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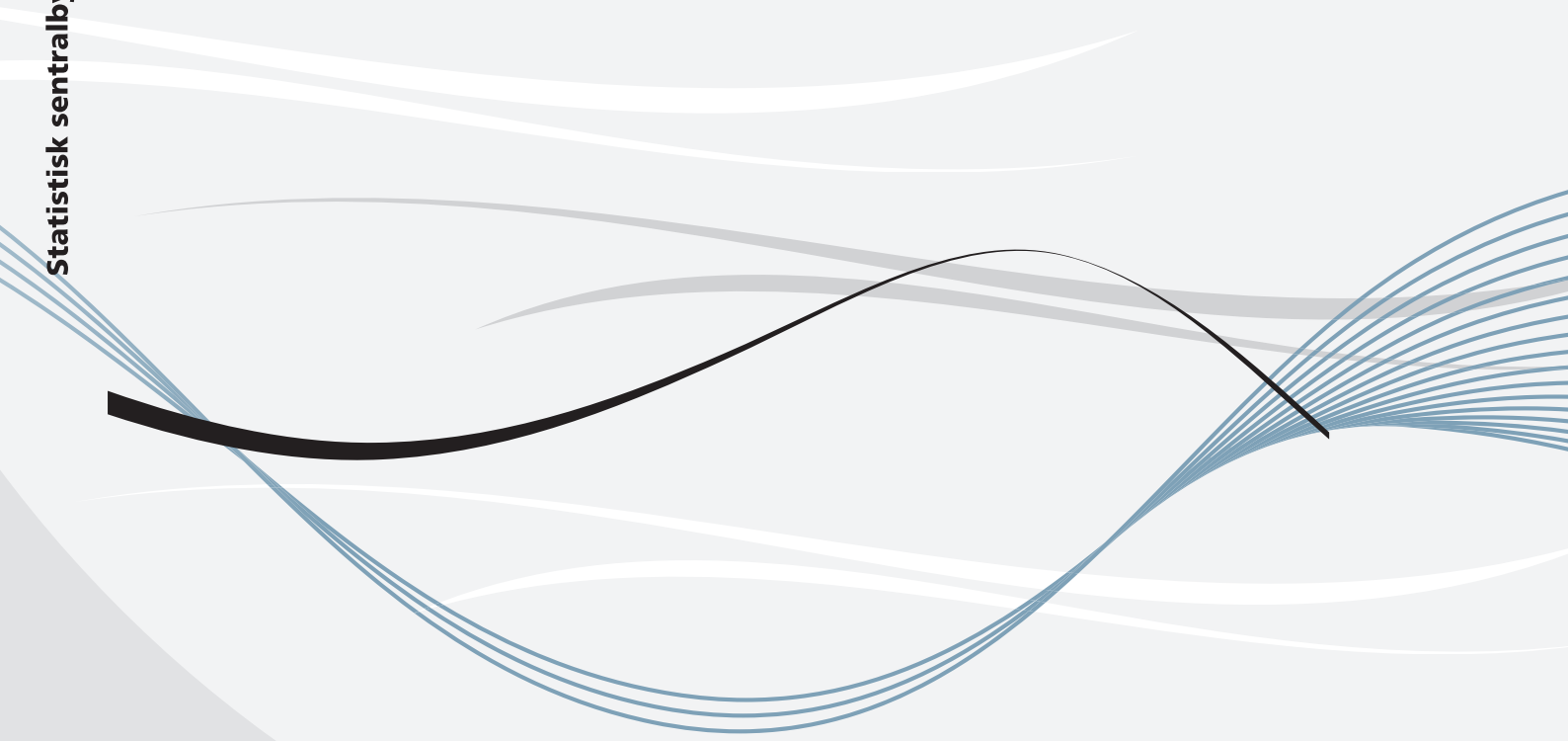

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The capital constraining effects of the norwegian wealth tax

Abstract:
This paper investigates if the Norwegian wealth tax imposes capital constraints on small privately held businesses. A panel of 31,428 Norwegian firms from 2005 to 2009 is used to estimate two models of capital constraints. The models are estimated using the Fixed Effects method. When firms are sorted a priori into two groups based on the wealth tax burden of the primary owner, the non-taxed firms are found to be slightly more constrained than the taxed firms, at a 10% and 5% confidence level depending on the model. Sorting based on the wealth tax is the most effective method of sorting firms into more or less constrained groups, while more traditional methods proved ineffective in this panel. The negative capital constraining effects of the wealth tax are therefore minimal; the tax affects only the private firms least reliant on internal financing

Keywords: Wealth Tax, Norway, Capital Constraints

JEL classification: H23, G3

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Address: Chris Edson, Statistics Norway, Research Department. E-mail: ced@ssb.no

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Sammendrag

I internasjonal sammenheng er skatt på formue sjelden. Siden 2006 har Finland, Island, Luxemburg, Spania og Sverige avskaffet formuesskatten, med den begrunnelsen at formueskatten er en belastning for forretningsdrivende og investorer. Formuesskatten blir også regnet som en form for dobbeltbeskatning, idet overskuddet beskattes både ved opptjening og siden kontinuerlig når det reinvesteres i produksjonskapital.

