dividend distribution. This is illustrated by the higher multipliers and marginal impacts generated by estimation of the share issue equation in comparison with the corresponding results from the dividend distribution equations.

Based on the results in Table 3.6, the internal financing possibilities of a firm have a higher significance for the likelihood of share issue finance than do investments. The multipliers and marginal impacts of income flows and their statistical significance are higher than the multipliers and marginal impacts of corresponding investment variables.[80] This applies to both of the estimated models. In principle, the result can be interpreted as contradictory to the assumptions of the 'traditional' view: according to the 'traditional' view, it is investments that play the key role in a firm's share issue finance decision. Hence, share issues should have a stronger association with investments than with income flows in order that the estimation results could be interpreted as supportive of the 'traditional' view.

The model also includes dummy variables on the solvency of a firm as explanatory variables. The dummies have been constructed by dividing firms into three categories according to equity ratio. A corresponding categorisation was also used in the preceding section. Equity ratio is considered to correlate with the opportunities of a firm to utilise the external capital markets in increasing its debt finance. We have assumed that, for firms with already weak solvency, it is more difficult to raise debt finance than for firms with good solvency. Therefore, we also expect that firms with weak solvency will, in the absence of the debt finance alternative, resort more to share issues to cover their financial needs than firms in a solid financial position. If the solvency of a firm is good, it has the opportunity to increase its debt capital. In contrast, if solvency is weak, it may be that share issues are the only way available to attract external capital into the firm.

In the estimations in Table 3.6, the reference group is firms with high solvency (equity ratios over 35%). The results show, however, that there are no differences between the groups in terms of the likelihood of using share issue finance. The multipliers of the dummy variables on solvency remain low and are not statistically significant. Hence, share issue finance is used in obtaining external finance equally frequently in both firms with high solvency and firms with weak solvency. One of the reasons why the constraint related to the availability of external debt capital is not shown in the results on the use of share issue finance is the incentive based on the Finnish taxation system to employ equity finance. Equity increases the net

[80] In accordance with the Wald test, equivalence of the sums of two investment variables and the sum of the multipliers of two income flow variables in the Probit model is rejected: the multipliers of investment and income flow variables deviate statistically significantly from each other. A similar result is also received for the IV Probit model.

wealth of a firm, which in turn enables higher tax-free dividends. Therefore, firms for which raising debt capital from the external finance markets has been a feasible financing alternative have nevertheless also utilised share issues in their financial decisions.

Thus, the results discussed so far allow us to draw the following conclusions. The likelihood of share issue finance is influenced most significantly by a firm's internal financing opportunities. Hence, share issues may be considered one financing alternative and decisions concerning their utilisation are made in consideration of other available forms of finance. Investments have a clear positive association with the likelihood of share issue finance, but the results do not allow us to deduce that share issues have a role, as suggested by the 'traditional' view, as the marginal source of finance for investments. If this was the case, fluctuations in the use of share issue finance would be more closely linked to investment needs than to the availability of alternative sources of finance. In addition, the results indicate that the general financial position of a firm does not have an influence on the likelihood of its utilising share issue finance. The opportunity of a firm to have relatively low-cost debt finance does not decrease the likelihood of share issue finance.

Let us now discuss the significance of the likelihood of share issue finance for a firm's dividend decisions. The first analysis (Table 3.7, columns 1–2) utilises firm-specific likelihoods of share issues estimated with the bivariate Probit model and compares the dividend distribution behaviour of the top and bottom quartile in terms of the likelihood of share issues (the two middle quartiles are excluded from the analysis). For these groups, the Tobit and IV Tobit models explaining the distribution of dividends are estimated separately. Although based on the analyses above share issues cannot be considered to describe the opportunity of Finnish firms to utilise the external finance markets, it is nevertheless interesting to explore the connection between the likelihood of share issue finance and a firm's dividend distribution decisions. As a rule, we can assume that a higher probability of a firm utilising share issue finance would decrease the association between the financial decisions reviewed and dividend distribution.

In the second analysis (Table 3.7, columns 3–4) the categories of firms compared are restricted further. One category of firms now consists of those with a high probability of utilising share issue finance, but a low equity ratio. These are most likely to be firms that, due to a shortage of other financing opportunities, are forced to resort to share issue finance. These firms are most tightly bound by both internal and external financial constraints. Another category consists of firms with a low probability of share issue finance and a high equity ratio. The solvency and available financing opportunities of these firms can be considered so good that they have no need to raise new finance by issuing new shares. Such firms have many kinds of flexibility in their financing opportunities. Hence, the categories of firm compared are considered to be the opposing extremes in terms of financial position, and therefore it is interesting to explore the heterogeneity of dividend policies and differences in significance of factors being associated with the distribution of dividends by these categories. Significant differences in estimation results may provide further evidence on the validity of the assumptions under the 'new' view for the financial policies of Finnish firms.

The dividend equations are estimated for the categories of firms presented with the Tobit and IV Tobit methods similarly to in Section 3.5. Due to problems related to estimation (discussed in the previous section) the data is restricted to include only mature firms. As above, mature firms are defined as firms that have paid dividends in at least one year during the review period 1994–2004.

TABLE 3.7: *Tobit and IV Tobit estimation results for dividend models / restricted categories of firms*

	Tobit	IV Tobit	Tobit	IV Tobit	Tobit	IV Tobit	Tobit	IV Tobit
	New Issue Low (pr < 0.058)	New Issue Low (pr < 0.058)	New Issue High (pr > 0.311)	New Issue High (pr > 0.311)	New Issue Low (pr < 0.058) Equity ratio > 35%	New Issue Low (pr < 0.058) Equity ratio > 35%	New Issue High (pr > 0.311) Equity ratio ≤ 20%	New Issue High (pr > 0.311) Equity ratio ≤ 20%
$Investment_t$ (Inv)		-0.0192		-0.0237		-0.0127		-0.0588
		(0.00212)**		(0.00248)**		(0.00391)**		(0.00184)**
$Investment_{t-1}$	-0.0087		-0.0094		-0.0069		-0.0385	
	(0.00187)**		(0.00171)**		(0.00248)**		(0.00163)**	
$Investment_{t-2}$	-0.0012		-0.0015		0.0022		-0.0024	
	(0.00027)**		(0.00030)**		(0.00076)		(0.00023)**	
$Earnings_t$ (P)		0.0341		0.0376		0.0350		0.0716
		(0.00155)**		(0.00169)**		(0.00427)**		(0.00154)**
$Earnings_{t-1}$	0.0194		0.0232		0.0173		0.0481	
	(0.00178)**		(0.00203)**		(0.00318)**		(0.00247)**	
$Earnings_{t-2}$	0.0018		0.0024		0.0013		0.0069	
	(0.00051)**		(0.00061)**		(0.00057)**		(0.00033)**	
$Value_{t-1}$	0.0007	0.0008	0.0005	0.0007	0.00002	0.0005	0.0017	0.0012
	(0.00029)**	(0.00038)**	(0.00020)**	(0.00029)**	(0.00014)	(0.00084)	(0.00003)**	(0.00005)**
$Value_{t-2}$	0.0005		0.0004		0.00001		0.0003	
	(0.00023)*		(0.00026)		(0.00010)		(0.00015)*	
$Debt_{t-1}$	-0.0051	-0.0062	-0.0064	-0.0075	-0.0007	-0.0021	-0.0112	-0.0093
	(0.00088)**	(0.00096)**	(0.00072)**	(0.00107)**	(0.00058)	(0.00176)	(0.00026)**	(0.00014)**
$Debt_{t-2}$	-0.0045		-0.0028		0.0001		-0.0052	
	(0.00143)**		(0.00095)**		(0.00077)		(0.00034)**	
Dummies								
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	207948	211028	207948	211028	40217	42977	55393	59021
Pseudo R^2	0.173		0.191		0.074		0.256	
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)		0.132		0.119		0.171		0.225
z(2) (p-value)		0.047*		0.039*		0.111		0.094
Hansen J-stat (p-value)		0.131		0.148		0.219		0.324

The results in the first columns of the table show that the association between dividend distribution and other financial decisions as well as income flows is very similar among firms in which the use of share issues for finance is likely and those in which it is unlikely. Every explanatory variable has a statistically significant and, in terms of sign, expected association with dividends in the estimation results for both categories of firm. For firms with a low probability of utilising external finance markets for raising equity the associations are somewhat lower and less significant than for firms with high corresponding probabilities. The result is in line with the hypothesis: better opportunities to utilise external finance markets decreases the association between other financial decisions and dividends. All in all, however, the differences in the associations between financial factors and dividend distribution are very low among the categories of firms compared.

By contrast, in the estimation results in Table 3.7, columns 3–4, the differences between the categories of firms compared are striking. For firms with a high probability of utilising share issue finance but weak solvency the associations between the financial factors reviewed and dividend distribution are strong and statistically very significant. In this category, dividend distribution seems to be influenced very strongly by the internal financing capabilities of a firm. In the reference category, firms with a low probability of share issue finance and a high equity ratio, there are no corresponding associations between dividends and the financial factors reviewed, or they are much more tenuous. The result lends empirical support to the 'new' view: when a firm has difficulties in utilising the external finance markets, its dividend decision is closely linked to its other financial decisions and particularly to its internal financing capabilities.

In conclusion, we can state that the better we can isolate a group of firms with limited availability of finance, the better we can consider the validity of the findings of the 'new' view in Finland. Interpretations of the 'new' view about the impacts of dividend taxation on investment and financial decisions by firms are related to conclusions that limit the generalisability of the model to the entire corporate sector.

4. Conclusions

In the literature on the impacts of dividend taxation on the investments and other financial decisions of a firm, no generally accepted view about these impacts has emerged. The literature can be divided roughly into three paradigms. These are the 'traditional' view, the 'new' view and the 'tax irrelevance' view. Neither do empirical studies offer any unanimous findings about the impacts of dividend taxation on a firm's financial policy.

The present study reviews whether support for findings of the 'new' view regarding the impacts of corporate taxation on firms' financial policies can be found in Finland. The association of dividends with investment decisions and income flows is estimated by controlling simultaneously for the financial development of a firm (value and amount of debt). The review method is similar to that used in Auerbach and Hassett's (2003) study. If the results show that these relations are significant, this can be considered as empirical support for the 'new' view. The review also takes into account that, for firms in different financial positions, these associations – and thus the impacts of dividend taxation – may be different. In addition, the significance of share issues as a form of finance in a firm's financial policy is reviewed. The 'traditional' view maintains that, as the marginal source of finance for investments, share issues play an important role in a firm's finance. The 'traditional' view is considered to receive empirical support if share issue finance has a stronger association with investments than with the cash flows generated by investments. In such a case, we can consider that investments are the factor that steer the utilisation of share issues in a firm's financial policy.

The results show that the 'new' view does not completely describe the impacts of dividend taxation on the financial decisions of Finnish firms. As a rule, dividend and investment decisions have an association in line with the findings of the 'new' view, but there differences between firms in the strength of the association that can sometimes be considerable. The findings of the 'new' view are most compatible with firms that are assumed to have less external finance available and at higher cost. According to the results, in firms with weak solvency, the negative connection between dividends and investments and the positive connection between dividends and income flows is very strong. In contrast, in firms with outstanding solvency, investment and dividend decisions are mutually independent. Hence, there is no association between dividends and investments as assumed by the 'new' view. Income flows are still positively associated with dividends, but there is no statistically significant association between borrowing and dividends: such firms seem to have many kinds of flexibility in their choice between forms of finance. It is hard to find statistically significant associations between dividends and other financial variables. Hence, according to this study, the 'new' view represents least those firms that are not bound by financial constraints and can make financial decisions in a flexible manner.

Based on the results of models on the probability of share issues, we can state that the probability of share issue funding is most significantly influenced by the internally generated cash financing possibilities of a firm. Hence, share issues may be considered one financing alternative and decisions concerning their utilisation are made in consideration of other available forms of finance. In principle, the result can be interpreted as contradictory to the assumptions of the 'traditional' view. According to the 'traditional' view, investments play the key role in a firm's decisions on share issue finance. Hence, share issues should have a stronger association with investments than with income flows in order for the estimation results to be interpreted as supportive of the ‘traditional’ view.

It is assumed that, for firms with already weak solvency, it is more difficult to increase debt finance than for firms with good solvency. Therefore, firms with weak solvency are expected, in the absence of the debt finance alternative, to resort more to share issues to cover their financial needs than firms in a solid financial position. The results show, however, that there are no differences between the groups in terms of the likelihood of using share issue finance. Hence, share issue finance is used in obtaining external finance equally frequently in both firms with high solvency and firms with weak solvency. One of the reasons why the constraint related to the availability of external debt capital is not shown in the results on the use of share issue finance may be the incentive based on the Finnish taxation system to employ equity finance.

Finally, empirical analyses delineate, in terms of both solvency and probability of share issues, the category of firm for which the availability of finance in external finance markets is most probably tightly constrained and, on the other hand, the category that most probably has access to many alternative forms of finance. In summary of the results, we can state that the better the category of firms with limited financing opportunities can be isolated, the better support is found for the ‘new’ view in the financial policy of the Finnish corporate sector. However, we cannot state that the findings of the ‘new’ view could not be valid for solvent firms with good financing opportunities. Rather, the findings of the ‘new’ view are hard to substantiate with the review method used. Furthermore, it can be argued that interpretations of the ‘new’ view about the impacts of dividend taxation on investment and financing decisions by firms include very demanding assumptions and results, for which it is difficult to find empirical support at least for the corporate sector as a whole.

All in all, firms have differing opportunities and different degrees of willingness to respond, through dividends, share issues and other financial decisions, to changes occurring in the economy. Taxation is not the only factor that may steer firms’ financial decisions. Therefore, it is hard to describe empirically any impacts directly emanating from taxation.

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Appendix 1. Model

The model assumes a classical corporate tax system; a taxation model integrating the taxation of limited firms and their shareholders is presented in Section 2.3. For simplicity, we ignore risk. Furthermore, the analysis is targeted to one representative agent in both the investor and firm population: the heterogeneity of agents is hence excluded from the review.

In the model, firms' profits are subject to an assumed constant income tax τ. The effective dividend income tax rate θ is assumed to be higher than the effective capital gains tax rate c $(c \leq \theta)$. In the model, capital gains are taxed upon the increase in value – on an accrual basis – not upon realisation, as is the case in reality.

The value of a firm at time t is V_t. The term S_t indicates the value of new shares issued and the term D_t dividend distribution by the firm at time t. If $S_t < 0$, the firm buys back more shares than it issues new shares. Equilibrium in the financial market requires that the owner's discount rate corresponds to the after-tax return ρ:

$$\text{A.1} \qquad \rho = \frac{D_t}{V_t}(1-\theta) + \frac{\dot{V}_t - S_t}{V_t}(1-c),$$

where $\dot{V}_t$ marks change in a firm's value V_t relative to time t. The second term on the right-hand side illustrates that an increase in the value of a firm is correlated with an increase in profits from the firm. Increases in share values due to growth through share issues are not taxable.

The equation may be presented as a simple first-order differential equation for V:

$$\text{A.2} \qquad \frac{\rho}{1-c}V_t = \dot{V}_t + D_t\left(\frac{1-\theta}{1-c}\right) - S_t\,.$$

As the period is lengthened, the discounted value of a firm approaches zero. From Equation A.2 an equation can be derived for the value of the firm at time t:

A.3 $$V_t = \int_t^{\infty} e^{-\frac{\rho}{1-c}(s-t)} [D_s(\frac{1-\theta}{1-c}) - S_s]ds .$$

This equation is the basis for a firm's optimal dividend and share issue decisions when the objective to maximise the value of the firm. Dividend and share issue decisions are not independent decisions, and they are also subject to both technological and legal constraints. Dividend and share issue decisions are naturally also correlated with the net income received from the firm:

A.4 $$G_t = D_t - S_t.$$

Furthermore, dividends cannot receive negative values, i.e. $D_t \geq 0$. In addition to these constraints, the distribution of dividends may be constrained by other factors resulting, for example, from asymmetric information on the financial markets or different interests between the owners and management of a firm. However, this analysis only assumes the following simple constraint:

A.5 $$D_t \geq p(D_t + \dot{V}_t - S_t).$$

The equation requires that dividends correspond at least to proportion p of the total earnings of a firm.

An alternative means of profit distribution can always be found for repurchase of own shares – dividends – whereas share issues are the only form of equity finance available to a firm. In other words, even if utilisation of the external finance markets were expensive for the firm, in the context of share issues it lacks other alternatives. We might observe firms issuing equity but not repurchasing equity. On the basis of these conclusions, we can derive the following constraint:

A.6 $$S_t \geq 0.$$

Based on the above equations and constraints, a Lagrange equation can be derived for a policy maximising the value of a firm:

A.7

$$V_t = \int_t^{\infty} e^{-\frac{\rho}{1-c}(s-t)} [G_s + D_s(\frac{1-\theta}{1-c} - 1) + \lambda_s(D_s - p\dot{V}_s - pG_s) + \mu_s(D_s - G_s)]ds$$

where the multipliers λ_s and μ_s (shadow prices) are related to the constraints A.4 – A.6, at least one of which becomes binding for all values of time *t*.

Taking a derivative of the equation with respect to time t results in a first-order differential equation analogous with Equation A.2. Utilisation of the same approach as with equation A.3 results in:

A.8

$$V_t = \int_t^{\infty} e^{-\int_t^s \frac{\rho}{(1-c)(1-\lambda_v p)} dv} \frac{1}{1-\lambda_s p} [G_s(1 - \lambda_s p - \mu_s) + D_s(\frac{1-\theta}{1-c} - 1 + \lambda_s + \mu_s)]ds$$

At the margin, issuing new shares to cover the distribution of dividends increases the amount of taxes payable and reduces the value of a firm's shares (increase in dividend taxes exceeds the reduction in capital gains taxes). This cost corresponds in equation A.8 to the negative term $(1 - \theta) / (1 - c) - 1$. If the objective is to maximise the value of the firm, the firm will reduce both its issuance of new shares and its dividends until at least one constraint becomes binding.

The first-order condition with respect to dividends D_s is:

A.9 $\lambda_s + \mu_s = 1 - (1 - \theta) / (1 - c).$

Utilisation of Equation A.9 in Equation A.8 results in the optimum value of the firm presented in the text (Equation 2.2).

Appendix 2: Results of System GMM estimation

	All firms		Equity ratio <20%		Equity ratio 20–35%		Equity ratio >35%	
	All	Mature	All	Mature	All	Mature	All	Mature
$Investment_t$ (Inv)	-0.0189	-0.0254	-0.0332	-0.0502	-0.0177	-0.0221	-0.0113	-0.0147
	(0.00331)**	(0.00288)**	(0.00240)**	(0.00238)**	(0.00362)**	(0.00357)**	(0.00477)**	(0.00463)**
$Earnings_t$ (P)	0.0289	0.0311	0.0539	0.0552	0.0306	0.0325	0.0242	0.0251
	(0.00154)**	(0.00127)**	(0.00169)**	(0.00160)**	(0.00222)**	(0.00206)**	(0.00188)**	(0.00173)**
$Value_{t-1}$	0.0003	0.0004	0.0016	0.0019	0.0007	0.0006	0.0001	0.0001
	(0.00003)**	(0.0003)**	(0.00006)**	(0.00005)**	(0.00015)**	(0.00009)**	(0.00065)	(0.00069)
$Debt_{t-1}$	-0.0032	-0.0030	-0.0054	-0.0047	-0.0025	-0.0022	-0.0018	-0.0019
	(0.00045)**	(0.00036)**	(0.00018)**	(0.00018)**	(0.00034)**	(0.00031)**	(0.00097)	(0.00100)
Dummies								
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	941558	562145	270773	140446	438995	302498	273356	121326
Wald (p-value)	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
z(1) (p-value)	0.088	0.120	0.147	0.177	0.113	0.142	0.094	0.087
z(2) (p-value)	0.053	0.105	0.096	0.124	0.160	0.155	0.063	0.069
Hansen J-stat (p-value)	0.071	0.123	0.151	0.203	0.096	0.138	0.077	0.100

ESSAY 3

Tax treatment of dividends and capital gains and the dividend decision under dual income tax

1. Introduction

The taxation of dividends has attracted renewed attention in public economics literature in recent years, partly because of the US 2003 tax reform which introduced considerable cuts to the tax rates on dividend income. Several studies have used the reform as a "natural" experiment to bring new understanding on the effects of dividend taxation on corporate behaviour. One of the issues is how the change in the relative tax burden between dividends and capital gains affected dividend pay-out behaviour (Poterba 2004, Chetty and Saez 2005, Gordon and Dietz 2006).

Another topical theme in public economics is income shifting between different tax bases. While the US literature has mainly focused on shifting between corporate and individual income tax bases (Gordon and Slemrod 2000), the European debate also pays attention to the incentives generated by the tax rate differentials between individual labour and capital income (Sørensen 2005b). On the background is the recent trend towards low nominal tax rates on capital income.

The Nordic dual income taxation (DIT), which combines progressive taxation of labour income with proportional tax on capital income, has received growing attention in the international debate.[81] As the literature

[81] See Sørensen (2005b), Cnossen (2000), Keuschnigg and Dietz (2005) and the articles in the CESifo DICE Report 3/2004.

explains, there are several theoretical and practical arguments in favour of DIT. However, since there is a large tax-rate gap between the proportional rates on capital income and the top marginal rates levied on labour income, the system is likely to provide incentives for tax-minimizing behaviour. Another problem, when implementing DIT, is how to deal with the fact that entrepreneurial income is a result of a combined contribution of capital and labour inputs. To tackle these issues, the Nordic countries have set up tax rules, among them the so-called splitting rules, for the taxation of owners of closely held corporations (CHC) and unincorporated firms. These splitting rules calculate the capital income part as an imputed return on the firm's assets and treat the residual as labour income.

The question of whether the tax rules of income-splitting have behavioural implications has attracted some attention among Nordic tax economists. Hagen and Sørensen (1998) provide a verbal analysis of the problem and Kari (1999), Lindhe et al. (2002, 2004) and Hietala and Kari (2006) report on the effects on investment decisions using standard corporate tax models. Kanniainen et al. (2007) discuss the effects on entrepreneurship. Some studies have also dealt with the issue of income-shifting. Alstadsæter (2003) examines the effects of the previous Norwegian DIT rules on tax-planning, especially the choice of the organizational form. Fjærli and Lund (2001) provide empirical evidence on income-shifting between labour income and capital income bases.

This paper analyses the taxation of closely held companies (CHC) under the variant of DIT applied in Finland since 1993. It centres on tax-planning, especially on how dividends and financial investments should be arranged to maximize after-tax income in the long run. Evidence using a large set of micro data is also provided.[82]

The Finnish DIT combines a broad-based flat tax on capital income with a progressive tax on labour income (Table 1.1). The tax rate difference between the top marginal tax rate (MTR) and the proportional capital income tax rate was close to 26 per cent in 2004 and even larger before the gradual MTR cuts implemented in the last decade. There is relief on owner-level taxation of dividends so that in practice owners

[82] The focus is on tax rules in force before a recent tax reform implemented as from 2005, which brought changes to tax rates and replaced the former full imputation system by a system of shareholder relief. The basic structure of the Finnish DIT was not changed, however. See Hietala and Kari (2006).

receive normal dividends tax-free.[83] Realized capital gains from the sale of shares are taxed at the normal tax rate on capital income. Dividends received from a CHC are split into capital income and earned income by considering an imputed return on the firm's net assets as capital income (normal dividend) and categorizing the residual as earned income (excess dividend). The presumptive rate used to calculate the capital income portion of dividends was 9.6 per cent and the capital base was defined as the net assets in the firm's tax accounts.

TABLE 1.1: *Summary data of the Finnish income tax system in 2004*

Tax parameter	**Symbol**	**%**
Personal MTR on earned income[84]	τ_{ex}	20.92-54.92
Tax rate on corporate income	τ_f	29
Personal tax rate on capital income	τ_c	29
Rate of imputation	s	29
Presumptive rate of capital income	ρ	9.585

The Nordic countries have adopted differing definitions of the capital base (Hagen and Sørensen 1998, Lindhe et al. 2002). Under the Norwegian gross method the base is measured as the firm's non-financial gross assets[85]. Sweden's approach is to define the base as the acquisition cost of the shares. Finland chose a third alternative and defines the base as the firm's net business assets. The Finnish base thus includes all types of business assets, including financial assets, and deducts liabilities. As is shown in this paper, this definition has interesting implications for firm behaviour and also for the efficiency of the tax system.

Besides the splitting system, another unconventional feature of the Finnish tax system is that it has combined single taxation of dividends with non-relieved taxation of capital gains, the latter implying double taxation of retained profits. Sweden and Norway took a different approach

[83] From 1993 until 2004 this was implemented by a full imputation system. After the 2005 reform 'normal dividends' are tax-exempt up to 90,000 euros. Dividends exceeding this amount and also dividends from stock exchange-quoted corporations are subject to partial double taxation.

[84] Includes central government income tax of 0-34%, municipal income tax of 18.12% (average), church tax of 1.3% (average) and sickness insurance contribution of 1.5%.

[85] In this paper we refer to the previous Norwegian tax system, effective from 1992 to 2005. As from 2006 Norway introduced a notably different model to tax equity income. For the new system, see Sørensen (2005a) and Christiansen (2004).

in their DIT reforms in the early 1990's: both countries aimed at neutrality. While Norway's strategy was to implement single taxation of both distributed and retained profits, Sweden chose the other extreme: double taxation of both.

What are the effects of the non-neutrality of the Finnish system in this respect? Tax literature suggests that the relative tax burden on distributed and retained profits is important for dividend and financing decisions. A lower tax burden on dividends may induce higher dividend distributions (e.g. Poterba 2004, Gordon and Dietz 2006,). Furthermore, Sinn (1987) shows it to establish incentives for what he calls a distribute-and-call-back policy, where profits are converted into new equity capital by distributing them and then collecting them back through new share issues.

This paper presents a formal analysis of the financial behaviour of a CHC under the Finnish dual income tax. It argues that the non-neutralities of the tax system encourage entrepreneurs to undertake two specific tax-planning strategies by which these agents may avoid personal taxation entirely. Capital gains taxation is shown to be important in understanding the observed dividend behaviour. In the theoretical part, a standard deterministic corporate tax model is used (Auerbach 1979, Sinn 1987) augmented here by financial capital. The modelling of the Finnish dual income tax closely follows Kari (1999) and Lindhe et al. (2002). The firm's optimal policy is analysed not only in the long-run equilibrium, but also in the adjustment stage. The empirical part provides evidence for the tax-planning strategies suggested by the theory using a large data set consisting of linked micro data for closely held firms and their owners.

The paper proceeds as follows. Section 2 sets up the model. Section 3 provides an analysis of the firm's optimal policy under the Finnish variant of DIT. Sections 4 and 5 present empirical support for the behaviour outlined in section 3. Section 6 concludes.

2. The model

2.1. Objective of the firm

Assume a closely held company that maximizes the wealth of its entrepreneur

$$\text{(1)} \qquad \max \int_{t_0}^{\infty} G\, e^{i'(t-t_0)} dt \ ,$$

where G is the after-tax value of dividends received by the entrepreneur and i' is the after-tax discount rate of the owner.

There are two types of assets available in which the firm can invest: real capital, K, generating profits $f(K)$ with standard properties $f' > 0, f'' < 0$, and financial capital, F, with a constant rate of return i. Both assets are non-depreciable and develop as

$$\text{(2)} \qquad \dot{K} = I \ , \qquad K(t_0) = K_0$$
$$\dot{F} = S \ , \qquad F \geq 0,\ F(t_0) = 0$$

where I is real investment and S is the net flow to financial assets. K_0 is the start-up value of the firm's stock of real capital financed by an initial equity input from the entrepreneur at time t_0 when the firm is established. The owner is assumed to be liquidity-constrained and also unwilling to accept outside equity to finance the firm. Because of this, the starting value of the firm K_0 is determined purely by these constraints, which are defined more explicitly below.

This assumption concerning K_0 is motivated here not only as a plausible feature of real life, but also by technical reasons. Without it we are not able to analyse the effects of the Finnish DIT on the firm's growth path in the presence of the incentive for the distribute-and-call-back policy mentioned in section 1. An endogenously determined initial stock of capital would eliminate the growth path and thus obscure many interesting aspects of the tax system. [86]

[86] As an example of a different approach, Sinn (1991) analyses dividend taxation as the only tax parameter in a model where the size of initial capital is optimized.

The firm's budget constraint is

(3) $$(1-\tau_f)[f(K) + iF] = D + I + S,$$

where τ_f depicts the rate of corporation tax and D depicts dividends distributed to owners. Observe that the only source of financing (after the initial equity input) is after-tax profits. Debt financing is ruled out to simplify the analysis, as is new equity because of the liquidity constraints. In section 3.3 we extend the analysis by adding new share issues. The firm's uses of funds are dividends D and investments in real capital I and financial assets S.

Observe that the model excludes labour, both outside and the owner's own, as a factor of production. We do this to focus on the firm's tax planning using financial operations. The model further excludes the owner's wages as a form of remuneration from the firm. This may seem unconventional because one of the problems of DIT is alleged to be in the incentives to report labour income as more leniently taxed capital income. Instead of wage, however, our model includes excess dividends which face the high marginal tax rates of labour income.[87] Hence, in our model, the potential income-shifting from labour income to capital income occurs between excess dividends and normal dividends.

2.2. The tax system

Personal capital income is taxed at a flat rate τ_c, which equals the rate of corporation tax. Income categorized as earned income is taxed at rate τ_{ex}, which satisfies $\tau_{ex} > \tau_c$. To simplify the analysis, all tax rates are proportional (see Kari 1999 and Lindhe et al. 2002). Dividend taxation is mitigated by a full imputation system at a rate of $s = \tau_f = \tau_c$.

The splitting system is modelled by first dividing the cash dividend D into two parts

[87] This modelling choice has a good theoretical basis. In the Finnish tax system, excess dividends bear a small tax advantage compared to wage income due to social security contributions (Hietala and Kari 2006). This implies that excess dividends can be seen as the marginal form of labour income (Lindhe et al. 2002, Hietala and Kari 2006).

(4) $$D = D_n + D_{ex},$$

where D_n is 'normal dividend', subject to taxation as capital income, and D_{ex} is 'excess dividend', taxable as earned income in the hands of the owner.

The dividend variables are constrained as follows:

(5) $$0 \leq D_n \leq \rho N, \; D_{ex} \geq 0$$

The lower boundaries are necessary to exclude new financing through negative dividends. The upper boundary for (grossed-up) normal dividends brings the split rule into the model. It corresponds to the concept of 'imputed capital income' mentioned above and is calculated as a return at the rate ρ (presumptive rate of return) on the firm's net assets N. Since debt is excluded from the model, N is the sum of the firm's real and financial assets, $N = F + K$.

To simplify later analysis, it is useful to set the following profitability requirement for the firm's profit function

(6) $$\frac{(1-\tau_f) f(K^*)}{K^*} > \rho$$

where K^* depicts the size of the stock of real capital which satisfies $f'(K) = i$, where i is the interest rate. This assumption excludes firms, whose average return on capital is so low that their dividends remain below the threshold of the splitting system. By this we focus on high-profitability firms, where the predicted incentives are likely to occur (Lindhe et al. 2002).

The after-tax dividend income of the owner G is defined as

(7) $$G = \gamma_n D_n + \gamma_{ex} D_{ex},$$

where $$\gamma_n = \frac{1-\tau_c}{(1-s)(1-\tau_g)}, \quad \gamma_{ex} = \frac{1-\tau_{ex}}{(1-s)(1-\tau_g)}.$$

γ_n and γ_{ex} depict the opportunity cost of retaining after-tax profits distributable in the form of normal dividends or excess dividends, respectively, familiar from standard corporation tax theory (Auerbach 1979, Sinn 1987). τ_g is the accrual-effective tax rate on capital gains.[88]

Finally, we make the following assumptions

(8) $\tau_g < \tau_c$, $\tau_g < (\tau_{ex}-\tau_c)$, $\rho > i$, $i' = \dfrac{1-\tau_c}{1-\tau_g} i$ and $\lambda_1(K_0) = \lambda_1^0 > \gamma_n$.

The first assumption states that the accrual-effective tax rate on capital gains is below the nominal tax rate on capital income. The second may be less obvious but focuses the analysis on cases where the tax rate gap between earned income and capital income is high compared to the effective capital gains tax rate. In the Finnish tax system this is easily satisfied in the case of a high-MTR entrepreneur. The third assumption states that the imputed rate of return of the splitting system, ρ, is higher than the interest rate, i. The next one specifies the tax adjusted interest rate, i'. The last assumption sets up the constraint for the start-up capital stock K, discussed above. It is defined in terms of the shadow price for real capital $\lambda_1(K)$.

2.3. Optimality conditions

The model now consists of the objective function in (1), the equations of motion for the state variables in (2), the firm's budget constraint in (3), the definitions in (4), (7) and (8) and the constraints on the control and state variables in (2) and (5).

The current-value Lagrangean and the first order conditions for the basic model are:

(9) $$L = \gamma_n D_n + \gamma_{ex} D_{ex} + \lambda_1\{(1-\tau_f)[f(K) + iF] - D_n - D_{ex} - S\} + \lambda_2 S + q_1 D_n \quad + q_2[\rho(K+F) - D_n] + q_3 D_{ex} + q_4 F$$

(10a) $$\partial L/\partial D_n = \gamma_n - \lambda_1 + q_1 - q_2 = 0$$

(10b) $$\partial L/\partial D_{ex} = \gamma_{ex} - \lambda_1 + q_3 = 0$$

[88] Capital gains tax at the effective tax rate τ_g, creates an additional expected burden when profits are retained, and thus increases the opportunity cost of retained profits.

(10c) $\partial L/\partial S = -\lambda_1 + \lambda_2 = 0$

(10d) $$\dot{\lambda}_1 = i'\lambda_1 - (1-\tau_f) f'(K)\lambda_1 - \rho q_2$$

(10e) $$\dot{\lambda}_2 = i'\lambda_2 - (1-\tau_f) i\lambda_1 - \rho q_2 - q_4$$

plus the constraints in (2) and (3) and the standard Kuhn-Tucker conditions, not presented here.

3. The firm's optimal policy[89]

3.1. Long-run equilibrium

This section presents a brief outline of the dynamic solution to the theoretical model. It begins by analysing policy in the long-run equilibrium assuming that investments in financial assets are not available. After this benchmark case, analysed also in earlier literature, the firm's opportunity set is broadened with financial investments.[90]

Financial investment excluded (F = 0)

To analyse the firm's steady-state policy in the absence of financial investments, assume that the firm, satisfying the profitability condition (6), distributes excess dividends $D_{ex} > 0$. This together with (10b) implies that $\lambda_1 = \gamma_{ex}$, and further, using (10a), that $q_2 = \gamma_n - \gamma_{ex} > 0$. Thus the upper constraint for normal dividends is binding, $D_n = \rho N$. This means that the firm pays out excess dividends only if the maximum amount of normal dividends is distributed.

Using (10d) as well as (10a) and (10b), we obtain the following marginal condition to characterize the firm's investment policy:

[89] We are grateful to one of the referees for very helpful comments on the exposition of this section.

[90] A more formal analysis of the model is given in a separate technical appendix available from the authors by request.

(11) $$f'(K^{**}) = \frac{1-\tau_c}{(1-\tau_f)(1-\tau_g)} i - \frac{\tau_{ex}-\tau_c}{(1-\tau_f)(1-\tau_{ex})} \rho .$$

This condition defines a steady-state stock of real capital denoted here as K^{**}. The rhs of the equation corresponds to the cost of capital for Finnish CHCs as derived in Lindhe et al. (2004) and Hietala and Kari (2006). Compared to the standard 'new' view cost of capital for investment financed by retained earnings, there is an additional term (second term on the rhs), which reflects the incentive effects created by the split of dividends into capital and earned income parts. Observe that the first term is independent of dividend taxation but the second term is not. The splitting system thus breaks with the 'new' view result, which states that dividend taxes do not distort investment financed from retained earnings.

The incentive effects reflected by the second term follow from the Finnish practice of splitting dividends using the firm's net assets as the capital base. By retaining profits the firm increases the capital base and thus reduces the share of dividends subject to earned income taxation. This leads, in the case of a positive tax rate differential ($\tau_{ex} - \tau_c$), to a tax saving which reduces the firm's cost of capital.

Equation (11) implies for an owner with tax rates as assumed in (8) (see Appendix 1):

(12) $$f'(K^{**}) < i .$$[91]

Thus, as argued in the above cited studies, in this framework the Finnish splitting system may create strong investment incentives, leading to an inefficient outcome.

Allowing access to financial investment (F ≥ 0)

Let us examine the case where the firm has the opportunity to invest in financial assets with a constant pre-tax rate of return equal to the market interest rate *i*. Now observe that the assumed tax system treats financial and real investments equally. The return on both investments is taxed at

[91] Hietala and Kari (2006) calculate that, using the Finnish tax rates effective in 2004, the cost of capital in the case of a top tax bracket owner, was 0.2% when i=7% is assumed.

the rate τ_f (see eq. (3)) and both assets are included in the capital base of the splitting system, $N = K + F$. This allows us to state that the marginal returns on the two asset types must be equal in the long-run equilibrium:

$$(13) \qquad f'(K) = i\,.$$

This condition also defines the long-run cost of capital for real investments. This allows us to conclude that the steady-state stock of real capital K^* is lower than the capital stock K^{**}. Hence the inclusion of financial investments removes the distorting effect of the Finnish CHC tax rules indicated in earlier research.

To proceed in the analysis of the firm's long-run policy, let us insert condition (13) into (10d). Using this and conditions (10a) and (10c) we obtain the following formula for the firm's long-run equilibrium marginal valuation of capital:

$$(14) \qquad \lambda_1{}^* = \lambda_2{}^* = \frac{\rho}{\tau_g(1-\tau_c)i + (1-\tau_g)\rho}$$

This value can be shown to satisfy $1 < \lambda_1{}^* = \lambda_2{}^* < \gamma_n$ (Appendix 1). Using this inequality and conditions (10a) and (10b) above, we obtain $q_1 = 0$, $q_2 > 0$, $q_3 > 0$, which imply $D_n = \rho N$, $D_{e\,x} = 0$. Thus, in the long run equilibrium, the firm's dividend policy follows the rule that the maximum amount of normal dividends is distributed ($D = \rho N$), but no excess dividend ($D_{ex} = 0$).

Now, assuming the absence of financial assets, the profitability condition (6) implies:

$$(15) \qquad (1 - \tau_f)f(K^*) - D_n > 0.$$

There are two alternative ways to use the positive residual cash flow: financial investments and excess dividends. While excess dividends trigger a high tax liability in the hands of the owner, financial investments have some favourable features under the assumed tax system. They increase the after-tax profits by an amount of $(1 - \tau_f)i$ per unit of financial investment. However, since financial assets are included in the capital base N, they also increase normal dividends by an amount of ρ per one unit of investment. Since $\rho > (1 - \tau_f)i$, this tax system not only leads to taxation of the returns on financial investments as normal dividends in the hands of the owner, but goes further and reduces the amount of excess dividends. Thus financial investments can be used as a tax planning vehicle by which excess dividends can be avoided.

Hence the firm will retain the part of the after-tax profits that exceeds D_n and invest this in financial assets. This continues until the following equality is satisfied:

$$(1 - \tau_f)f(K^*) - \rho K^* = (\rho - (1 - \tau_f)i)F^* \tag{16}$$

where F^* is the long-run equilibrium value of the stock of financial capital.[92]

At this stage all of the firm's after-tax cash flow is used for normal dividends and nothing is left for the investment of excess dividends. Both of the firm's asset categories are stationary and therefore, as shown in Appendix 1, the standard transversality condition for the problem is satisfied. This means that the financial investment regime fulfils the requirements for the final stage of the optimal dynamic solution.

Consider finally the firm's financial investment policy when $K < K^*$. This can be studied by combining (10d) and (10e) and using $f'(K) > i$. We obtain $q_4>0$, which implies that $F = 0$. Hence, as is fairly clear intuitively, the firm does not invest in financial assets unless $K = K^*$.

3.2. Growth path

In section 2 we assumed that the entrepreneur is credit-constrained and therefore is able to invest only a small amount of initial capital in the firm. This exogenous amount was defined in terms of the marginal valuation of capital $\lambda_1(K_0) = \lambda_1^0 > \gamma_n$. Comparing this to the information of the previous section, we observe that the long run equilibrium value of this variable is below the start-up value $\lambda_1^* < \lambda_1^0$. In our framework with a concave profit function, this implies that the start-up size of the real capital stock is strictly lower than its long-run size, $K_0 < K^*$. Now, due to this gap, the

[92] As repayment of debt closely corresponds to financial investments, the tax system analyzed in this paper is likely to produce incentives to retire debt as well. Observe that both operations increase the net assets of the firm.

dynamic solution to the firm's problem must include an adjustment phase during which the firm grows its capital stock to the long-run equilibrium level. In the following we outline features of the firm's growth path using intuitive reasoning.

The initial investment condition, $\lambda_1^0 > \gamma_n$, says that the marginal valuation of capital exceeds the opportunity cost of retaining normal dividends (γ_n). Thus a value-increasing policy choice is to invest the accruing after-tax profits in real capital rather than to distribute them as dividends. So, after the firm has started up, it invests all after-tax profits $I = (1 - \tau_f)f(K)$ and pays out no dividends $D = 0$. This is an internal growth phase similar to the one of Sinn (1991). After the accumulation of real capital with decreasing returns has depressed the marginal valuation capital below the opportunity cost of retaining normal dividends, $\lambda_1 < \gamma_n$, the firm's policy changes. Now normal dividends are a better use for after-tax profits than investments. Hence the firm starts distributing the maximum amount of normal dividends, $D = \rho K$, and using the rest $I = (1 - \tau_f)f(K) - \rho K > 0$ for investments in real capital.

Once the optimal size of the capital stock K^* is reached and the marginal valuation of capital has been depressed to its long-run equilibrium value, the firm continues paying normal dividends but starts investing its residual profits in financial assets, as explained in the previous section.

This process, with both normal dividends and financial investments, continues until

$$(1 - \tau_f)f(K^*) + (1 - \tau_f)iF^* - \rho K^* - \rho F^* = 0, \quad (17)$$

i.e. when the firm is in the long-run equilibrium in respect of the stocks of both real and financial assets. Table 3.1 summarizes information on the firm's policies during the different phases of the optimal solution.