I Norge har man valgt å beholde formuesskatten. Man har også økt den effektive skattesatsen gjennom å fjerne "aksjerabatter" med mer. Samtidig har bunnfradraget økt kraftig, slik at andelen som betaler formuesskatt har falt fra rundt 33 prosent i 2005 til bare 17 prosent i 2011.

I dette arbeidet undersøker jeg om den norske formuesskatten medfører kapitalrasjonering i små, private aksjeselskap. Jeg estimerer 2 forskjellige modeller for kapitalrasjonering på et paneldatasett av 31.428 selskaper fra 2005 til 2009. Når foretakene er sortert a priori i to grupper etter hovedeierens skatteposisjon, så viser det seg at foretak der eieren ikke betaler formuesskatt er noe mer kapitalrasjonert enn foretak der eieren betaler formuesskatt. Konfidensnivået er på 5 - 10 prosent, avhengig av hvilken modell som estimeres.

Fordi skatten har størst betydning for foretak som er minst avhengig av internfinansiering, synes formuesskatten å ha minimal betydning for kapitalrasjonering.

1. Introduction

Wealth taxes are uncommon and under increasing public attack to be repealed. Since 2006 Sweden, Spain, Finland, Iceland and Luxembourg have all abolished their wealth tax (Eurostat 2009). The February 2012 survey by the Organization for Economic Cooperation and Development (OECD) of the Norwegian economy listed capital taxation as one of the few areas in need of improvement; it was addressed in 4 of the 15 recommendations made by the report. Of these recommendations the report was particularly critical of the wealth tax. The report states that it generates little tax income but caused large increases in the effective tax rate and the unequal treatment of housing property leads to distortions in investment. Using a nominal rate of return of 4% and an inflation rate of 2% the Norwegian Ministry of Finance calculated that the effective tax rate on equity shares for an individual paying the wealth tax is 113% (OECD Report, 2012). This rate suggests that individuals subject to the wealth tax will be unwilling to invest in any projects.

Table 1: Effective Tax Rates from OECD Report

	Without wealth tax	With wealth tax
Interest-bearing accounts	56%	113%
Shares	56%	113%
Owner-occupied housing	0%	14%
Rental housing	56%	79%

This chart is reproduced as presented in the 2012 OECD Economic Survey on Norwegian.

The OECD report also references the public debate and discussion surrounding the wealth tax. This debate focuses on many possible negative consequences from the wealth tax, but relatively few positive impacts. The main concerns are for the discouragement of domestic investment and the flight of wealthy individuals from the nation. Because the double taxation on capital gains is conceptually easy to explain, using the Effective Tax Rate (ETR) shown in Table 1, this argument is typically made without any reference to published studies. These two effects are also often mentioned together to justify an expected decrease in growth in countries that have a wealth tax (Hansson, 2002).

There is a small but growing body of research into various wealth taxes and their effects, that focuses both on the moral implications related to the distribution of the tax burden as well as empirical measurement of behavioral changes. Michalos (1988) writes an argument for implementing a wealth tax in Canada to address growing wealth inequality and a high concentration of wealth in entrenched family lineages. Joumard (2002) reviews the tax systems of OECD countries and concluded that the lack of a wealth tax greatly undermined the redistributive properties of many tax systems. Isaacs

(1977) makes the opposite moral argument that the tax is a levy against success and that it is incompatible with the United States' national identity. He goes further to state that issues arising from the expected non-compliance with the tax (tax avoidance) would make the tax unable to achieve its intended goal.

Econometric explorations of the empirical impact of the wealth tax are rare. Hansson (2002 & 2008) uses a cross country panel to investigate the effects of abolishing the wealth tax, finding a slight increase in both Gross Domestic Product (GDP) growth and entrepreneurship. Unfortunately both of these studies are possibly biased by their inability to measure all correlated government activity, a common concern in national level cross-country studies (Slemrod, 1995). Pichet (2007) finds that the French wealth tax leads to capital flight and high levels of tax avoidance. The overall cost he calculates from the tax is higher than the received revenue.