TABLE 3.1: *Summary information on the solution*

	K	K	***F***	F	***D***	$\boldsymbol{\lambda_1}$
Start-up	$=K_0$		=0			$\lambda_1^0 > \gamma_n$
1. growth phase	>0	>0	=0	=0	=0	$\lambda_1 \geq \gamma_n$
2. growth phase	$=K^*$	=0	≥0	>0	$=D_n$	$\lambda_1 \leq \gamma_n$
Final phase	$=K^*$	=0	≥0	≥0	$=D_n$	$1 < \lambda_1^* < \gamma_n$

It may be worthwhile to take another look at the financial investment phase. Why, for example, does the firm not approach the steady-state value of financial assets F^* at a faster rate than in the solution above? To help understand this issue, let us compare the owner's costs and benefits from a one-unit increase in investment in financial assets financed by a one-unit reduction in normal dividends. The owner's cost of reducing dividends is given by γ_n, while the value of the discounted additional income stream is $(1 - \tau_f)i\gamma_n / i'$.[93] Observe that with $i' = (1 - \tau_c)i / (1 - \tau_g)$ and $\tau_c = \tau_f$.

$$(18) \qquad \gamma_n > \frac{(1-\tau_f)i\gamma_n}{\dfrac{(1-\tau_c)i}{1-\tau_g}},$$

which tells us that the value of normal dividends is greater than the value of a one-unit investment. Thus any investment financed by a reduction in normal dividends is value-decreasing. One interpretation of this is that due to capital gains tax the total tax on the returns on financial assets held within the firm $\tau_f + \tau_g(1 - \tau_f)$ is higher than the tax on the return on financial assets outside the firm τ_c. Thus the firm's optimal choice is to set normal dividends to their maximum value.

Observe the non-standard features of the entire dynamic solution to the firm's problem. Dividends are paid during the (second) real investment growth phase, and not only in the steady state. In this respect the outcome differs from Sinn (1991), who shows that under a linear dividend tax profits are only distributed in the steady state. We also

[93] To focus on the basic incentive to distribute normal dividends, we abstract here from the effect of investment on future normal dividends through the asset base N. Thus we assume a non-binding upper constraint on normal dividends.

observe an unambiguous incentive to invest excess profits in financial assets. The firm is not indifferent in respect of the use of funds, but strictly prefers investment in financial assets. Furthermore, no personal taxes are paid on distributed profits. This is because the imputation credit eliminates taxes on normal dividends and because excess dividends, subject to a high tax burden, are never paid out. Financial investments are in fact the tax-planning vehicle by which the distribution of excess dividends can be avoided.

3.3. Extension: new equity

The model in section 2 assumes that the firm does not collect new equity after the start-up stage. This assumption was imposed partly to simplify the analysis. Some features of the tax system, however, raise the question of whether the tax system creates special incentives to raise new equity. Attention is drawn to the unusual combination of a full imputation system with non-relieved taxation of capital gains. Under this combination, and taking into account the tax rates, dividends, and especially 'normal dividends', are in practice tax-free to shareholders. Capital gains are taxed at an effective rate τ_g, which is strictly positive. In literature such a system is seen to create incentives for tax-arbitrage, and is known as a distribute-and–call–back policy (Sinn 1987). Expected future capital gains tax prompts the firm to convert internally generated equity into share capital.

To examine this question, let us augment the model with new equity capital Q provided by the original owner. The variable is constrained as follows:

$$(19) \qquad 0 \le Q \le \overline{Q} ,$$

where the ceiling $\overline{Q}$ is motivated by the financial constraints of the owner. We could think of the ceiling as being a function of income received by the owner from the firm. To simplify issues, however, let us assume $\overline{Q}$ to be exogenous.

We obtain the following first-order condition for the optimal use of equity issues

(20) $\partial L/\partial Q = -1 + \lambda_1 + q_5 - q_6 = 0,$

where q_5 and q_6 are the shadow prices related to the lower and upper constraints on Q respectively. Now the optimal value of Q depends on the co-state variables λ_1 and λ_2 as follows:

(21) $$Q\begin{cases} = 0 \\ \geq 0 \ \& \leq \overline{Q} \\ = \overline{Q} \end{cases} \Leftrightarrow \quad \lambda_1 = \lambda_2 \begin{Bmatrix} < \\ = \\ > \end{Bmatrix} 1$$

Condition (21) compares the value of a one-unit additional investment to the owner's opportunity cost on this investment, i.e. the cost of investing one unit of additional equity in the firm. Since $\lambda_1 = \lambda_2 > 1$ in all regimes of the optimal solution derived in section 3.2, we conclude that the firm faces an incentive to collect new equity from the owner throughout its life cycle.

To obtain additional insight into these incentives, compare the costs and benefits from a one-unit increase in normal dividends, γ_n, financed by new equity, the cost of which to the owner is one. Since $\gamma_n > 1$, this policy is value-increasing.

The role of capital gains taxation here can be understood by looking at the incentives under the case $\tau_g = 0$. Now $f'(K^*) = i$ implies, by conditions (10e), (10c) and (10a), that $q_2 = 0$ and $\lambda_1 = \lambda_2 = 1$. Thus the upper constraint for normal dividends becomes non-binding and the incentive to collect new equity ceases. The firm is now indifferent in respect of both new equity and normal dividends. This demonstrates the crucial role of capital gains taxation in creating the incentive to finance dividend distributions by new equity.

3.4. Summary

Our theoretical model adds financial investments to the standard investment model for CHCs. The model predicts that under the Finnish DIT, which splits dividends from a CHC using the firm's net assets as the capital base, the owner avoids taxes on earned income using firm-level financial investments as the tax-planning vehicle. This is shown to eliminate the tax distortion to real investment decisions reported in earlier literature.

The firm's growth path contains several non-standard features. Unlike in the standard dividend-tax model by Sinn (1991), here the firm pays out dividends not only in the steady-state but also during its growth path. The CHCs dividend policy is determined by the rule that the maximum amount of normal dividends is distributed. This occurs both in the second real investment regime and the financial investment regime. Moreover, the CHC faces an incentive to collect new equity at the same time as it pays out dividends (distribute-and-call-back policy). This incentive is induced by the higher tax on retained profits (capital gains) than distributions in the Finnish tax system.

In the empirical part of this paper we address three aspects of the theoretical results. The first is the dividend rule: if the CHC distributes dividends, it should always distribute exactly the maximum amount of normal dividends ($D = \rho N$). The second question concerns the financial investment regime; there should be a connection between distribution of dividends and financial investments ($F > 0$ & $D = \rho N$). The third issue deals with distribute-and-call-back policy. We examine whether firms simultaneously collect new equity and distribute dividends ($Q > 0$ & $D = \rho N$).

4. Data and descriptive statistics

The panel data employed has been collected by the Finnish Tax Administration and is based on the firms' tax declarations. It contains information on financial statements and taxation of Finnish corporations for the period 1999–2003. The data set also includes information on the principal shareholders[94] of all dividend-distributing corporations; in some analyses we utilize linked data of the dividend-distributing CHCs and their owners.

An important quality of the data is that there is no restriction on the size of the firm or the sector it operates. It covers all Finnish firms that are subject to taxation and thus small firms make up the vast majority of the

[94] The principal shareholder is defined as the one who owns the largest number of shares in the firm.

data. In this article the focus is on those small corporations: closely held corporations and other small firms owned by another domestic enterprise or a foreign natural person or enterprise.

The income-splitting system analysed concerns dividends from CHCs received by domestic natural persons. Thus, if we hypothesize that the system affects dividend distributions, we expect to see a difference in dividend policies between corporations owned by natural persons and those owned by other owner groups[95]. Figure 4.1 illustrates the distribution of corporations according to the dividend return (share of dividends relative to the firm's net assets) for three groups of corporations which differ in their ownership structures. Figure 4.1 gives the intuition that dividend distribution is indeed very much influenced by the splitting system. Distribution by corporations whose principal shareholder is a natural person peaks at around a 10 percent return on the firm's net assets. This corresponds broadly to the upper boundary of normal dividends; 9.585 percent of the firm's net assets.[96]

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[95] In 2003 the principal shareholder was the type "natural person" in 41854 dividend-paying corporations. In the same year there were 2857 dividend-paying corporations where the principal shareholder was another enterprise (including all the legal organizational forms) and 578 corporations where the principal shareholder was a foreign natural person or enterprise.

[96] The maximum amount of normal dividend is determined as follows: Grossed up dividends (cash dividend plus imputation credit) are categorized as capital income up to a 13.5 percent return on the firm's net assets (gross assets minus debt). In terms of cash dividends the equivalent rate is 9.585 percent on net assets (see Lindhe et al. 2004).

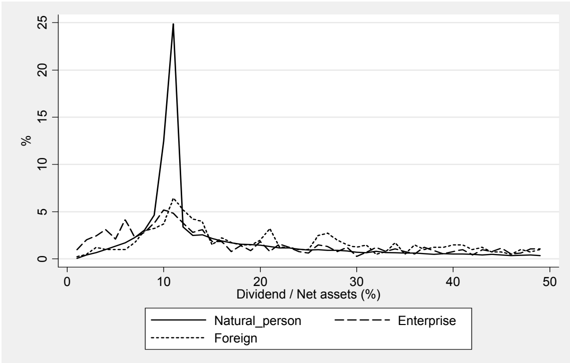

FIGURE 4.1: *Dividend return according to owner status, 2003*

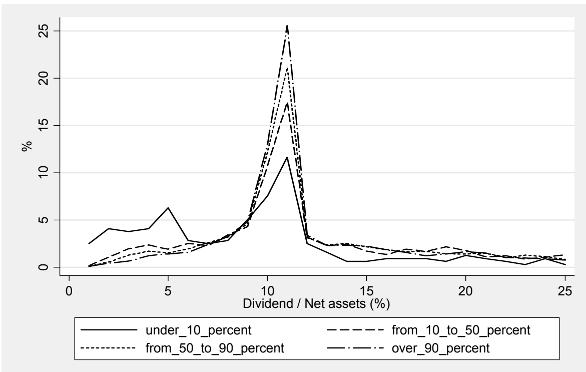

FIGURE 4.2: *Dividend return according to share of ownership, 2003*

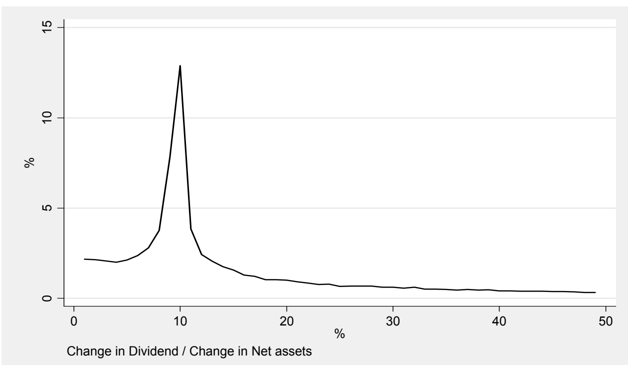

FIGURE 4.3: *Response of dividends to change in net assets, 1999-2003*

On the right hand side of the peak in Figure 4.1 are corporations that paid excess dividends. Table 4.1 shows how dividends distributed by the non-listed corporations for the financial year 2003 were divided between normal and excess parts. As can be seen, 80 per cent of dividends were taxed as capital income and only 20 per cent as earned income. In the following we focus on corporations distributing only normal dividends, and leave the questions related to excess dividends for later research.

TABLE 4.1: *Capital income and earned income as shares of dividends in 2003*

	Normal dividends	Excess dividends
Number of corporations	48677	30073
Mean (€)	194582	78177
Median (€)	8498	9635
Sum (€)	9471 million	2351 million
Average share of distributed dividends	80.2	19.8

In Figure 4.2 the distribution of cash dividends as a return on the firm's net assets is presented according to the principal shareholder's share of ownership. We observe that also the share of ownership affects the significance of taxation for dividend distribution; the higher the principal shareholder's share of ownership is, the higher is the peak at around 10 percent return and the more dividend distribution is influenced by income taxation. It appears that high share of ownership gives better opportunities for tax planning.

The Figure 4.3 illustrates how dividends respond to changes in net assets among CHCs. The peak is still at around 10 percent return on firm's net assets; a significant proportion of firms have increased (decreased) dividend distribution by exactly the amount that corresponds to the change of the maximum amount of normal dividends.

The graphs presented support our theoretical findings. Firms distribute dividends corresponding to the maximum amount of normal dividends.

5. Estimation methods and results

Our theory predicts that the policy whereby the firm invests in fixed assets continues until the condition $f' = i$ is satisfied. At this point the firm switches to financial investments. The firm saves in financial assets until it reaches a sufficient size of the capital base. However, all the time the firm distributes to dividends amounting $D = \rho N$. In this section we investigate whether there are differences in investment policies of firms as suggested by our theoretical approach. We also test the significance of distribute-and-call-back policy. This analysis includes two steps: first we lay out a binary response model for the case where the dividend distribution exactly corresponds to the maximum amount of normal dividends. We study whether the probability to distribute maximum normal dividends is dependent on financial factors and ownership characteristics of the corporation. The purpose of the second step is to determine the financial factors being primarily associated with the maximum normal dividends. In this analysis we use gradually narrower samples based on dividend distribution and tax rules.

5.1. Discrete model of maximum normal dividends

Method

In our first analysis we investigate the probability that the firm distributes dividends exactly to the maximum amount of normal dividends.

The estimation method is a random effects probit model, which involves an auxiliary distributional assumption on the unobserved heterogeneity. The binary outcome, y_{it}, signifies whether firm i has distributed dividends to the maximum amount taxable as capital income in year t ($y_{it} = 1$) or not ($y_{it} = 0$). This is represented by the following:

(22) $$y_{it} = y_{it-1}'\delta + \mathbf{x}_{it}'\boldsymbol{\beta} + v_{it}$$

(23) $$v_{it} = u_i + \varepsilon_{it} ,$$

where i indexes corporations and t indexes years. u_i denotes the unobserved firm-specific component that is assumed to be random across firms with $u_i \sim N(0, \sigma^2_\alpha)$. The term $\varepsilon_{it} \sim N(0, \sigma^2_\varepsilon)$ represents random error and is assumed to be independent of u_i. The terms u_i and ε_{it} are also assumed to be orthogonal to the set of covariates, $\boldsymbol{x}$, with an associated parameter vector $\boldsymbol{\beta}$. The model is estimated by maximum likelihood, using unbalanced panel data.

We assume that the probability of distributing dividends amounting to $D = \rho N$ is related to financial factors and the ownership of the corporation. In addition, the firm's growth rate, size and industry are included as additional explanatory variables in the econometric model. The growth rate dummies are included to control for deviations in firms' financial policies[97]. There might be economies of scale in financing, and therefore we control also the size of the firm measured by the logarithm of its employment. Since we do not have access to any other variables needed to control for the industry-level heterogeneity, we only test the significance of industry-level dummies.

The inclusion of the lagged dependent variable, y_{it-1} captures the tendency that may exist for corporations that have paid the maximum normal dividend in one year to continue to do so. We expect that y_{it-1} is positive and statistically significant.

Estimation of the model with lagged dependent variable requires an assumption concerning the first observations, y_{i1}, in particular regarding their relation with the unobserved heterogeneity u_i. We assume that this is exogenous, although we know that this is a very strong assumption. When the initial condition y_{i1} is correlated with the unobservables u_i, this will lead to an upward bias in the extent of persistence in dividend policies. In our case this is very likely, because our examining period is relatively short.

The estimation results from the random effects probit model are presented in Table 5.1 and Table 5.2 (Appendix 3). The second specifications include the lagged dependent variable. The third and fourth estimation results include additional control variables. Apart from the last estimation case we use an interval 9 to 10 per cent return on net asset to define the corporations that have paid dividends maximum amount

[97] Growth is a difference in turnover between two consecutive years. We use three growth rate dummies: negative, 5–10 per cent and over 10 per cent. The reference category is that growth in turnover is 0–5 per cent.

taxable as capital income and therefore get $y_{it}=1$. In the last estimation the interval in question is 7 to 12 per cent. If the results of the two last estimations differ, we can make some conclusions concerning the sensitivity of the financial factors affecting maximum normal dividend policy.

Table 5.2 includes the results of estimations where we used the panel data covering all corporations. The results in Table 5.2 based on data that only includes dividend-paying corporations. We only have information on the ownership of a corporation if the corporation has paid dividends. For that reason no ownership information is used in Table 5.1.

Combining non-linear models used in microeconometric applications with typical panel data features like an error component structure yields complex models which are difficult to estimate by maximum likelihood. In such cases the GMM approach is a good alternative. The assumed absence of any correlation between the unobserved heterogeneity and both the regressors and the error term are strong assumptions. These assumptions and the initial conditions problem referred to above can be relaxed by estimating a linear probability fixed effects model for binary response by GMM. We estimated also the linear probability model by GMM: the results are consistent with the results of the random effects probit model and they are not presented[98]. The findings seem to be quite robust to different model specifications.

Results

A high level of after-tax profit increases the probability of maximum normal dividend distribution. According to our theory, liquidity-constrained immature firms finance investment out of retained profits and neither pay dividends nor issue new shares. The after-tax profit is a statistical significant explanatory variable also when we are considering only dividend-paying corporations (Table 5.2). That can be interpreted to

[98] Note that now we do not estimate the model including the lagged dependent variable. In that case, due to the correlation between Δy_{t-1} and Δw_{it}, instrumentation becomes necessary to avoid a downward bias on the coefficient of the lagged dependent variable. A popular technique for this is the method developed by Arellano and Bond (1991), who derive a GMM estimator involving an increasing number of instruments beginning at *t-2* as *t* increases. However, the time dimension of our data is short so this is not a suitable approach in our case.

mean that the maximum normal dividend policy is mostly undertaken by the most profitable firms.

Investments in fixed assets are negatively related to the propensity to distribute dividends amounting to $D = \rho N$. As can be seen from dividend-paying corporations, the level of fixed investments has a statistically insignificant effect on the probability. Immature firms invest in fixed assets and do not distribute dividends, whereas there are no significant differences in investment behaviour between corporations that have paid maximum normal dividends and other dividend-paying corporations.

The opposite holds when considering financial holdings; the probability of distributing maximum normal dividends increases when the corporation's financial holdings increase. This is evident also when we are considering only dividend-paying corporations. This finding gives strong support to our theoretical result of the investment behaviour in CHCs. We argued that firms have an incentive to increase net assets by investing in financial assets and simultaneously pay dividend the maximum amount taxable as capital income.

These conclusions provide support for the findings of investment behaviour and dividend policy of the firm presented in the theoretical part of the article.

It is also interesting to note that the coefficient of the share issues is significant at the 5 percent level in the third estimation in Table 5.2. This indicates that among dividend-paying firms a new share issue increases the probability of distributing maximum normal dividends. This is consistent with our findings concerning distribute-and-call-back policy in the previous chapters.

The owner dummies are contained in the two last estimations. Because of the data restrictions we are now only considering dividend-paying corporations. When the owner of the corporation is another firm or foreign, the probability of dividends being distributed to the maximum amount of normal dividends decreases. This is exactly what can be expected for tax reasons. The results are consistent with the intuitive presentation in Figure 4.2.

The lagged dependent variable is highly significant, indicating that, controlling for financial characteristics and unobservable factors, there is a significant degree of persistence in the dividend policies of Finnish corporations.[99]

5.2. Models for the factors with the most impact on dividend distribution

Method

In the followings we are interested in the significance of the financial factors being primarily associated with the maximum normal dividends. Generally there are three alternative ways to increase net assets and therefore normal dividends: investments in fixed assets, investments in financial assets and debt repayment. However, now we use debt variables only as controls, because our theory doesn't say anything about debt in corporate finance structure.[100] We have classified the corporations into gradually narrower groups based on dividend distribution and taxation. As a dependent variable we use the firm's dividends/total assets.

Random effects and fixed effects models are the most popular approaches estimating unobserved effects panel data models under a strict assumption of exogeneity of the explanatory variables. The estimated models are in the forms

(25) $$y_{it} = x_{it}'\beta + \alpha_i + \varepsilon_{it} \quad \text{(FE)}$$

(26) $$y_{it} = x_{it}'\beta + \alpha + u_i + \varepsilon_{it} \quad \text{(RE)}$$

with the same explanations as in the previous binary response models. The fixed effects approach (FE) takes α_i to be a firm-specific constant term in the regression model. Fixed effect model allows for α_i to be arbitrarily correlated with the x_{it}. The random effects model (RE) assumes that unobserved heterogeneity is uncorrelated with the explanatory variables

[99] It can also be noticed that the results are quite sensitive to the interval of the return on net assets which specifies the corporations that get $y_{it} = 1$.

[100] Intuitively the same incentives apply; debt repayment is actually negative financial investment.

used. The random effects approach specifies that u_i is a firm-specific random element with normal distribution.

We control again the firm's growth rate, size and industry and these variables are included as additional explanatory variables in the model. The question of whether the effects are random or fixed is tested using a Hausman specification test. The estimation results are given in Table 5.3.

Results

In the first estimations the entire data set is considered. As can be expected, profit has a very significant influence on dividend distribution. It can also be seen that the more the firm invests in real assets, the less it pays dividends; real investments and dividends are more or less alternative uses of funds. They also take in all likelihood places in different growth stages. The influence of financial investments on dividends is positive and significant. This is very much in line with expectations.

In the second estimations we consider corporations that have distributed dividends the maximum amount of normal dividends. In this case we require that dividends correspond 7–12 per cent return on the firm's net assets. There are few differences comparing to the results in the previous case; the significance of financial holdings variable increases, whilst the significance of profit and real investments decreases. Compared to the previous case, this reflects that there are also other factors than profitability aspects behind the dividend decision of these corporations.

The results of the third estimation are in line with previous findings. In this estimation we consider corporations that have distributed dividends the maximum amount of normal dividends and require that dividends correspond to the 9-10 per cent return on the firm's net assets. It can be noticed that the significance of financial holdings increases further and, at the same time, the significance of real investments continues to decrease. This means that of the firms that have paid dividends amounting to $D = \rho N$, much of the increase in net assets is generated by new financial investments and therefore financial investments are important factors explaining distributed maximum normal dividends. This is consistent with the optimal behaviour of the firm under the DIT described in the theoretical part. From our theoretical point of view, when the firm shifts from the first real investments regime to the second real investments regime and to the financial investments regime the empirical observed changes in the firm's investments and financial structure are expected.

In the case of corporations that have distributed dividends up to the maximum amount taxable as capital income, new share issue does not affect dividend distribution. The effect of new share issue falls short of significance. According to these results the distribute-and-call-back policy does not get empirical support.

All in all, the results indicate that in part there are differences in the significance of the variables that are associated with the dividend distribution of different types of firms. In particular, those differences can be approached by classifying corporations according to dividend distribution and tax rules. It is very noticeable that financial investments have most typically associated with dividends in the case of corporations that have distributed dividends to the maximum amount of normal dividends. This suggests that firms increase the amount of normal dividends by investing in financial holdings in a particular stage of the growth path.

We conclude by noticing that the fixed-effects model seems to fit the data well: the results of the Hausman specification tests reject the null hypothesis of random effects. This is consistent with our expectation of the importance of effects that vary across corporations but are constant over time.

6. Conclusion

This paper introduces financial investments into a standard investment model and uses it to analyse the financial and investment policies of a CHC under the Finnish dual income tax. Main aspects of the tax system are high taxation of capital gains on shares compared to dividends, and the dual income tax. The latter element splits dividends using the firm's net assets as the capital base into capital income taxed at a low proportional tax rate and earned income subject to a progressive schedule with high top marginal tax rates.

The results suggest that the potential distortions of the Finnish variant of dual income tax do not necessarily affect real investments, as claimed in earlier literature, but rather financial behaviour. Taxation induces the firm to postpone distributions because of the high tax rate on earned income and instead invest these funds in the financial markets. Through these financial investments the firm increases its net assets and transforms excess dividends into more leniently taxed future normal dividends. As a result the entrepreneur never pays personal taxes on dividends. The CHC is also shown to face an incentive to raise new equity capital to finance additional dividends. This activity, called in literature as distribute-and-call-back policy may lead to a similar outcome. The firm's retained profits are transformed into new equity capital and thus capital gains tax is not paid on the increase in the firm's value of equity.

Empirical evidence based on tax return data supports the hypothesis concerning the effects on dividend policy as well as the effect on financial investment. In particular, the data gives strong support to the hypothesis that it is optimal for the firm to distribute the maximum normal dividends. A significant proportion of dividend-paying corporations pursue exactly this type of policy. The empirical part also provides evidence that firms increase capital base by investing in financial assets and simultaneously distribute dividends to an amount corresponding to maximum normal dividends. However, the data only lightly supports the hypothesis concerning the tax-induced distribute-and-call-back policy.

The particular incentives to tax planning discussed in this paper may well be a special feature of the Finnish DIT. Other Nordic countries do not include financial assets into the capital base of split. Thus the observed financial investment incentive is probably not faced there. Similarly, Norway and Sweden have taxed retained and distributed profits fairly equally, while Finland has favored dividends. Albeit a Finnish peculiarity, we yet believe that our results provide a useful contribution to the debate on design issues in a dual income tax. The policy conclusion remains ambiguous, however. There seems to be a trade-off between efficiency aspects and adverse effects on tax revenue raised by income shifting.

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Appendix 1

The result $K^{**}<K^*$

The inequality

$$f'(K^{**}) = \frac{1-\tau_c}{(1-\tau_g)(1-\tau_f)}i - \frac{\tau_{ex}-\tau_c}{(1-\tau_{ex})(1-\tau_f)}\rho < i$$

holds if $\tau_g < (\tau_{ex}-\tau_c)\frac{1}{1-\tau_f}\frac{1-\tau_g}{1-\tau_{ex}}\frac{\rho}{i}$. Using condition (8) we observe that $\rho/i > 1$, $(1-\tau_g)/[(1-\tau_f)(1-\tau_{ex})] > 1$ and $\tau_g > (\tau_g - \tau_c)$, which allows us to conclude that the tax-rate condition is satisfied.

Long-run value of λ_1 and λ_2

In financial investment phase $\lambda_1 = \lambda_2 = \frac{\rho}{\tau_g(1-\tau_c)i+(1-\tau_g)\rho}$. This value satisfies $1 < \lambda_1 = \lambda_2 < \gamma_n$. The first inequality requires that $\rho > (1-\tau_c)i$, which holds by (8). The second inequality requires that $\tau_g(1-\tau_c)I > 0$ which also holds.

Convergence of $F(t)$

In the financial investment phase, where $D = \rho N$ the firm's budget equation is:

(A1) $$(1-\tau_f)[f(K^*)+iF] = \rho N + S.$$

Inserting (A1) to (3) we obtain:

(A2) $$\dot{F} = [(1-\tau_f)i-\rho]F + (1-\tau_f)f(K^*) - \rho K^*.$$

This differential equation is convergent since $\rho > r$ (see (9)), approaching the following equilibrium value

(A3) $$F^* = \frac{(1-\tau_f)f(K^*)-\rho K^*}{\rho-(1-\tau_f)i}.$$

Transversality condition

The final regime of the solution must satisfy the following transversality condition[101]:

(A4) $$\lim_{t\to\infty} \lambda_1(t)K(t)e^{-i't} = \lim_{t\to\infty} \lambda_2(t)F(t)e^{-i't} = 0\,.$$

This is satisfied in the financial investment phase due to convergence of *F* and the constancy of K^* and the co-state variables. Hence, the financial investment regime qualifies for the final regime of the optimal solution.

[101] Leonard and Long (1993), Theorem 9.3.1 and Corollary 9.3.2.

Appendix 2

TABLE 4.2: *Financial characteristics of corporations in 1999-2003 (€)*

	all corporations					
	N	mean	median	std. deviation	min	max
dividend	119830	287573	16819	5578317	0,01	1438887738
profit	253225	190106	6762	19617684	-2231302403	3070208097
Δ(short-term debt)	167983	201100	248	28289791	-467395212	557828090
Δ(long-term debt)	73108	346539	-3702	33862756	-277754160	364625817
real investments	141162	388483	13596	32260974	0,17	3043126118
Δ(financial holdings)	78949	692264	1265	23987000	-514159360	953702604
share issue	3242	346990	6557	66265140	250	272345657
	dividend distribution					
	N	mean	median	std. deviation	min	max
dividend	119830	287573	16819	5578317	0,01	1438887738
profit	117875	297994	23178	12007009	-70621856	3070208097
Δ(short-term debt)	86085	145743	444	21476422	-241623968	472749926
Δ(long-term debt)	35139	263840	-5046	29901359	-173647232	364625817
real investments	71928	296232	17623	18850614	0,17	1955293696
Δ(financial holdings)	47584	312318	1359	19177160	-514159360	953702604
share issue	1049	389692	5887	8466524	1982	272345657
	maximum dividend taxable as capital income (maximum normal dividend); 7%-12%					
	N	mean	median	std. deviation	min	max
dividend	54641	74331	11480	862801	100	109996008
profit	54390	117494	20417	749448	-6376940	86680600
Δ(short-term debt)	41580	42211	216	10138677	-204163960	93772400
Δ(long-term debt)	16907	78018	-5081	2517389	-107665392	129497136
real investments	32923	113376	18236	1550526	0,17	219706272
Δ(financial holdings)	16037	49477	3856	2926014	-102376856	91633960
share issue	442	23802	5482	2225029	1098	82221185
	maximum dividend taxable as capital income (maximum normal dividend); 9%-10%					
	N	mean	median	std. deviation	min	max
dividend	37006	65626	11353	567571	108	54492888
profit	36840	112597	19975	803566	-6376940	86680600
Δ(short-term debt)	28800	17318	133	1509950	-132717816	85026448
Δ(long-term debt)	11704	14788	-4916	2378493	-107665392	50844284
real investments	21718	93568	17518	748510	0,17	63465120
Δ(financial holdings)	16464	54533	5958	2070595	-102376856	91633960
share issue	378	41490	6482	2122004	2469	82221185

dividend = distributed dividend from year t, (*balance sheet*)
profit = after tax profit in year t (*income statement*)
Δ(short-term debt) = current liabilities in year t minus current liabilities in year t-1 (omitted amounts: advanced paid, accounts payable and deferred income and accrued expenses), (*balance sheet*)
Δ(long-term debt) = long term debts in year t long term debts in year t-1 (omitted amounts: advanced paid, accounts payable and deferred income and accrued expenses), (*balance sheet*)
real investments = gross fixed investments in year t, measured as an increase in net expenditures (*depreciation account*)
Δ(financial holdings) = current financial assets in year t minus current financial assets in year t-1, (*balance sheet*)
share issue = share issue in year t, (*balance sheet*)

Appendix 3

***TABLE 5.1:** Coefficient estimates from random-effects probit model / All corporations*

	RE probit (9-10)	Marg. effect	RE probit (9-10)	Marg. effect	RE probit (9-10)	Marg. effect	RE probit (7-12)	Marg. effect
PROFIT								
profit/total assets	3.721 (0.109)**	0.262	2.429 (0.112)**	0.190	3.258 (0.117)**	0.231	2.532 (0.109)**	0.309
FINANCE								
Linked with theory								
real investments/total assets	-1.467 (0.114)**	-0.107	-1.243 (0.095)**	-0.103	-1.126 (0.087)**	-0.095	-1.037 (0.096)**	-0.087
Δfinancial holdings/total assets	2.043 (0.098)**	0.127	1.614 (0.073)**	0.115	1.884 (0.075)**	0.130	1.114 (0.085)**	0.055
share issue/total assets	0.486 (0.294)	0.005	0.341 (0.202)	0.005	0.251 (0.186)	0.003	0.185 (0.126)	0.001
Others								
Δlong-term debt/total assets	-0.931 (0.145)**	-0.081	-0.619 (0.132)**	-0.053	-0.743 (0.082)**	-0.062	-0.969 (0.178)**	-0.074
Δshort-term debt/total assets	-1.217 (0.121)**	-0.096	-1.017 (0.117)**	-0.079	-0.826 (0.103)**	-0.065	-0.837 (0.113)**	-0.082
yt-1 (dep. var. t-1)			3.512 (0.091)**	0.327				
OTHER CONTROLS								
growth negative					-0.359 (0.227)	-0.006	-0.274 (0.213)	-0.004
growth 5-10%					0.416 (0.264)	0.011	0.362 (0.221)	0.009
growth >10%					-0.124 (0.072)	-0.010	-0.075 (0.046)	-0.070
ln(employment)					-1.235 (0.271)**	-0.159	-1.139 (0.249)**	-0.151
ln(employment)^2					-0.779 (0.198)**	-0.072	-0.752 (0.181)**	-0.068
industry dummies					yes		yes	
year dummies	yes		yes		yes		yes	
log-likelihood	-55387.443		-52143.287		-62371.229		-60121.887	
ρ (Rho)	0.402 (0.00085)		0.355 (0.0012)		0.429 (0.00068)		0.421 (0.00076)	
pseudo R^2	0.12		0.18		0.21		0.20	
number of obseravations	401258		351544		374378		374378	
number of firms	90251		79145		82899		82899	

7-10: Dividends correspond 7-12 per cent return on the firm's net assets.
9-10: Dividends correspond 9-10 per cent return on the firm's net assets.
The marginal effects are calculated as $d[prob(y=1 | \mathbf{x})]/dx_i = \Phi(\mathbf{x_i}'\boldsymbol{\beta})\beta$, where $\Phi(\cdot)$ is a standard normal density function.
A robust estimator as per White is used to estimate standard errors.
** and * denote significance at 0.01 and 0.05 respectively.
The within-firm correlation ρ indicates the proportion of the total variance that is accounted for by the panel variance component.
Under a restriction $\rho=0$, the model collapses to the pooled cross-sectional probit model.

TABLE 5.2: *Coefficient estimates from random-effects probit model / Dividend-paying corporations*

	RE probit (9-10)	Marg. effect	RE probit (9-10)	Marg. effect	RE probit (9-10)	Marg. effect	RE probit (7-12)	Marg. effect
PROFIT								
profit/total assets	1.385 (0.086)**	0.182	1.302 (0.087)**	0.180	1.247 (0.077)**	0.171	1.918 (0.117)**	0.225
FINANCE								
Linked with theory								
real investments/total assets	-0.168 (0.090)	-0.009	-0.125 (0.085)	-0.009	-0.156 (0.087)	-0.007	-0.126 (0.088)	-0.006
Δfinancial holdings/total assets	0.788 (0.059)**	0.068	0.664 (0.058)**	0.061	0.784 (0.055)**	0.087	0.639 (0.048)**	0.075
share issue/total assets	0.883 (0.394)*	0.027	0.467 (0.258)	0.010	0.511 (0.226)*	0.023	0.471 (0.246)	0.014
Others								
Δlong-term debt/total assets	-0.197 (0.118)	-0.010	-0.188 (0.122)	-0.009	-0.183 (0.096)*	-0.019	-0.191 (0.112)	-0.010
Δshort-term debt/total assets	0.472 (0.218)*	0.015	0.264 (0.185)	0.007	0.326 (0.203)	-0.005	0.419 (0.213)	-0.005
yt-1 (dep. var. t-1)			2.877 (0.077)**	0.386				
OWNERSHIP								
dummy for foreigens	-0.837 (0.079)**	-0.131	-0.447 (0.055)**	-0.117	-0.816 (0.067)**	-0.128	-0.525 (0.064)**	-0.093
dummy for enterprises	-1.241 (0.147)**	-0.175	-1.115 (0.132)**	-0.169	-1.124 (0.173)**	-0.182	-1.011 (0.122)**	-0.138
OTHER CONTROLS								
growth negative					-0.135 (0.071)	-0.003	-0.127 (0.070)	-0.003
growth 5-10%					-0.279 (0.158)	-0.006	-0.254 (0.155)	-0.005
growth >10%					-0.381 (0.222)	-0.009	-0.331 (0.205)	-0.010
ln(employment)					-0.755 (0.171)**	-0.029	-0.759 (0.189)**	-0.025
ln(employment)^2					-0.348 (0.187)	-0.007	-0.327 (0.169)	-0.007
industry dummies					yes		yes	
year dummies	yes		yes		yes		yes	
log-likelihood	-32485.783		-30158.741		-36672.344		-33192.75	
ρ (Rho)	0.296 (0.0031)		0.508 (0.0058)		0.220 (0.0019)		0.288 (0.0028)	
pseudo R^2	0.09		0.11		0.15		0.13	
number of obseravations	81048		64755		76176		76176	
number of firms	22064		16123		20432		20432	

7-10: Dividends correspond 7-12 per cent return on the firm's net assets.
9-10: Dividends correspond 9-10 per cent return on the firm's net assets.
The marginal effects are calculated as $d[prob(y=1|\mathbf{x})]/dx_i = \Phi(\mathbf{x_i}'\boldsymbol{\beta})\beta$, where $\Phi(\cdot)$ is a standard normal density function.
A robust estimator as per White is used to estimate standard errors.
** and * denote significance at 0.01 and 0.05 respectively.

TABLE 5.3: *Coefficient estimates from random-effects and fixed-effects regression models of dividend distribution*

dependent variable: dividends/total assets

	all corporations		maximum dividend taxable as capital income (maximum normal dividend); 7-12		maximum dividend taxable as capital income (maximum normal dividend); 9-10		dividend taxable partly as earned income (excess dividend)	
	RE	FE	RE	FE	RE	FE	RE	FE
Linked with theory								
profit / total assets	1.175 (0.361)**	0.922 (0.275)**	0.955 (0.251)**	0.724 (0.155)**	0.713 (0.204)**	0.548 (0.106)**	0.519 (0.188)**	0.426 (0.166)**
real investments / total assets	-0.798 (0.226)**	-0.611 (0.223)**	-0.278 (0.071)**	-0.197 (0.078)**	-0.296 (0.083)**	-0.171 (0.074)**	-0.077 (0.040)*	-0.102 (0.052)*
Δfinancial holdings / total assets	0.551 (0.127)**	0.763 (0.171)**	0.337 (0.075)**	0.481 (0.114)**	0.317 (0.052)**	0.533 (0.151)**	0.292 (0.079)**	0.398 (0.091)**
share issue / total assets	0.066 (0.042)	0.067 (0.034)*	0.085 (0.062)	0.094 (0.057)	0.091 (0.051)	0.118 (0.070)	0.071 (0.043)	0.063 (0.041)
Others								
Δshort-term debt / total assets	0.162 (0.083)*	0.094 (0.047)*	0.137 (0.066)*	-0.051 (0.033)	-0.026 (0.012)*	-0.047 (0.023)*	-0.186 (0.049)**	-0.224 (0.081)**
Δlong-term debt / total assets	-0.087 (0.056)	-0.061 (0.045)	-0.034 (0.021)	-0.039 (0.023)	-0.057 (0.035)	-0.019 (0.012)	-0.187 (0.094)*	-0.126 (0.090)
growth negative	-0.259 (0.186)	-0.174 (0.091)	0.013 (0.010)	0.029 (0.020)	0.028 (0.016)	0.040 (0.027)	0.007 (0.004)	-0.087 (0.057)
growth 5-10%	0.084 (0.039)**	0.087 (0.037)**	0.035 (0.018)	0.022 (0.016)	0.032 (0.020)	0.025 (0.021)**	0.019 (0.013)	0.013 (0.009)
growth >10%	0.097 (0.042)**	0.116 (0.051)**	0.025 (0.019)	0.023 (0.018)	0.017 (0.010)	0.009 (0.005)	-0.097 (0.035)**	-0.124 (0.055)**
ln(employment)	0.249 (0.091)**	0.191 (0.042)**	-0.088 (0.035)**	-0.092 (0.030)**	-0.133 (0.062)**	-0.151 (0.062)**	-0.108 (0.031)**	-0.169 (0.042)**
ln(employment)^2	-0.171 (0.126)	-0.065 (0.039)	-0.089 (0.049)	-0.071 (0.041)	-0.122 (0.078)	-0.086 (0.051)	-0.064 (0.049)	-0.058 (0.031)
constant	-0.252 (0.189)	—	-0.184 (0.129)	—	-0.137 (0.093)	—	-0.121 (0.084)	—
industry dummies	yes	yes	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.194	0.392	0.197	0.348	0.211	0.419	0.174	0.316
Hausman (p-value)	51.25 (0.000)		42.89 (0.000)		36.22 (0.000)		27.09 (0.000)	
Wald (p-value)	11532.47 (0.000)	9913.12 (0.000)	8741.95 (0.000)	7619.13 (0.000)	8987.31 (0.000)	8214.43 (0.000)	10069.16 (0.000)	8673.68 (0.000)
number of obseravations	299495	299495	66234	66234	57006	57006	27993	27993
number of firms	59899	59899	22689	22689	17051	17051	9436	9436

7-10: Dividends correspond 7-12 per cent return on the firm's net assets.
9-10: Dividends correspond 9-10 per cent return on the firm's net assets.
Wald test of the joint significance of coefficient estimates is reported.
Robust standard errors are reported.
** and * denote significance at 0.01 and 0.05 respectively.

ESSAY 4

Anticipating Tax Changes: Evidence from the Finnish Corporate Income Tax Reform of 2005

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 utilized 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. In particular, the 2005 reform led to increased taxation of dividends received by individual investors from Finnish listed firms.[102] 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 remained tax-free.[103] The 2005 reform therefore increased

[102] The combined tax rate on distributed profit rose from 29 to 40.5 per cent.
[103] For more information on the exemption, see sec. 2.1.

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 their 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, using 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 minimize their tax burden over time. This behaviour is likely to be especially pronounced within corporate and capital income taxation, since the timing of 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.[104] 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 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.

[104] Problems of anticipated tax policies have been addressed among others by Auerbach (1989), who argues that these may be in the 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.

How should we expect dividend tax changes to affect a 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 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 regarding dividends and investments, and hence affects firms' behaviour also under the 'new view' model (Auerbach and Hasset 2007, Korinek and Stiglitz 2008). This case was discussed during the US 2003 tax reform debate,[105] 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 on 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.

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.[106] 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

[105] The US dividend tax cut was legislated to expire at the end of 2008.
[106] Examples of studies of the US 1986 tax reform include Ben-Horim et al. (1987), Bolster and Janjigian (1991) and Casey et al. (1999).

ownership by managers.[107] 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 by 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

A notable feature of 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.[108] Prior to the 2005 tax reform the tax rate on capital income and corporate profits was 29 per cent[109], while the top marginal tax rate (MTR) on earned income was around 55 per cent.

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

[108] 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.

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

As to the taxation of 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 (henceforth *normal dividend*) was calculated as a 9.585 per cent return on the firm's net assets. The residual part was taxed as earned income (henceforth *excess dividend*). 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 2004 and implemented as from 2005 closely followed the 2003 blueprint, especially in terms of dividend taxation.

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[110]	55	55	55
Method of dividend taxation - taxable share of dividends	full imputation ..	double taxation 100	partial relief 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 [111]	43.5	40.5
Non-listed firms			
Normal dividend			
≤ 90 t€	29	43.5	26
> 90 t€			40.5
Excess dividend (Top MTR)	55	55	55

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 are 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 normal dividends from non-listed corporations were made tax-exempt up to a fixed amount of 90,000 euros. Any amount beyond that was taxed

[110] Top MTR of 2004. Observe that neither the Arvela report nor the government proposal included cuts in the MTR on earned income. Some minor cuts were eventually implemented, however.

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

according to the main rule. The 70 per cent rule was also applied to excess dividends. (Table 2.1)

2.2. Theoretical predictions

Dividend tax and the timing of dividends

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

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

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, e.g. increases, the firm's value changes accordingly. This change still has 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 no longer 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. Auerbach and Hassett (2007) and Korinek and Stiglitz (2008) study this effect using inter-temporal models. They show that an anticipated tax hike increases distributions before the reform and may affect investments both before and after the reform.

Based on this short discussion it seems reasonable to expect that the Finnish 2005 tax reform caused anticipatory responses in 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 at 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 normal dividends. 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 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 normal dividends from non-listed corporations, which remained tax exempt up to 90,000 euros. One further aspect affecting our hypotheses is that the ceiling for normal dividends 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 five 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 at the margin as earned income (excess dividend)[112]
4. Non-listed corporations with dividends taxed at the margin as capital income (normal dividend), maximum dividend payment below 90,000 euros before 2003
5. Non-listed corporations with dividends taxed at the margin as capital income (normal dividend), maximum dividend payment above 90,000 euros before 2003

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.[113] The Appendix 1 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 2002 profits; the other relates to the response to the 2003 Government proposal and should be seen in dividend payments from 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 (excess dividend) 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 first treatment groups, measured by our Treatment03 variable.

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[112] Put differently, the ceiling for dividends taxable as capital income is binding.

[113] 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.

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 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 (excess dividend). Hence we hypothesize that the 2003 Government proposal induced an increase in dividends in firms in groups 2 and 5. These are our second treatment groups, measured by our Treatment04 variable.

The classification of firms into groups 4 and 5 was made on the basis of the dividend level before the announcement of either reform. For the Arvela proposal, this definition is not important, since all dividends taxed as capital income would have become double-taxed. However, using the pre-reform period dividend level is very important when we examine the responses to the government tax bill in 2004. If the group assignment were made on the basis of the dividend level in that year, this explanatory variable would be partially the same as one of the dependent variables (dividends/assets), which would not make sense at all.

3. Data and the empirical approach

The panel data employed contains information on the industrial sector, size, financial statement accounts and taxation of Finnish corporations in the period 1999–2004. This data was taken from the registers compiled by the Finnish Tax Authority. These registers cover the whole population of firms that pay taxes in Finland. Identification, income and tax return information on the principal shareholders of all dividend-distributing corporations is also available and it is possible to link the corporation and its principal shareholder.

In comparison to similar studies using 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 used in our estimations. We classified firms into listed and non-listed firms. We 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 were 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	<0.001	0.38
Profit/assets	283	0.06	0.30	-0.55	0.65
Investment/assets	272	0.05	0.11	<0.001	1.32
Equity/debt	271	2.08	7.80	0.01	23.62
Growth rate	201	0.08	1.16	-0.31	0.97
ln(employment)	292	5.61	4.24	3.00	8.88
Debt/assets	236	0.20	0.16	<0.001	0.98
Control group					
Dividend/assets	314	0.08	0.14	<0.001	0.57
Profit/assets	327	0.09	0.33	-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	0.59	-0.76	0.81
ln(employment)	345	6.03	4.59	3.22	10.28
Debt/assets	392	0.27	0.21	<0.001	0.98
Non-listed corporations	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Treatment group (2004)					
Dividend/assets	7360	0.06	0.20	<0.001	0.99
Profit/assets	7259	0.06	0.32	-0.49	0.67
Investment/assets	6647	0.07	0.21	<0.001	1.45
Equity/debt	7172	1.91	9.07	<0.001	46.78
Growth rate	7176	-0.004	0.10	-1.95	1.30
ln(employment)	7206	2.75	1.85	0	6.96
Debt/assets	7174	0.22	0.14	<0.001	1.00
Control group					
Dividend/assets	203621	0.04	0.20	<0.001	1.00
Profit/assets	453609	0.07	0.34	-0.70	0.86
Investment/assets	236324	0.09	0.24	<0.001	1.50
Equity/debt	396218	2.13	10.72	<0.001	89.91
Growth rate	317606	-0.003	0.59	-4.65	4.98
ln(employment)	316043	1.57	1.65	0	7.77
Debt/assets	396218	0.30	0.26	<0.001	1.00

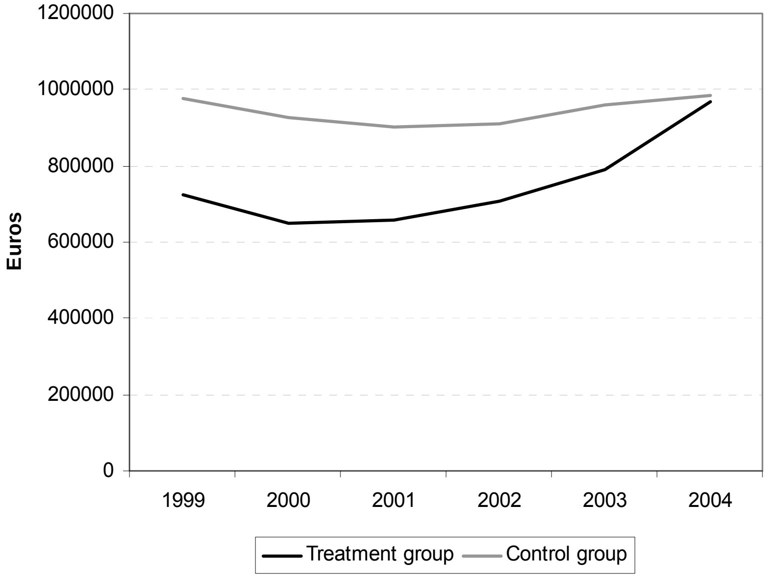

FIGURE 3.1: *Median dividend in listed corporations*

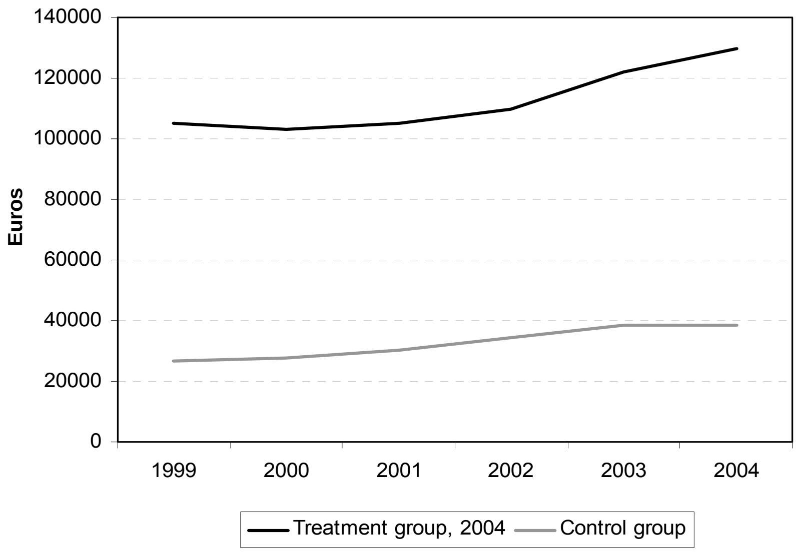

FIGURE 3.2: *Median dividend in non-listed corporations*

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)

$$d_{i,t} = \alpha_i + \beta_1 treatment\ 03_i + \beta_2 treatment\ 04_i + \gamma year_t + \delta X_{i,t} + \eta_1 treatment\ 03 * year\ 03_{i,t} + \eta_2 treatment\ 04 * year\ 04_{i,t} + \varepsilon_{i,t}$$

In Eq. (1), $d_{i,t}$ refers to the dependent variable of firm *i* at time *t*, which is either the dividends/asset or investment/asset ratio. As explained in Section 2, the variable *treatment03* is an indicator variable which takes the value of 1 if the firm is one whose dividend taxation would have increased under the Arvela proposal. *Treatment04* is an indicator of whether the firm is one whose dividend taxation would have increased under the final government tax bill.[114] The year dummies are denoted by the variable *year*, and *X* refers to some additional control variables, discussed below. In some specifications, we also let the constant vary by firm and that is why it also has the subscript *i*. Our main interest is in the interaction variables *treatment03*year03* and *treatment04*year04* that measure the impact of the anticipated tax increase in 2003 (the Arvela proposal) and 2004 (the Government proposal).[115]

The identifying assumption is that other potential unobservable factors explaining 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 could have had 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. The idea is that the future tax increase variables should not affect business profits; if they did, there could an unobserved variable that would coincide with the tax increase status and that could be the real reason (instead of the tax

[114] We also estimated models using only one treatment variable, which was a combination of the Treatment03 and Treatment04 variables. The interaction of this variable with the years 2003 and 2004 was significant in all model specifications. Given this, the Arvela and government effects can be estimated together or separately. These results are available from the authors upon request.

[115] In other words, *treatment03*year03* takes the value of 1 for firms in groups 2, 4 and 5 in 2003 and 0 for all other years and all other firms. The *treatment04*year04* variable takes the value of 1 for firms in groups 2 and 5 in 2004 and 0 for all other years and all other firms.

change) for possible impacts on dividends and investment. Business profit regressions did not produce significant coefficients for our treatment variables, which increases the confidence in interpreting the potential effects of tax changes on dividend and investment as causal impacts.[116]

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 dividend distributions by firms that had not paid dividends earlier or to a discrete change in the dividend policy of non-listed firms that had earlier paid dividends below the maximum amount of normal dividends. 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 ceiling of normal dividends. 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.[117] 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 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 that the increase in the share of firms that

[116] Again, these results are available from the authors upon request.

[117] Almost all listed firms have always distributed some dividends and therefore measuring new dividend distributions is of little importance.

began to distribute dividends is roughly equal to the maximum amount that could be distributed tax free (illustrated by the vertical line).

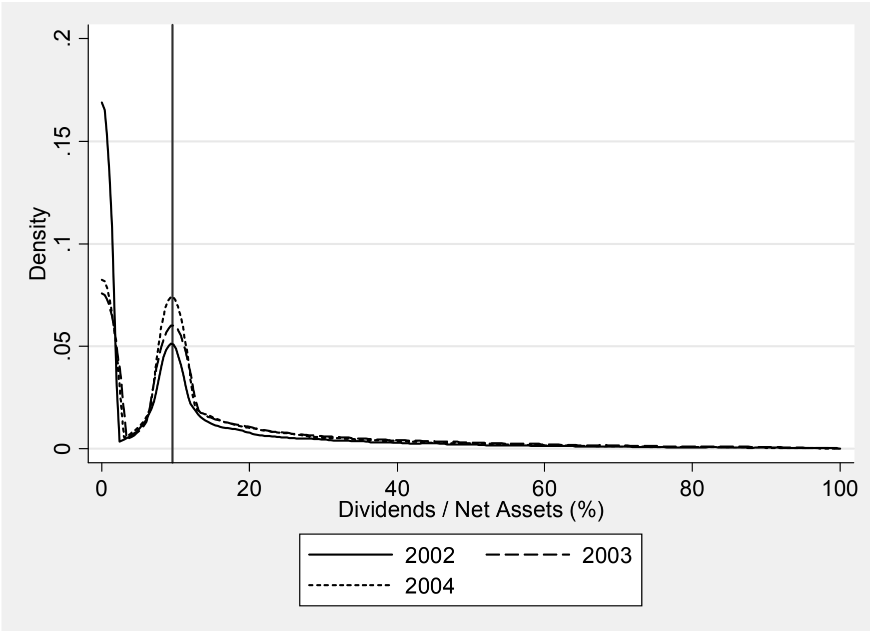

FIGURE 4.1: *Distribution of dividends in non-listed corporations*

Next, we examine the initiation of dividend distributions by estimating a logit model, where the dependent variable takes the value of 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. The group dummies are the two dummies, *treatment03* and *treatment04,* which capture the impact of belonging to the treatment group. 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) equity/debt ratio; d) location dummies (dividing the country into 10 administrative regions) and e) the logarithm of the number of employees. In every specification we have reported coefficients of the estimated models and marginal effects

(∂y/∂x), which show directly the impact of belonging to the group facing tax increases in 2003 and 2004 on the probability of dividend initiation.

TABLE 4.1: *Initiation of dividend distributions in non-listed corporations*

	(1)		(2)		(3)		(4)		(5)	
	Initiation	∂y/∂x	Initiation	∂y/∂x	Initiation	∂y/∂x	Initiation	∂y/∂x	Initiation	∂y/∂x
Treat03*year03	0.045	0.007	0.070	0.070	0.665	0.069	0.677	0.070	0.673	0.07
	(1.80)	(1.82)	(21.49)**	(21.49)**	(23.31)**	(29.06)**	(23.71)**	(29.71)**	(23.55)**	(29.47)**
Treat04*year04	0.512	0.069	0.149	0.149	0.583	0.061	0.568	0.059	0.592	0.061
	(7.18)**	(8.57)**	(24.64)**	(24.64)**	(7.27)**	(9.10)**	(7.08)**	(8.81)**	(7.39)**	(9.28)**
Profit/assets					7.798		7.836		7.808	
					(138.61)**		(138.65)**		(138.23)**	
Equity/debt					0.075		0.074		0.074	
					(84.41)**		(84.16)**		(83.06)**	
ln(employment)									-0.038	
									(8.43)**	
DUMMIES										
Group	yes				yes		yes		yes	
Firm			yes							
Year	yes		yes		yes		yes		yes	
Industry					yes		yes		yes	
Location							yes		yes	
Constant	-1.259		-0.056	-3.497	-3.740	-3.701				
	(15.60)**		(6.89)**	(36.85)**	(39.13)**	(38.67)**				
Obs	289713		289713		288689		288689		288689	
Pseudo R^2	0.02		0.10		0.19		0.19		0.19	

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. The magnitudes of the impacts of the actual plan and the Arvela plan are roughly similar; both increase the probability that a firm distributes dividends by 6–7 per cent depending on specification.[118] These results represent responses of a moderate size to the tax proposals. The coefficients of the profit/asset and the equity/debt ratios are positive as expected; more profitable and less indebted firms find it easier to pay out dividends. The negative sign of the employment variable is perhaps more surprising. The signs of the profit/asset and the equity/debt ratios are similar in other dividend regressions below, whereas the sign of the employment variable is reversed in Table 4.2, suggesting that the relation between dividend policies and employment is not straightforward.

[118] We interpret the marginal effects mainly based on 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.

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 discussed above, the old system seems to have created incentives for non-listed companies to distribute as dividends the maximum amount of normal dividends. Kari and Karikallio (2007) present evidence that a significant proportion of dividend-distributing non-listed corporations closely followed this rule in their payout 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 ceiling of normal dividends and 0 otherwise. We use the same set of regressors and controls as in our earlier analyses (Table 4.2).

We find that much of the response in tax planning appeared in 2004; it was 60 per cent more probable that a firm would exploit the maximum amount of tax-free normal dividends if it foresaw an increase in dividend taxation after the reform. The first-round impacts in 2003 were much milder. The impact of the future tax increase on tax planning in 2004 is surprisingly large, although it does depend on conditioning the response on the control variables used.

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.

TABLE 4.2: *Tax planning in non-listed corporations*

	(1)		(2)		(3)		(4)		(5)	
	Initiation	∂y/∂x	Initiation	∂y/∂x	Initiation	∂y/∂x	Initiation	∂y/∂x	Initiation	∂y/∂x
Treat03*year03	2.469	0.105	0.107	0.107	2.692	0.056	2.689	0.056	2.673	0.055
	(41.00)**	(18.63)**	(66.58)**	(66.58)**	(40.35)**	(16.09)**	(40.31)**	(16.06)**	(40.08)**	(16.03)**
Treat04*year04	0.235	0.003	0.392	0.392	5.759	0.624	5.751	0.621	5.768	0.625
	(1.52)	(1.37)	(22.63)**	(22.63)**	(25.53)**	(12.04)**	(25.50)**	(11.94)**	(25.53)**	(12.04)**
Profit/assets				9.884		9.891		syys.94		
				(104.76)**		(104.60)**		(104.39)**		
Equity/debt				0.013		0.013	0.013			
				(11.00)**		(10.94)**		(11.19)**		
In(employment)		0.086								
				(7.03)**						
DUMMIES										
Group	yes				yes		yes		yes	
Firm			yes							
Year	yes		yes		yes		yes		yes	
Industry					yes		yes		yes	
Location							yes		yes	
Constant	-4.491		-0.002		-6.513		-6.603		-6.718	
	(65.17)**		(1.98)*		(56.04)**		(55.27)**		(55.68)**	
Obs	289713		289713		289693		289693		289693	
Pseudo R^2	0.15		0.06		0.38		0.39		0.39	

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

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 in 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. The 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					
Treat03*year03	0.004	0.009	0.007	0.007	0.006
	(2.04)*	(4.31)**	(3.23)**	(3.25)**	(3.00)**
Treat04*year04	0.012	0.037	0.040	0.040	0.033
	(7.29)**	(27.09)**	(8.44)**	(8.51)**	(7.26)**
Profit/assets			0.319	0.318	0.316
			(60.69)**	(60.66)**	(60.24)**
Equity/debt			0.001	0.001	0.001
			(20.12)**	(20.07)**	(16.01)**
ln(employment)					-0.006
					(33.17)**
DUMMIES					
Group	yes		yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.058	0.004	0.028	0.028	0.039
	(32.77)**	(1.66)	(24.79)**	(25.79)**	(28.83)**
Obs.	129437	129437	129437	129437	129437
R-squared	0.09	0.05	0.22	0.22	0.22

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

From our data, the level of the dividend/asset variable before 2003 was 0.052. The mean treatment parameter was 0.007 in 2003 and 0.032 in 2004. Therefore, the mean increase in dividends consequent to the anticipated tax increase was 13 per cent in 2003 and 62 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 in 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. Another potential worry is that the results could be sensitive to the presence of outliers. We checked that the qualitative results stay the same when one utilizes the method of robust regression (see e.g. Rousseeuw and Leroy 1987), which gives lesser weight to observations with a large residual.

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 listed firms. 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					
Treat03*year03	0.024	0.025	0.017	0.018	0.019
	(3.73)**	(2.35)*	(2.56)**	(2.63)**	(2.66)**
Treat04*year04	0.005	0.044	0.010	0.010	0.005
	(0.89)	(4.15)**	(1.58)	(1.43)	(0.73)
Profit/assets			0.374	0.366	0.373
			(3.08)**	(2.99)**	(3.04)**
Equity/debt			0.004	0.005	0.003
			(2.11)*	(2.17)*	(1.49)
ln(employment)					-0.010
					(4.68)**
DUMMIES					
Group	yes		yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.056	0.063	0.048	0.047	0.188
	(5.74)**	(9.75)**	(1.16)	(1.10)	(3.63)**
Obs	529	529	529	529	529
R-squared	0.17	0.30	0.34	0.36	0.40

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 before 2003 was 0.037, the mean marginal impact of the Arvela report on the amount of dividends distributed was 56 per cent. As in the case of non-listed companies, this is again a large response.

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 to what extent 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 1.1 billion euros, and the overall value of additional dividends was 240 million euros (See Table 4.5 below).

After the tax reform, 70% of this amount would have been taxed at the flat capital income tax rate of 28%. This means that the overall tax revenue loss would have amounted to 47 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 31 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	56	not signif.	182,949	NA
Non-listed	120,895	109,656	13	62	13,908	41,967

5. Financing the additional dividends

Since dividends increased, the question arises of how this is reflected in the firms' other decisions. One possibility is that investments could have decreased. This could 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 incentives for investment even before the reform. This could happen if an investor foresees that an investment will provide a return after a few years, but the net-of-tax return on 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 by 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 mixed and depends very much on the circumstances of the owner and the firm. However, the reform also includes elements, especially the corporate tax cut, which may have induced firms to shift investments to the transitory period. By advancing investments the firms could have aimed to increase depreciation deductions and hence postpone reporting of profits to the time after the tax cut. In sum, the reform could have affected investments through several channels. For the above reasons and the larger size of the dividend tax changes compared to the corporate tax cut, we expect that the main effect on investments probably operated through the cash flow channel. Even if investments did not react, the balance sheet position of firms could change as a result of increased dividends, increasing indebtedness, for example. 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 one additional control variable: 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					
Treat03*year03	-0.014	-0.021	-0.003	-0.005	-0.004
	(1.18)	(1.43)	(0.22)	(0.35)	(0.29)
Treat04*year04	0.003	0.026	0.013	0.015	0.012
	(0.57)	(1.97)	(1.42)	(1.37)	(1.15)
Profit/assets			-0.005	-0.030	-0.015
			(0.08)	(0.50)	(0.25)
Growth rate			0.028	0.027	0.033
			(1.58)	(1.54)	(1.78)
Equity/debt			0.119	0.094	0.099
			(2.25)*	(1.98)	(2.02)*
ln(employment)					-0.008
					(2.19)*
DUMMIES					
Group	yes		yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.061	0.059	0.065	0.92	0.210
	(5.57)**	(7.92)**	(2.79)**	(3.56)**	(3.77)**
Obs.	608	608	608	608	608
R-squared	0.16	0.24	0.31	0.32	0.32

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					
Treat03*year03	-0.007	-0.032	-0.023	-0.023	-0.022
	(0.45)	(2.18)*	(1.49)	(1.51)	(1.48)
Treat04*year04	-0.025	-0.021	-0.027	-0.025	-0.008
	(1.73)	(1.62)	(1.54)	(1.44)	(0.46)
Profit/assets			0.070	0.071	0.066
			(27.03)**	(27.33)**	(25.84)**
Equity/debt			-0.001	-0.001	-0.001
			(14.06)**	(13.90)**	(17.89)**
Growth rate			-0.001	-0.001	0.003
			(1.06)	(0.88)	(3.19)**
ln(employment)					-0.012
					(46.38)**
DUMMIES					
Group	yes		yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.088	0.099	0.081	0.092	0.109
	(75.94)**	(99.94)**	(50.72)**	(59.01)**	(63.84)**
Obs.	156116	156116	156116	156116	156116
R-squared	0.04	0.46	0.27	0.27	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 non-listed firms in general, there appears to be no link between the anticipated tax change and investment prior to the reform. For 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 the 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 on investments from the tax change (see Appendix 3).[119] 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, which are relatively large.

The results for the control variables indicate that firms that are more profitable also invest more, whereas in the case of non-listed companies, firms with a high equity/debt ratio invest less. The latter finding may be due to the fact that many of the non-listed companies use loans to a significant degree for financing investment.

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.

[119] 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					
Treat03*year03	-0.024	-0.015	-0.023	-0.024	-0.024
	(1.14)	(0.81)	(1.21)	(1.21)	(1.26)
Treat04*year04	-0.024	-0.034	-0.015	-0.014	0.011
	(1.50)	(2.57)*	(0.95)	(0.87)	(0.73)
Profit/assets			-0.152	-0.128	-0.145
			(2.27)*	(1.90)	(2.15)*
ln(employment)					0.007
					(2.56)**
DUMMIES					
Group	yes		yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.219	0.211	0.227	0.164	0.074
	(21.64)	(31.33)**	(7.35)**	(4.65)**	(1.46)
Obs.	623	623	623	623	623
R-squared	0.03	0.03	0.16	0.2	0.22

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					
Treat03*year03	0.096	0.081	0.092	0.092	0.092
	(43.81)**	(36.88)**	(42.00)**	(41.93)**	(41.44)**
Treat04*year04	0.001	0.014	0.002	0.002	0.004
	(0.05)	(3.76)**	(0.51)	(0.50)	(1.31)
Profit/assets			-0.366	-0.366	-0.365
			(80.26)**	(80.23)**	(80.13)**
ln(employment)					0.011
					(43.26)**
DUMMIES					
Group	yes		yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.18	0.225	0.213	0.213	0.202
	(39.20)**	(94.61)**	(43.81)**	(43.60)**	(41.16)**
Obs.	283885	283885	283885	283885	283885
R-squared	0.09	0.05	0.16	0.18	0.17

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 only measured reactions in the 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 tentatively, seen as consistent with the 'new view' of dividend taxation, according to which the timing of dividends is adjusted, whereas investment behaviour remains unaffected.

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 induced 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 of normal dividends 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 that these incentives, as well as incentives on capital accumulation and financial structure, need to be designed in a more rigorous manner.

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Appendix 1: Sensitivity analysis of estimation models in different definitions of corporate group number 5

Maximum dividend payment above		Intiation of Dividend Distribution coeff.	Robust z	∂y/∂x	Robust z	Tax Planning coeff.	Robust z	∂y/∂x	Robust z
70 000 €	Treatment03	0.651	(20.19)**	0.064	(17.12)**	1.701	(38.42)**	0.045	(16.26)**
	Treatment04	0.276	(3.48)**	0.030	(3.86)**	4.277	(11.76)**	0.502	(11.54)**
85000€*	Treatment03	0.673	(23.55)**	0.070	(29.47)**	2.673	(40.08)**	0.055	(16.03)**
	Treatment04	0.592	(7.39)**	0.061	(9.28)**	5.768	(25.53)**	0.625	(12.04)*
100 000 €	Treatment03	0.730	(29.13)**	0.094	(31.69)**	2.442	(32.46)**	0.056	(15.79)**
	Treatment04	0.643	(7.75)**	0.062	(8.15)**	6.029	(30.17)**	0.701	(14.15)**

Maximum dividend payment above		Dividend Responses coeff.	Robust z	Investment Responses coeff.	Robust z	Debt Responses coeff.	Robust z
70 000 €	Treatment03	0.006	(2.71)**	-0.016	(2.00)*	0.087	(38.13)**
	Treatment04	0.029	(5.82)**	-0.008	(2.39)*	0.008	(2.62)**
85000€*	Treatment03	0.006	(3.00)**	-0.022	(1.48)	0.092	(41.44)**
	Treatment04	0.033	(7.26)**	-0.008	(0.46)	0.004	(1.31)
100 000 €	Treatment03	0.006	(2.89)**	-0.006	(1.89)	0.087	(38.50)**
	Treatment04	0.034	(3.37)**	-0.011	(1.91)	0.003	(1.04)

* Used in the estimation results in the text

Note: Estimated models include the total control set

Appendix 2: Modelling the entire distribution by Tobit

Dividend responses in non-listed corporations (TOBIT)

	(1)	(2)	(3)	(4)
Dependent variable: Dividend/assets				
Treatment03*year03	0.026	0.028	0.028	0.028
	(42.68)**	(48.26)**	(47.55)**	(47.64)**
Treatment04*year04	0.026	0.018	0.017	0.019
	(11.81)**	(8.55)**	(8.20)**	(9.11)**
Profit/assets		0.327	0.326	0.325
		(138.28)**	(138.18)**	(137.89)**
Equity/debt		0.0007	0.0007	0.0007
		(24.72)**	(24.04)**	(22.77)**
ln(employment)				-0.003
				(22.77)**
DUMMIES				
Group	yes	yes	yes	yes
Firm				
Year	yes	yes	yes	yes
Industry		yes	yes	yes
Location			yes	yes
Constant	0.021	-0.010	0.011	0.008
	(8.80)**	(3.68)**	(4.11)**	(3.16)**
Obs.	177631	177631	177631	177631
R-squared	0.33	0.49	0.49	0.49

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*year03	-0.021	-0.007	-0.003	-0.003	-0.004
	(34.05)**	(5.06)**	(1.98)*	(1.99)*	(2.57)**
Treatment04*year04	-0.003	-0.005	-0.008	-0.008	-0.001
	(1.44)**	(2.27)*	(3.20)**	(3.25)**	(0.56)
Profit/assets			0.040	0.041	0.037
			(8.89)**	(9.05)**	(8.23)**
Equity/debt			-0.001	-0.001	-0.001
			(18.33)**	(18.06)**	(21.22)**
Growth rate			0.008	0.008	0.01
			(8.75)**	(8.77)**	(11.16)**
ln(employment)					-0.01
					(41.56)**
DUMMIES					
Group	yes		yes	yes	yes
Firm		yes			
Year	yes	yes	yes	yes	yes
Industry			yes	yes	yes
Location				yes	yes
Constant	0.103	0.096	0.095	0.100	0.110
	(40.55)**	(37.79)**	(34.45)**	(35.50)**	(38.91)**
Obs.	160805	160805	160805	160805	160805
R-squared	0.01	0.06	0.06	0.06	0.07

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

ESSAY 5

The Impact of Dividend Taxation on Dividends and Investment: New Evidence Based on a Natural Experiment

1. Introduction

The best-known theories of how dividend taxation affects dividend distributions and investment behaviour are the so-called 'old view' – see for instance Harberger (1966), Feldstein (1970) and Poterba and Summers (1985) – and the 'new view' – see for instance King (1974), Auerbach (1979) and Bradford (1981). According to the old view, the marginal source of funds is new equity, and dividend taxation distorts both dividend and investment decisions. The new view, on the other hand, assumes that, at the margin, investment is financed by cutting (or postponing) dividend distributions. In this setting, a constant dividend tax reduces both the cost of the investment and the future return in the same proportion and hence has no effect on the firm's cost of capital or dividend distributions.[120] And, of course, a large number of alternative and complementary theories exist; these include the signalling theory – see for instance Bernheim (1991) – and the agency theory of Chetty and Saez (2007).

These theories mainly deal with the long-run impacts of dividend taxation. In recent years, an interesting new literature has emerged, in particular the papers by Auerbach and Hassett (2007) and Korinek and

[120] The 'Nucleus' theory by Sinn (1991) combines the views.

Stiglitz (2009), which also encompasses the short-run effects of dividend tax changes.[121] These impacts can arise if dividend tax changes are anticipated and the firm's owners can therefore seek to minimise the tax burden over time, paying out extra dividends when the tax rate is low. Korinek and Stiglitz (2009) demonstrate that if firms face liquidity constraints, then an anticipated dividend tax increase, accompanied with above-average dividend distributions, can also reduce investments even if the long-run cost of capital does not change.

While the theories are well developed, there is still considerable uncertainty about the empirical magnitudes of these effects. Nonetheless, recent studies have successfully utilised policy reforms to isolate the causal impacts of tax changes. Such evidence is available for the Anglo-Saxon countries in particular (see e.g. Bond, Devereux and Klemm (2007) for UK evidence and Chetty and Saez (2005) and Auerbach and Hassett (2007) for the US). The findings in Auerbach and Hassett and Bond et al. appear to be more in line with the new rather than the old view, whereas Chetty and Saez (2007) argue that the evidence regarding the US tax reform of 2003 is not readily compatible with either of the views. This finding is the basis for their analysis of dividend taxation from an agency point of view, where the asymmetry of information between the owners and managers of the company plays a key role. The existing evidence, in particular in studies aiming to find a causal impact of tax policy by studying tax reforms, is mainly based on the behaviour of large listed companies, where signalling and agency behaviour may indeed be very relevant. This also means that it may not be possible to arrive at a 'pure' separation of the old vs. the new view using data from listed companies.

The present paper presents new evidence on the impacts of dividend tax changes on firm behaviour based on a corporate income tax reform that took place in Finland in 2005. This reform led, in particular, to increased taxation of dividends received by individual investors from domestic firms listed on the stock exchange.[122] The taxation of dividends paid to institutional investors or foreign owners did not change. In closely held corporations, dividends up to a certain threshold level were kept tax-free. The 2005 reform therefore increased the dividend taxation of some,

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[121] For an early analysis of anticipation effects with policy uncertainty, see Alvarez, Kanniainen and Södersten (1998), who also examine the impacts of a rate-cut-cum-base-broadening tax change on investment behaviour.

[122] The combined tax rate on distributed profit rose from 29 to 40.5 per cent.

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. This suggests that the reform involved sufficient exogenous variation in tax treatment, and it therefore opens up a promising avenue for empirical work.

Our analysis is based on a large register-based data set covering all Finnish corporations. Thus the vast majority of our data is from small and medium-sized enterprises, where the main owner and the manager are often the same person. Therefore concerns about the role of asymmetric information between owners and managers or between firm representatives and investors are likely to be of less significance.

An additional motivation for our analysis stems from the need to design the Nordic dual income tax in a successful way. While all dual income tax systems of this type share the same key features (progressive tax on labour income, flat tax on capital income), there are significant differences in the institutional details of the systems. In particular, the earlier Finnish tax system was seen to offer generous opportunities for shifting labour income into more leniently taxed capital income (Lindhe, Södersten and Öberg 2004), while the new Norwegian tax design is probably well sheltered against this behaviour (Sørensen 2005). An increase in the dividend tax can basically reduce the scope for income-shifting, but on the other hand it can have undesirable consequences on investments. Analysing the linkages between dividend taxation and investment is therefore also of key importance for the proper design of dual income tax, which is of interest per se because of the increased attention being paid to dual income tax systems worldwide.

The analysis in this paper deals with differences in dividend payout and investment behaviour in the years following the 2005 reform compared to the years when the blueprint of the reform was not yet known (2000–2002).[123] The reason for this choice is that we want to have a base year for our analysis that purely reflects the earlier tax system. In our companion paper (Kari et al. 2008), we concentrated on the changes of the anticipated tax increase in the years immediately before the tax reform. There we documented a large increase in dividend payments by firms that were likely to face a dividend tax increase in the future. A similar pattern

[123] Plans for the tax reform were unveiled in 2002 and 2003. Therefore dividend and investment behaviour were already affected by the anticipated reform as from 2003.

was found by Alstadsaeter and Fjaerli (2009) for the years preceding the new Norwegian tax system of 2006.

The results in this paper, based both on regression-based difference-in-differences analysis and propensity score matching, provide quite clear evidence that dividends declined in firms that faced an increase in dividend taxation.[124] Since there was a large and anticipated increase in dividend payments in the years before the reform when the coming reform was common knowledge (Kari et al. 2008), much of the response in dividends after the reform is likely to be due to intertemporal tax planning or, in other words, timing effects. There are few robust signs, however, that investments declined. All this is probably more compatible with the new rather than the old view of dividend taxation, and it also appears that, at the aggregate level, firms that faced a tax increase were not cash-constrained in the years following their extra dividend payments.[125]

The paper proceeds as follows. Section 2 presents the institutional details and the contents of the Finnish tax reform. Section 3 discusses the theoretical predictions regarding the short-run and long-run responses in firm behaviour. Section 4 describes the data and our empirical strategy. The results are presented in Section 5. Section 6 concludes.

2. The Finnish corporate income tax reform of 2005

Dividend taxation before the 2005 reform

Finland has applied a Nordic-type dual income tax since 1993, under which personal capital income is taxed at a flat tax rate and all other income (earned income) according to a progressive tax rate schedule.

[124] While matching combined with difference-in-differences is often seen as a very promising estimator in labour economics applications (see e.g. Smith and Todd 2005), it has not been used to such a large extent in public economics. In that respect, one of the contributions of this paper is to narrow the gap in methods between these two areas of economics.

[125] Our results, therefore, confirm the ideas in Korinek and Stiglitz (2009) in respect of dividend payments, but not investment. However, the tax increase only hit relatively large, mature firms, where liquidity constraints are likely to be less severe. We would not want therefore to interpret these findings as a robust test of the implications of the Korinek and Stiglitz paper.

Prior to the 2005 tax reform the tax rate on capital income and corporate profits was 29 per cent[126], while the top marginal tax rate (MTR) on earned income was around 55 per cent.

A full imputation system was applied to prevent the double taxation of distributed profits. This system led to a zero effective tax rate on dividends at the shareholder level, because the tax rates on corporate profits and personal capital income were the same. Dividends from non-listed corporations, however, were treated differently. To avoid tax planning, induced by the wide tax rate gap between capital income and earned income, dividends from non-listed corporations were split into capital and earned income by categorizing capital income as an imputed return on the firm's net assets and interpreting the residual of income as earned income. The proportion of dividends taxable as capital income was calculated as a 9.585 per cent return on the firm's net assets.

One notable element of the pre-reform system was the taxation of net wealth. Personal net wealth above a threshold of 185,000 euros was subject to taxation at a rate of 0.9 per cent. The tax base was fairly narrow, however. Most types of interest-bearing assets were exempt and only 70 per cent of the current value of shares in listed firms was reckoned as taxable gross wealth. This share was only 30 per cent for closely held companies.

The 2005 reform

The 2005 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 tax reform lowered the tax rate on corporate profits from 29 to 26 per cent and the personal capital income tax rate from 29 to 28 per cent. The most important change from the point of view of this study was the replacement of the full imputation system by a partial double taxation of distributed profits under which 70 per cent of dividends are included in the recipient's taxable capital income. Another important element was the repeal of

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

taxation of individual net wealth. This change was phased in as from 2006, one year after the other major changes.[127]

The splitting of dividends into capital and earned income was maintained in the 2005 tax reform with some fine tuning, however. The rate of the imputed return was lowered to 9 per cent. One major exception from the overall approach of the new dividend tax system was that the capital income part of dividends from non-listed corporations was made tax-exempt up to 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.

The 2005 reform led to increased taxation of dividends received by individual investors from Finnish listed firms (Table 2.1). The taxation of dividends paid to institutional investors or foreign owners was not changed. In closely held corporations, dividends up to the threshold level of 90,000 euros remained tax-free. For those receiving dividends in excess of that amount, the reform led to increased taxation. 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.

[127] The 2005 rules for net wealth tax included some complex mitigations.

TABLE 2.1: Dividend taxation before and after the 2005 reform

	Previous tax system	2005 reform
Tax rate on corporate profits	29	26
Tax rate on capital income	29	28
Top MTR on earned income	55	55
Splitting parameter (effective)	9.585	9
ETR* on capital gains	12	14
Method of dividend taxation	full imputation	partial relief
Combined tax rate on distributed profits:		
Listed firms	29	40.5
Non-listed firms		
Capital income, ≤ 90 t€	} 29	26
> 90 t€		40.5
Tax rate on net wealth	0.9	0 (2006)

* Accrual effective tax rate.

3. Theoretical background

This section discusses the changes in incentives to invest and distribute dividends caused by the 2005 tax reform. We first introduce three theories of the effects of dividend taxation: the old view, the new view and the irrelevance view, and discuss how these predict short-run and long-run behavioural changes. After that, we provide a more detailed analysis of the reform by studying the changes in firms' cost of capital, first for closely held corporations (all corporations not listed on the stock exchange) and then for listed companies. Finally, we discuss to what extent our data and the 2005 reform can be used to assess the theories presented in this section.

3.1. Alternative views of dividend taxation

The old view of dividend taxation (Harberger 1966, Poterba & Summers 1985), assumes that the marginal source of funds to finance new investments is new equity issued in external capital markets. It predicts that dividend taxation raises the cost of capital and thus has a negative impact on investments, dividends and overall economic efficiency in the economy.

The new view (King 1974, Auerbach 1979, Bradford 1981), on the other hand, assumes that, at the margin, investment is financed by cutting dividend distributions. Hence the firm's marginal source of funds is retained earnings. In this setting, dividend taxes reduce both the cost of the investment and its future return. If the tax rate on dividends stays constant over time, it reduces both the costs and revenues in the same proportion, and hence has no effect on the firm's cost of capital or dividend distributions. So, while the old view has it that the burden of dividend tax falls entirely on marginal investment projects and thus raises the cost of capital, the new view predicts that dividend taxes capitalize into share values and leave the cost of capital intact. Observe, however, the assumption of a constant dividend tax rate (new view).

The third key theory of the effects of dividend taxation, the irrelevance view (Stiglitz 1973), claims that, at the margin, firms finance their real investments with debt or by cutting their stock of financial capital. Due to the deductibility of interest costs in corporate taxation, the firm's cost of capital corresponds to the interest rate.[128] Corporate and personal taxes only fall on intra-marginal profits and leave the cost of capital unaffected.

While the new and old views analyse firm behaviour in the steady state (mature firm), the so-called nucleus theory, elaborated in Sinn (1991), expands the scope of the dividend tax theories to the birth and growth phases of a firm. It claims that the neutrality of the new view breaks down in the case of a growing firm, even if the marginal source of financing is retained earnings. It also claims that the cost of capital for the initial investment (the firm's birth stage), financed with outside equity, is

[128] This assumes that the corporate tax base before interest deduction equals the economic profit.

much higher than the cost of capital of mature firms, as suggested by the old view.

Recent research has discussed the implications of dividend tax theories in the case of an anticipated dividend tax change (Korinek and Stiglitz 2009, Auerbach and Hassett 2007 and Kari et al. 2008). Such tax changes induce firms to engage in inter-temporal tax arbitrage by shifting dividend payments from high-tax periods to low-tax periods. The goal is to reduce the present value of the owners' taxes. In the case of a future dividend tax hike, for example, firms will aim to benefit from the present low tax rate by increasing distributions before and reducing them after the tax increase. This short-run effect on dividends applies regardless of the marginal source of funds and hence under all the above three theories (Table 3.1). However, this shock slowly fades away and in the long run dividends return to their equilibrium level. Observe that for the old view this long-run level is lower than the original level and for the new view and the irrelevance view the long-run level is basically the old one.

The short-run effect of an anticipated dividend tax cut on investment[129] seems more complicated. Under the old view it is likely that a dividend tax increase leads to a reduction in investment both before and after the reform. The reason is that the tax increase reduces the present value of after-tax dividends regardless of the timing of an investment, before or after the anticipated reform.

The new view basically predicts no change in investments after the reform but a decrease in investments in the anticipation phase. The reason for the latter outcome is that the tax increase reduces the present value of the after-tax dividend stream while the opportunity cost of investing is left unchanged. This increases the firm's cost of capital and affects negatively the amount invested before the reform (Korinek and Stiglitz 2009). After the reform, the opportunity cost of investing also declines and the cost of capital returns to its original level.

Under the tax irrelevance view the neutrality of dividend taxation in respect of investment applies both in the anticipation stage and after the reform. Investment is solely determined by the cost of debt, which is not affected by the tax treatment of dividends.

[129] The reform may affect investment not only through the firm's cost of capital but also through second-order general equilibrium effects. We focus in this paper on the cost of capital effects.

Note, however, that if firms are cash-constrained, the extra dividends paid by the firms in the anticipation phase can lead to reduced investments during the anticipation years and, if the effect is very strong, also during the first years after the reform. This can happen both under the tax irrelevance view and the new view.[130]

Table 3.1 summarises the predictions of the three theories for the short-run effects. The minus sign in parenthesis refers to the potential negative effects on investment in the case of credit-constrained firms.

TABLE 3.1: *Short-run effects of an anticipated dividend tax cut*

	Dividend		**Investment**	
	Anticipation stage	After reform	Anticipation stage	After reform
Old view	+	-	-	-
New view	+	-	-	0 (-)
Tax irrelevance view	+	-	0 (-)	0 (-)

In Kari et al. (2008), we observe a sizeable abnormal increase in dividends by firms which expected an increase in dividend taxation in 2005. The observation was interpreted as evidence of an anticipatory response to the reform. As regards investment, however, we did not find any statistically significant change in the anticipation phase. Hence when we focus on the behavioural responses of firms to the reform in the years after its implementation, we may expect to find a (short-run) drop in dividends regardless of which theory best describes behaviour. For investments the situation is different. While the old view predicts an unambiguous drop in investments, the two other views predict an unchanged level of investment if firms are not credit-constrained in the years following the reform.

[130] In the model by Korinek and Stiglitz (2009) investment opportunities are stochastic and due to capital market imperfections the firm holds cash balances to be able to quickly respond to investment opportunities as they arise. An increase in dividends as a response to an anticipated tax cut leads to a transitory reduction in cash balances and further to reduced investments until the optimal amount of cash has been restored through internal savings.

3.2. The effect of the tax reform on the cost of capital

This section analyses the effects of the Finnish 2005 tax reform on the long-run cost of capital. The treatment is split into two sections because tax rules for non-listed and listed firms differ widely in the Finnish dual income tax system. Two alternative sources of finance are discussed: retained earnings and new share issues. The cost of capital for debt-financed investment did not change in the reform.

Closely held corporations: the effects of the split model

Under the Finnish dual income tax, all dividends received by individual shareholders from non-listed companies are subject to a split into capital income and earned income. Due to the tax rate gap between these income types, this system is likely to distort firms' investment and dividend decisions. These special incentive effects are non-existent in the case of listed firms.

Hietala and Kari (2006)[131] derive the following expression for the cost of capital of a non-listed company:[132]

(1) $$\pi_K(K) = \alpha r - \beta \rho \ ,$$

where π depicts operating profit, K is the capital stock, r is the gross real rate of return required by the owner and ρ is the splitting parameter that determines the maximum amount of dividends taxable as capital income. Any dividends in excess of that amount are taxed as earned income.

Assuming the 'new view' case, under which investment is financed from retained earnings, α takes the standard form

(2) $$\alpha = \frac{1-\tau_c}{(1-\tau_f)(1-\tau_g)} \ ,$$

[131] Incentives in the Finnish tax system before the reform are also covered in Lindhe, Södersten and Öberg (2004).

[132] Here we leave aside the effect of net wealth taxation to simplify the analysis. For investors whose taxable net wealth exceeded the threshold this tax produced a small additional burden on equity-financed investment in the pre-reform tax system.

where τ_c is the (proportional) tax rate on capital income, τ_f is the corporate tax rate and τ_g is the accrual effective tax rate on capital gains.

If the firm's distribution exceeds the maximum amount of dividends taxable as capital income, i.e. dividends are taxed as earned income at the margin, β takes the value

$$(3) \qquad \beta = \frac{\tau_e - \tau_c}{(1-\tau_f)(1-\tau_e)} \ ,$$

where τ_e is MTR on earned income.

Hence in (1) and in (2) and (3), the first term equals the standard-form expression of the cost of capital under the new view. The second term captures the special incentive effects of the Finnish DIT, produced by the tax rate gap and the method of calculating imputed capital income. For an owner with $\tau_e > \tau_c$ the second term $\beta\rho$ is positive and hence takes the firm's cost of capital below its standard level. Observe that the term depends on dividend taxes even if the new view assumptions are satisfied.

The 2005 tax reform mainly changed the values of the tax parameters but left the broader structure of the taxation of profits intact. Table 3.2 below shows the calculations made by Hietala and Kari (2006) on the cost of capital of non-listed firms in the old and the new tax system.[133]

The figures show that in the case where dividends are taxed entirely as capital income (Section A), the reform slightly lowered the cost of capital. This decrease is the result of two opposing changes. The cut in the corporate tax rate reduces the cost of capital (equations (13) and (16) in Hietala and Kari), while the increase in the effective capital gains tax rate increases it. Observe that the dividend tax rules, including the 90,000 euro threshold, do not have any effect here. This is an implication of the new view.

[133] The calculations assume $r = 7\%$ and no inflation. The effective tax rate on capital gains τ_g is 12 per cent under the pre-reform regime and 14 per cent under the post-reform regime, calculated using the approach introduced in King (1977).

TABLE 3.2: *Cost of capital for non-listed firms in the old and new tax systems (retained earnings)*

Regime	Dividends taxed at the margin as …					
	A. Capital income	B. Earned income MTR on earned income				
		31.92	35.92	41.92	47.92	54.92
New system ≤ 90,000 €	**7.9**	4.4	3.8	2.9	1.8	0.32
> 90,000 €		7.5	7.0	6.2	5.4	4.2
Old system	**8.0**	7.4	6.5	5.0	3.1	0.2

In the case where dividends are taxed as earned income at the margin (Section B), the nature of the change depends on the owner's marginal tax rate (MTR) τ_e and also whether dividends exceed 90,000 euros or not. The cost of capital decreases in most cases when dividends are below the threshold and increases in the opposite case. Observe that the cost of capital is very low, close to zero, when the owner's MTR is high.

We have thus far excluded the effect of the repeal of net wealth taxation as from 2006. This tax raised the level of the cost of capital by 0.4–0.6 per centage points if an entrepreneur paid this tax in the margin. So the effect of the repeal of the tax as from 2006 either made the reduction in the cost of capital larger or the increase smaller by the same amount.

Let us next consider the incentive changes in the old view case, i.e. when an investment is financed by new share issues (see Hietala – Kari 2006, Table 7). The changes follow a fairly similar pattern in the case where dividends are taxed as earned income. The reform increased the cost of capital for firms above the 90,000 euro threshold and lowered it below the threshold in most cases.

The main difference in the changes in the cost of capital between the two financing forms occurs when dividends are taxed entirely as capital income. The old view assumptions now lead to the outcome that the 90,000 euro threshold very much affects the level of the cost of capital. The parameters α and β of the cost of capital formula (1) are now

(4) $$\alpha = \frac{1-\tau_c}{(1-\tau_f)(1-\tau_d)} \text{ and } \beta = 0,$$

where τ_d is the tax rate on dividends. It takes the value $\tau_d = 0$ under the old system (due to the full imputation credit), and $\tau_d = 0$ below the threshold (exemption) and $\tau_d = 19.6\%$ above the threshold (70% taxable at 28%) under the new tax system.

TABLE 3.3: *The cost of capital for non-listed firms, dividends taxed as capital income (new share issues)*

Regime	Old tax system	New tax system
Div ≤ 90,000 €	7.0	6.8
Div > 90,000 €	7.0	8.5

As Table 3.3 shows, the cost of capital is slightly reduced when dividends are below the threshold and the cost of capital is notably increased above the threshold. If we include the effect from the repeal of the net wealth tax, the reduction (≤ 90,000 euros) is 0.4–0.6 per cent points higher and the increase (> 90,000 euros) smaller by the same amount.

Listed corporations

For listed corporations the cost of capital follows from (1) with β=0 and β as in (2) in the new view case and as in (4) in the old view case. Table 3.4 calculates the change in the cost of capital using the same parameter values as above.

TABLE 3.4: *The cost of capital for listed corporations*

Financing form	Old tax system	New tax system
Retained earnings (new view)	8.0	7.9
New share issues (old view)	7.0	8.5

3.3. Testable hypotheses

Consider first non-listed firms. The differences between Tables 3.1 and 3.3 provide an interesting opportunity to test to which model actual behaviour corresponds more closely. For this, we first divide firms into two groups: those that distribute dividends at the margin as earned income and those who distribute dividends at the margin as capital income. For the first group, the tax reform moved the cost of capital in the same direction both according to the old and the new view. This implies that the behaviour of firms that distribute excess dividends taxed as earned income cannot be used to distinguish between the old and the new view.

Firms that distribute dividends as capital income can be further divided into two groups: firms whose dividend distributions to the main shareholder are below the 90,000 threshold and firms above the threshold. When dividends are below the threshold, there were no major changes in the cost of capital either in the old or the new view case. However, when dividends are above the threshold, the new view predicts that there were no major impacts in the cost of capital, whereas according to the old view the cost of capital increased substantially. This division can be used to separate firms into treatment and control groups. The treatment group consists of firms that distribute dividends as capital income and their dividend distribution is above the 90,000 threshold. All other firms are assigned to the control group.

If the old view is correct, investments in the treatment group should decrease, relative to the control group, due to an increase in the cost of capital as a result of the reform. If, however, the new view or the tax irrelevance view is correct and the firms are not cash-constrained, investments should not decrease more in treated firms. Hence we should be able to differentiate between the old view and the new and irrelevance views if investments do not decline. However, we do not have the tools to infer which of the latter two views explains the outcome. And if investments are really reduced, this could in principle be due to the old view or severe cash constraints that the firms will still have after having paid extra dividends before the reform. Regarding dividends, we expect to see a short-run drop in dividends after the reform and we will not be able to use this information in differentiating between the different views.

Consider finally companies that are listed on the stock exchange (Table 3.4). For all domestic individual owners, dividends became partially double-taxed after the reform. However, the dividend tax did not affect domestic institutional owners or foreign owners. Therefore our hypothesis is that the larger the ownership share of domestic individuals the stronger short-run drop in dividends and investment.

4. Data and the empirical approach

The panel data employed contains information on the financial statements and taxation of Finnish corporations in the period 1999–2006. It was collected by the Finnish Tax Administration and is based on firms' tax declarations. The data set 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. However, since the tax increase only affected relatively large firms, we removed the smaller half of closely held corporations (that is, 50% of firms according to the total value of their balance sheet) from our sample to reduce the heterogeneity between firms that were affected by the tax increase and firms in the control group. The descriptive statistics are presented in Appendix 1.

Our aim is to estimate the causal effects of a dividend tax increase on dividend distributions and investment. Since the tax treatment differs depending on the stock market status of firms, we examine listed and non-listed firms separately.

Estimation strategy for non-listed firms

Given what we know from Section 3, the idea is to investigate whether dividends and investments are lower in closely held corporations that faced a dividend tax increase in 2005. Since the tax increase is dependent on how much the firms pay out in dividends, firms can themselves influence their tax bill and thus their treatment status. To overcome this problem, we determine the treatment status based on pre-reform dividend levels at a time when the future tax details were unknown. Hence the firm is placed in the treatment group if it distributed a large amount (on average more than 90,000 euros during the three-year period 2000-2002) of normal dividends taxed as capital income before the reform. Otherwise the firm is placed in the control group. Using this strategy the treatment status is exogenous to the firms at the time of the tax increase.

This idea is analysed by the difference-in-differences approach. We first use regression-based difference-in-differences specifications of the following type (here for investments)

$$inv_{i,t} = \alpha_i + \beta X_{i,t} + \delta group_i + \eta after_t + \gamma group * after_{i,t} + \varepsilon_{i,t},$$

where *inv* denotes real investments in firm *i* at time *t*, measured either as investments-to-assets ratios or as the log of investments. The variable *group* is assigned a value of 1 if the firm is in the treatment group and otherwise 0, while *after* is a time dummy which is 0 before the reform and 1 after the reform. Our main interest is in the interaction of these two, the tax increase variable *group**after*, which is 1 in 2006 for firms whose dividends, taxed as capital income, exceeded the 90,000 euro threshold before the reform, and otherwise 0.

We also include a group of control variables, *X*. For the sake of comparability with the matching estimates (discussed below), the set of control variables is the same as those used in the matching procedure to explain the propensity score, and includes the number of employees, turnover, the total value of the balance sheet, the level of indebtedness, profits, and the third-order polynomial of all these variables. The constant is either the same for all firms or firm specific, depending on the specification. When we do not include a firm-specific dummy variable, the standard errors are adjusted for clustering by firms. When no firm-level fixed effect is included, we also include dummies for industry and region in the control variables.

The identifying assumption is that, apart from the tax increase, all other factors that affect investment behaviour stay constant over time, so that these unobservable factors can be captured by firm or group-level fixed effects. While unobservable factors can always be present, we are not aware of any other reasons why investment behaviour might change over these years differently for firms in different groups. The fact that we can separate firms depending both on their ownership status and the level of dividend payments implies that in our empirical strategy we can control for more differences among firms than is usually the case in empirical tax analysis. This, in our view, increases confidence in interpreting the estimates as causal effects.

To further reduce the scope for other potential differences between treated and non-treated firms, we combine propensity score matching with the difference-in-differences analysis, inspired by the ideas of Heckman, Ichimura and Todd (1997).[134] The benefit of this method is that it makes the treated firms and the control group firms as similar as possible in terms of the observable variables, which is likely to be important in our case, since the size of the firms in the control group is on average much smaller than the size of the treated firms.

In this method, we match firms according to their pre-reform observable variables and then examine if the change in investments differs between matched pairs of treated and non-treated firms. In more formal terms, we estimate the average treatment effect on the treated (ATT) as follows:

$$ATT = \frac{1}{N_T} \sum_{i \in T \cap S} \left[inv(1)_{it} - inv(0)_{it-1} - \sum_{j \in C \cap S} \omega_{ij} \left(inv(0)_{jt} - inv(0)_{jt-1} \right) \right],$$

where N_T is the number of units in the treatment group, *T* refers to the treatment group and *C* to the control group, and S denotes the region of common support (see below). The estimator compares the change in the outcome variable, here investment in treated firms, from the pre- (time *t-1*) to the post-reform (time *t*) period, $inv(1)_{it} - inv(0)_{it-1}$, and to the weighted corresponding change in the control group, $\sum_{j \in C \cap S_P} \omega_{ij} \left(inv(0)_{jt} - inv(0)_{jt-1} \right)$. Here 0 refers to a situation with no tax increase and 1 to the outcome with the tax increase, and ω denotes the weight used for the control group observations.

The weights are determined on the basis of propensity score estimates. The idea is to explain the propensity score, i.e. the probability of facing a tax increase (in this case, that dividend payments are above the taxable threshold before the reform), with a set of observable variables. We use a probit regression to explain this probability using pre-reform values of the following variables: number of employees, turnover, total value of

[134] For an intuitive overview of matching methods, see e.g. Blundell and Costa Dias (2000).

the balance sheet, level of indebtedness, and profits, and the third-order polynomial of all these variables. We use both nearest neighbour and kernel matching, using in the former case one nearest neighbour and in the latter case the Epanechnikov kernel. With nearest neighbour matching, each treated firm is matched with one firm from the control group with the nearest value for the propensity score. In the case of kernel matching, a number of control group firms are used as a comparison with each treated firm. These control group firms come from a certain area with the values of the propensity score close enough to the corresponding value for the treated firm. This area is called the bandwidth, and we also conduct sensitivity analysis in respect of the bandwidth in kernel matching. Within the bandwidth, firms closest to the treated firm, in terms of the propensity score value, get the highest weight.

The common support assumption (that only firms that have the characteristics of *X* that are simultaneously observed for both treated and control firms are compared) is invoked. As usual, the standard errors are obtained by bootstrapping. Tests of how well matching succeeded are also provided.

Because the outcome variable is the change in investment, we can allow for time-invariant differences in levels of investment between firms in the treatment and the control groups. But of course we need to assume, as in the regression-based difference-in-differences analysis, that investments by firms in the control group would have evolved from the pre- to the post-reform period in the same way as investments by firms in the treatment group would have done had these firms not been treated.[135]

Above, we consider the impacts of the dividend tax increase on investments. We also examine the corresponding effects on actual dividend distributions. In the specifications above, investment variables are replaced with variables measuring dividend payments; all other variables and estimation techniques remain the same.

There are also some additional complications that need to be considered. First, the measure of how close to the threshold level the dividends are in the pre-reform period can affect the incentives to reduce dividends. We therefore examine the robustness of dividend and investment

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[135] Since we examine a balanced panel where the difference in investment is measured within the same firm, there is less need to use the post-reform values of observable variables in matching than would be the case if the data came from repeated cross-sections. For an analysis (for a different research topic) where matching combined with difference-in-differences is used in the same manner as here, see Huttunen (2007).

regression results to changes in the threshold levels for pre-reform dividends.

Second, and probably most seriously, we need to take into account that the reform was common knowledge as of the latter part of 2003, when the government's tax reform plan was published. Even a year before that, in November 2002, an initial blueprint for the reform, designed by a group of tax lawyers nominated by the government, was unveiled. This plan also included a tightening in the tax treatment of dividends. For these reasons, company managers had ample time to plan dividend distributions in advance so as to obtain tax savings by distributing relatively more dividends before than after the reform. In Kari et al. (2008), we indeed find strong empirical support that dividend payments increased in 2003 and 2004 in firms that anticipated a tax increase on their dividend distributions after the reform. If we simply took the 2003 or 2004 values, we would therefore mistakenly document a strong drop in dividend behaviour for treated firms after the reform. In order to deal with this problem, the pre-reform data is taken from years when the tax bill was unknown. In the basic analysis, we use the mean values for 2000–2002, but we also analyse the sensitivity of the results to the selected pre-reform years. The year after the reform is 2006, when all the elements of the tax reform were in force and the tax rules should have been common knowledge to company managers.

Estimation strategy for listed firms

In listed firms, the larger the share of domestic individual owners (continuous treatment), the more the effective dividend tax increased. Therefore, the estimated equations take the form

$$inv_{i,t} = \alpha_i + \beta X_{i,t} + \delta share_i + \eta after_t + \gamma share * after_{i,t} + \varepsilon_{i,t},$$

where *share* refers to the ownership share of individual domestic owners. Again, the coefficient of interest is that of *share*after,* measuring the impact of the tax increase in 2006. The constant term can either be firm-specific or not. If it is not, then the set of control variables (*X*) includes region and industry dummies. In all cases, we control for the size of the firm and its profitability. We also check whether the results remain the same if, instead of continuous treatment, firms are divided into two groups depending on whether domestic individual owners own more than 50% of the firm (treatment group) or not.

5. Empirical results

For a preliminary view of what the data is telling us, we compare the pattern of median dividends between the treatment and control groups in the period of 1999–2006 in Figures 5.1 and 5.2.

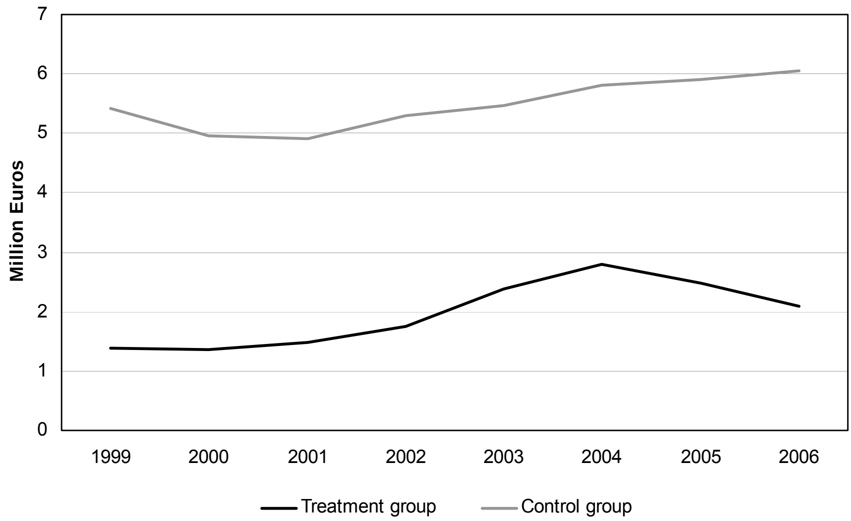

FIGURE 5.1: *Median dividend in listed corporations*

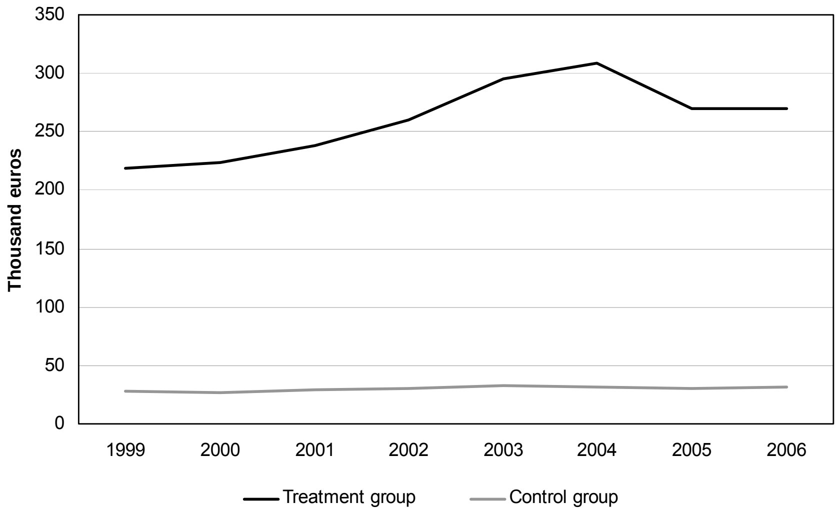

FIGURE 5.2: *Median dividend in non-listed corporations*

This information suggests that the median dividend in the treatment group increased in 2003 and 2004 compared to the mean dividend in the control group. This is probably a sign of anticipation effects; more about this in Kari et al. (2008). However, a more relevant observation from this paper's point of view is a moderate decrease in treatment group dividends compared to control group dividends in 2005.

Table 5.1 provides more information on the mean change in dividends and investments in treatment and control firms.[136] In non-listed firms, dividends increased in firms in the control group, whereas they fell in treated firms. Investments in non-listed firms do not follow any clear pattern. In listed firms, dividends increased and investment dropped, but there were no systematic differences in these changes between treatment and control firms.

[136] For expositional purposes, listed firms are also divided here into treatment and control groups, depending on whether the main shareholder is a domestic individual owner or not.

TABLE 5.1: *Comparison of treated and non-treated firms*

a) Non-listed firms

	ddivid, million €	dlogdivid	dinv, million €	dloginv
control	.033929	.4128043	-.0780709	-.1520273
	(3.073787)	(1.007568)	(14.02529)	(1.783085)
	[42489]	[21081]	[43866]	[26931]
treatement	-.0725417	-.0537045	.0094096	-.3917077
	(1.002207)	(.8754251)	(1.378833)	(1.525629)
	[800]	[653]	[808]	[598]

b) Listed firms

	ddivid, million €	dlogdivid	dinv, million €	dloginv
control	9.388596	.7592586	-6.606392	-.2550419
	(171.1179)	(1.015789)	(56.93541)	(1.872465)
	[84]	[59]	[82]	[79]
treatment	3.360575	.5090159	-.3964901	-.2230041
	(14.58871)	(.7642247)	(4.636289)	(1.903146)
	[37]	[25]	[34]	[34]

Notes: The mean change in dividends (ddivid), the log of dividends (dlogdivid), investments (dinv) and the log of investments (dloginv) in firms facing a tax increase or not. Standard errors in parentheses and the number of observations in squared brackets.

5.1. Dividends in non-listed firms

As argued above, our interest is to examine whether dividends per shareholder were reduced below the threshold level of 90,000 euros. Some support for this hypothesis is received from Figure 5.3, which plots the distribution of dividends before and after the reform. In the interval of 50,000 to 200,000, one can see a peak under the 90,000 threshold (the vertical line) where dividends become taxable in 2005. There were no peaks around that dividend level in any years before the reform.

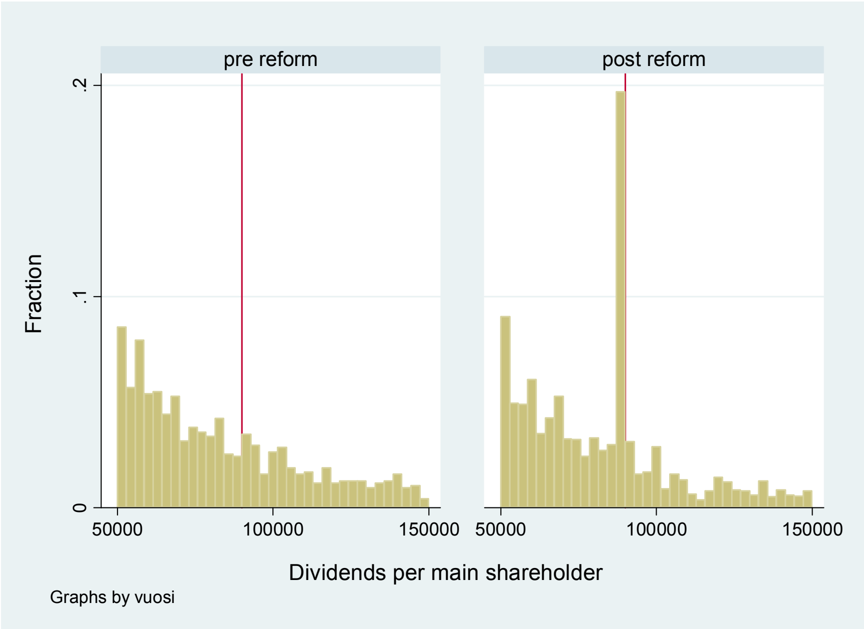

FIGURE 5.3: *Distribution of dividends in non-listed firms before (the mean value for 2000–2002) and after (2006) the tax reform*

The actual estimation results concerning the change in the magnitude of all dividends[137] paid out by non-listed corporations are presented in Table 5.2. We used both dividends directly (in millions of euros) and the logarithm of dividends as dependent variables. The estimation results of the model specification with a group dummy are presented in columns (1) and (3) and the results of the specification with a firm-level dummy in columns (2) and (4). As discussed above, our main interest is in the interaction of the group and time variables. This interaction variable is called *tax increase* in our estimation tables. It shows the impact of the tax increase on the magnitude of the dependent variable – in this case on distributed dividends. For every specification, we report the coefficient of the *tax increase* variable and its robust p value.

[137] In the regressions below, the dependent variable is all dividends paid by the firm instead of dividends to the main shareholder. If we used the latter measure, we might document a dividend drop even if total dividends did not decrease but the owner directed part of his 'own' dividends to other family members. Therefore, our dependent variable is closer to the notion of real behavioural changes. We return to this issue in Section 5.3

TABLE 5.2: Dividend responses in non-listed corporations

	(1) Dividends	(2) Dividends	(3) Log(Div)	(4) Log(Div)
tax increase	-0.154 (0.044)*	-0.068 (0.181)	-0.301 (0.000)**	-0.356 (0.000)**
time dummy	X	X	X	X
group dummy	X		X	
firm dummy		X		X
other ctrl vars	X	X	X	X
Observations	108213	108213	58999	58999
R-squared	0.256	0.256	0.655	0.160

Robust p values in parentheses. Other control variables include the number of employees, turnover, the total value of the balance sheet, the level of indebtedness, and profits, and the thirdorder polynomial of all these variables, as well as region and industry dummies in specifications without a firm-level fixed effect.

* significant at 5%; ** significant at 1%

As can be seen, the results regarding dividend distributions are not completely robust. However, model (4), where firm-specific variation is reduced with the firm-level dummy variable, and dividends are measured in log terms, is probably the most reliable case. According to this model, dividends declined in a statistically significant way in firms that faced a tax increase. The percentage change – and this is what regression (4) measures – was also large in financial terms: more than 30%.

We now proceed to the results from matching combined with difference-in-differences. Dividends per total firm assets and the logarithm of dividends are used as dependent variables. The tables in Appendix 2 analyse the success of our matching procedures. As expected, the treated firms are much bigger in every respect than the control firms before matching, but both the nearest neighbour and the kernel matching methods succeed in reducing these differences to a very large extent.[138]

The estimates of the average treatment effects on the treated (ATT) are reported in Table 5.3. We report the coefficient of the treatment effect and the bootstrapped standard errors. The coefficient of the ATT is statistically significant in models with logged dividends and negative but not so

[138] Using a somewhat smaller or larger bandwidth did not affect the qualitative results.

significant in models with dividends in euros as the outcome variable. When firms are matched, the results provide some evidence that dividend distributions declined in firms that faced a tax increase. In addition, the point estimate also increases, suggesting that dividends dropped by roughly 40 per cent in firms whose dividend taxation increased. Among the estimators we study, propensity score matching with the outcome variable in the first differences probably performs best by eliminating potential biases most effectively.

TABLE 5.3: *Dividend responses in non-listed corporations: Matching estimates*

	d(Dividends)		**dLog(Divid)**	
	NN	**Kernel**	**NN**	**Kernel**
ATT (std error)	-0.310 (0.179)	-0.215** (0.079)	-0.417** (0.091)	-0.387** (0.053)
Obs	693	37865	570	19395

Results from propensity score matching, dependent variable either the change in dividends or the change in the log of dividends. The propensity score is estimated with a probit model with the number of employees, turnover, the total value of the balance sheet, the level of indebtedness, and profits, and the third-order polynomial of all these variables as explanatory variables. The common support assumption is invoked. Bootstrapped standard errors in parenthesis. The matching method is either nearest neighbour or Epanechnikov kernel matching with a bandwidth of 0.05.

In sum, while the results regarding dividend distributions are not entirely robust, it seems that reducing the scope for the potential differences between the treated and non-treated firms indicates that dividends decreased more in firms that faced higher taxes.

One potential worry in the estimates above is that the results are sensitive to some extraordinarily large dividend payouts in pre-reform years (2000–2002), which put some firms in the treatment group even if they in some sense should not be there. To examine the seriousness of this risk, we determined the treatment status on the basis of mean dividends in 1998–2002, which reduces the weight given to outlying values from a single year. The results remained essentially the same with this modification.[139]

We also conduct sensitivity analysis in respect of the limit of 90,000 euros. The treatment consists of firms whose dividend payments exceeded the threshold *before* the reform, which means that the limit that affected the behaviour of firms might differ from 90,000 euros. In addition, the tax reform of 2005 reduced the corporate tax rate from 29 to 26 per cent. In some cases, this reduction lowered the total tax burden of a firm even if its dividends exceeded 90,000 euros. The results of the sensitivity analysis concerning both dividend and investment, based on matching methods – since these are our preferred specifications – are reported in Appendix 3. The pattern of the results remains broadly the same irrespective of whether the treatment group consists of firms whose dividend payments exceeded either 70,000 or 100,000 euros before the reform. However, the dividend drop appears to be bigger, the higher the threshold value used.

5.2. Investment in non-listed firms

We next consider investment responses in non-listed corporations. The models are similar to those used in the dividend regressions. Table 5.4 below reports the results of difference-in-differences estimation. Again, we use both investments per total firm assets and the logarithm of investments as dependent variables. The models include either a group dummy or a firm-level dummy. The control variables are the same as earlier.

[139] These results are available from the authors upon request.

TABLE 5.4: Investment responses in non-listed corporations

	(1) Investment	(2) Investment	(3) Log(Inv)	(4) Log(Inv)
tax increase	0.033 (0.757)	0.224 (0.405)	-0.255 (0.000)**	-0.083 (0.192)
time dummy	X	X	X	X
group dummy	X		X	
firm dummy		X		X
other ctrl vars	X	X	X	X
Observations	108996	108996	71262	71262
R-squared	0.042	0.048	0.422	0.020

Robust p values in parentheses. Other control variables include the number of employees, turnover, the total value of the balance sheet, the level of indebtedness, and profits, and the third-order polynomial of all these variables, as well as region and industry dummies in specifications without a firm-level fixed effect.
* significant at 5%; ** significant at 1%

Table 5.4 reveals that the estimation results regarding investments are otherwise not significant, whereas in model (3), without firm-level fixed effects, the effect of the tax increase appears negative and significant. Again, since there is huge variation within the firms, the models with a firm-level fixed effect provide more reliable results. According to these models (2) and in particular (4), investments did not decline. Thus there is no robust evidence that investments declined because of the tax increase.

The matching models with difference-in-differences concerning investment behaviour are estimated similarly as in the case of dividends. The estimates of the average treatment effects on the treated (ATT) and bootstrapped standard errors are reported in Table 5.5. When the treatment and control groups are made more alike by using matching methods, the results regarding investments are all insignificant.[140] This conclusion is not dependent on choosing matching as the estimation technique. This can be shown if we include all the same control variables (and their second and third power) in the regression equation with a firm

[140] The sensitivity analysis of investment matching models in respect of the threshold level that divides firms into treatment and control groups, reported in Appendix 3, comes to the same conclusion. In addition, the lengthening of the pre-reform period to cover years from 1998–2002 does not affect the results (similarly as for dividends.)

dummy for the sample used in matching and fulfilling the common support assumption. Then the specification is as close to the matching set-up as possible, but the estimation is conducted with standard linear methods. In this case, the coefficient for the tax increase variable is not significant either.

All in all, the results concerning investment responses in non-listed corporations tend to suggest that investments are relatively inflexible, and they do not on the whole react to tax changes.

TABLE 5.5: *Investment responses in non-listed corporations: Matching estimates*

	d(Investment)		**dLog(Inv)**	
	NN	**Kernel**	**NN**	**Kernel**
ATT (std error)	0.339 (0.444)	0.101 (0.144)	-0.050 (0.121)	-0.017 (0.065)
Obs	697	38365	562	25358

Results from propensity score matching, dependent variable either the change in investment or the change in the log of investment. The propensity score is estimated with a probit model with the number of employees, turnover, the total value of the balance sheet, the level of indebtedness, and profits, and the third-order polynomial of all these variables as explanatory variables. The common support assumption is invoked. Bootstrapped standard errors in parenthesis. The matching method is either nearest neighbour or Epanechnikov kernel matching with a bandwidth of 0.05.

5.3. An additional margin: changes in ownership

Since the 90,000 euro threshold is defined per person, owners of family firms could potentially also influence their tax payments by spreading their ownership within their family. We examine this using similar regression techniques as above, but with the ownership share of the main owner as the dependent variable.[141] The hypothesis then is that owners whose dividends were large before the reform have a stronger incentive to reduce their own ownership and distribute it to e.g. their children. The results (not reported here for the sake of space) reveal that the sign of the tax increase variable is indeed negative, but it is not statistically significant. Owners might have thus lowered their tax burden by other means than simply cutting dividends. In any case, the measured dividend drop above represents a real decrease in dividends since the dependent variable was all dividends paid by the firm.

5.4. Results for listed firms

The impact of the tax increase faced by listed firms on the magnitude of dividends and investments is analysed using the same simple difference-in-difference estimation strategy as in the case of non-listed firms. As earlier, we have two model specifications: one with a group dummy and another with a firm dummy. We used both dividends (investments) and the logarithm of dividends (investments) as dependent variables.

Our main interest is in the interaction between the proportional share of domestic individual ownership and time variables.[142] In the case of listed firms, this measures the impact of the tax increase in 2006. This is the variable *tax increase* in the estimation tables. We used the same sets of control variables as in the previous analyses. The proportional share of ownership by domestic individuals (*dom ownership*) is an additional control variable in specifications without a firm-level fixed effect.

The estimation results regarding dividends (Table 5.6) mostly suggest that dividends in listed companies did not drop more in firms that experienced a tax increase. The results across specifications regarding investment (Table 5.7) indicate that investments did not change in response to the tax reform. We conclude that listed firms did not change their dividend or investment policy even when they faced fairly high tax increases.

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[141] The data set does not contain a more direct measure of ownership within the family.

[142] We also categorised the share of ownership variable by dummy variables and used it and their interactions with the time variable in the estimation models. However, this did not change the results.

TABLE 5.6: *Dividend responses in listed corporations*

	(1) Dividends	(2) Dividends	(3) Log(Div)	(4) Log(Div)
tax increase	-15.135 (0.612)	-47.373 (0.087)	-0.484 (0.513)	-1.158 (0.024)*
time dummy	X	X	X	X
dom ownership	X		X	
firm dummy		X		X
other ctrl vars	X	X	X	X
Observations	189	189	124	124
R-squared	0.671	0.349	0.806	0.625

Robust p values in parentheses. Other control variables include turnover, profitability and employment as well as region and industry dummies in specs without a firm-level fixed effect.
significant at 5%; ** significant at 1%

TABLE 5.7: *Investment responses in listed corporations*

	(1) Investment	(2) Investment	(3) Log(Inv)	(4) Log(Inv)
tax increase	-13.063 (0.134)	-3.569 (0.582)	-0.349 (0.649)	0.215 (0.733)
time dummy	X	X	X	X
dom ownership	X		X	
firm dummy		X		X
other ctrl vars	X	X	X	X
Observations	186	186	135	139
R-squared	0.747	0.236	0.782	0.384

Robust p values in parentheses. Other control variables include turnover, profitability, employment and indebtedness as well as region and industry dummies in specs without a firm-level fixed effect.
* significant at 5%; ** significant at 1%

6. Conclusion

This paper examines how dividend distributions and investments in Finnish corporations reacted to the 2005 corporate and capital income tax reform. Since the reform treated different types of corporations differently, it involved exogenous variations to their tax treatment, offering an opportunity for promising empirical estimates. In addition, as the vast majority of our data comes from non-listed companies, the analysis is not blurred – at least to a large extent – by concerns of asymmetric information between owners and managers.

Our results indicate that dividend distribution declined in non-listed firms after the reform. Since there were large anticipatory increases in dividend distributions before the reform, this drop can also be a reaction to these earlier, abnormally large dividend distributions. This part of the results therefore serves as further confirmation of the results by Korinek and Stiglitz (2009): anticipated tax changes lead to large impact on the timing of dividends. Since dividends can be altered due to intertemporal tax planning also under the new view, the drop in dividend distribution is compatible both with the old and the new view of dividend taxation.

The results regarding investment do not indicate that investments declined more in firms that were subject to a dividend tax increase. While this result must be interpreted cautiously because our data covers a relatively short period (two years) after the reform, it is perhaps more in line with the new rather than the old view of dividend taxation. Since the reform was also known roughly two years in advance, the 'effective' reaction time for investment decisions that we measure covers approximately four years, thus increasing the likelihood that at least part of the long-term reactions are captured.

Another possibility is that firms suffer from liquidity constraints, and thus have lower investment activity after paying extraordinarily high dividends in the years before the reform, but on average this does not appear to be the case either for firms in our data set. However, because the dividend tax hike in the Finnish case hit mature firms which were able to pay large dividends before the reform, this reform does not open up the best possibility to examine the link between liquidity constraints and investments. And of course, even if this dividend tax did not affect (mature) firms, a different kind of dividend tax increase (which would also be faced by firms that are more likely to be young, growing firms) could have different impacts.

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Appendix 1: Descriptive statistics

	Obs	Mean	Std. Dev.	Min	Max
NON-LISTED FIRMS					
Dividends*	129255	.0853564	2.280798	0	600
Investment*	134138	.2084316	8.528886	0	2813.623
Turnover*	139520	3.403713	53.85463	0	11512.61
Nr of personnel	138899	21.11148	150.0728	0	16842
Balance sheet*	139451	6.614561	161.4212	.1288697	45093.78
Profit*	137436	-.6361726	301.3087	-111680.5	1743.529
Debt*	139397	2.519004	103.8281	-12.97514	26640.72
Net assets*	135867	1.263971	18.34198	-519.2112	2593.67
LISTED FIRMS					
Dividends*	267	45.31508	270.1771	0	4000
Investment*	257	13.91131	48.83482	.0009984	399.1752
Turnover*	241	306.6733	2138.952	.0035297	32212.98
Nr of personnel	267	745.6617	2233.524	1	28466
Balance sheet*	267	2152.083	15649.07	.2792644	248238.4
Profit*	228	31.70876	193.7652	-116.2483	2517.52
Debt*	267	828.0427	7348.071	0	117681
Domestic, individ owners	209	.3683637	.2867675	.0013	.9612

Notes: The mean value for years 2000–2002 and year 2006
Only larger half of non-listed firms (50% of firms according to the total value of their balance sheet)
Variables denoted by * are expressed in millions of EUR.

Appendix 2: Comparison of unmatched and matched firms in the treatment and control groups

a) Nearest neighbour matching

		Mean			%re-duct	t-test	
Variable	Sample	Treated	Control	%bias	bias	t	p>t
turnover	Unmatched	12.934	3.348	31.1		7.02	0.000
	Matched	12.934	14.722	-5.8	81.4	-1.34	0.180
balance	Unmatched	21.628	5.3637	25.9		5.41	0.000
statement	Matched	21.628	24.05	-3.9	85.1	-1.07	0.284
nr of	Unmatched	85.08	24.169	29.7		12.37	0.000
personnel	Matched	85.08	95.101	-4.9	83.5	-0.81	0.421
profits	Unmatched	.97924	-2.8961	0.9		0.18	0.860
	Matched	.97924	1.0042	0	99.4	-0.33	0.739
debt	Unmatched	4.374	2.367	2		0.37	0.710
	Matched	4.374	4.8416	-0.5	76.7	-0.70	0.483

b) Kernel matching

		Mean			%re-duct	t-test	
Variable	Sample	Treated	Control	%bias	bias	t	p>t
turnover	Unmatched	12.934	3.348	31.1		7.02	0.000
	Matched	12.934	14.531	-5.2	83.3	-1.12	0.261
balance	Unmatched	21.628	5.3637	25.9		5.41	0.000
statement	Matched	21.628	23.458	-2.9	88.7	-0.78	0.438
nr of	Unmatched	85.08	24.169	29.7		12.37	0.000
personnel	Matched	85.08	87.47	-1.2	96.1	-0.20	0.841
profits	Unmatched	.97924	-2.8961	0.9		0.18	0.860
	Matched	.97924	.7661	0.1	94.5	0.04	0.968
debt	Unmatched	4.374	2.367	2		0.37	0.710
	Matched	4.374	4.927	-0.5	72.4	-0.38	0.705

Appendix 3: Sensitivity analysis using matching with difference-in-differences

Dividend responses in non-listed corporations, dividend limit 70,000 euros

	d(Dividends)		dLog(Divid)	
	NN	Kernel	NN	Kernel
ATT (std error)	-.074 (0.106)	-.144* (0.074)	-.357** (0.065)	-.345** (0.046)
Obs	879	37865	718	19395

Dividend responses in non-listed corporations, dividend limit 100,000 euros

	d(Dividends)		dLog(Divid)	
	NN	Kernel	NN	Kernel
ATT (std error)	-0.351* (0.156)	-.289** (0.089)	-0.480** (0.087	-.403** (0.055)
Obs	562	37865	460	19395

Investment responses in non-listed corporations, dividend limit 70,000 euros

	d(Investment)		dLog(Inv)	
	NN	Kernel	NN	Kernel
ATT (std error)	-.057 (0.073)	.064 (0.307)	-0.050 (0.121)	-0.017 (0.065)
Obs	883	38365	562	25358

Investment responses in non-listed corporations, dividend limit 100,000 euros

	d(Investment)		dLog(Inv)	
	NN	Kernel	NN	Kernel
ATT (std error)	-.0988 (0.106)	.206 (0.352)	.095 (0.113)	.022 (0.084)
Obs	565	38365	461	25358

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