Tax theory based on the optimum distribution of tax burden between capital and labor is also applicable to the wealth tax because as Mieszkowski (1969) shows, a wealth tax is equivalent to a tax on business profits, assuming that the productivity of the capital stock is homogenous. If the productivity is assumed to be heterogeneous or monopoly pricing power exists, the wealth tax should be more socially efficient than a tax on business profits while taxing essentially the same base. Because of Mieszkowski's findings, if corporate income taxes decrease investment or economic growth then a wealth tax would also be expected to have a similar effect. Cummins, Hasset, and Hubbard (1996) found a significant negative effect on investment from changes in corporate income tax. Hall and Jorgenson (1967) also found that increasing the liberalness of the tax code's depreciation allowance, a decrease in the present value of the tax on capital, increased the investment rate.

As all taxes introduce inefficiencies into the market, a tax on capital cannot be viewed as a single event, but instead must be viewed as one of multiple tools at the government's disposal to fund public goods. Kocherlakota (2005) looked into the effects of various forms of taxation on a system where individuals could invest in human or physical capital. In this model the individuals had a stochastic ability score with persistent shocks that modified the return received from capital. Because of the possibility of persistent negative shocks throughout an individual's life, a wealth tax with redistribution was found to be societally pareto optimal. Using a different model that also allowed for investment in human or physical capital, Pecorino (1993) found that the growth maximizing mix of taxation is levied more heavily against the primary factor used in the consumption sector; however his initial model assumed that depreciation was not allowed. After adding depreciation for only physical

capital the optimum growth taxation policy was skewed towards higher taxation on physical capital. Nerlove, Razin, Sadka and Weizsacker (1993) also discussed that if human capital depreciates, and they argue that it does, the current taxation policies heavily favor investments in physical capital because of the allowed depreciation differential.

Unlike an income tax, the effects of the wealth tax are persistent during periods of non-investment on the part of the individual, which leads to an interdependence between the calculated tax rate from the wealth tax and the taxpayer's decisions. Discussions surrounding the wealth tax effects tend to only focus on the cost of the tax on investment actions, ignoring the fact that the tax burden is much heavier on inaction on the part of the individual. Returning to the OECD reported effective tax rates (ETR) including the wealth tax, first presented in Section 1.1, we can see how important it is when discussing the wealth tax to contrast any proposed effect on investment with the alternative effect of non-investment or underinvestment on the part of the taxed individual.

The OECD calculated the effective tax rate as the combined corporate and wealth tax burdens divided by the total profit in the period. The profit was calculated as simply the rate of return multiplied by the productively invested capital, and the corporate tax is then this profit multiplied by the corporate tax rate. Calculating the wealth tax is not quite as straight forward, as it is assessed on the total wealth owned at the end of the period, it includes the total wealth at the beginning of the period plus any profit earned in the period, or:

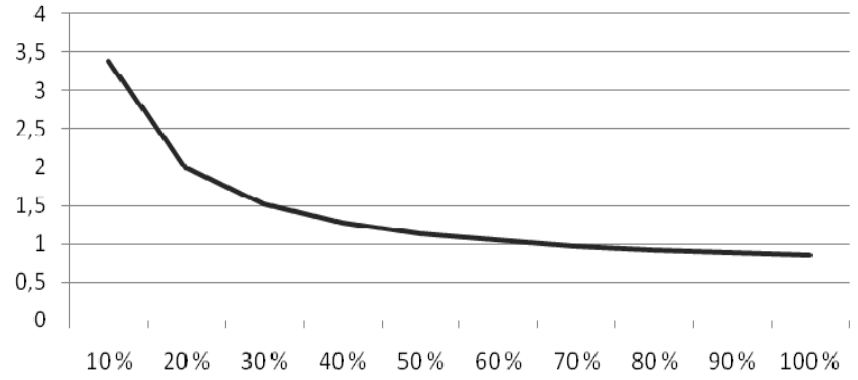
$$\text{Wealth Tax} = \text{Wealth Tax rate} * (\text{Total Starting Wealth} + (\text{Profit}))$$

One key assumption here is that the starting wealth used to calculate the wealth tax due is not identical to the wealth base used to calculate the one period profit, as not all the owner's possessed wealth is necessarily productively invested. For the purpose of this discussion, productive assets are defined as assets which produce a taxable income; this definition excludes assets that provide primarily welfare effects. The OECD report assumes an even distribution of the individual's wealth between productive and non-productive assets. Unlike an income tax which is indifferent to the proportion of total wealth that is productively invested, the wealth tax penalizes non-productive wealth. The ETR decreases as the percentage of wealth actively generating returns increases (Figure 1).

If 100% of an individual's wealth is actively generating returns the effective tax rate is only 85.15% compared to the OECD reported ETR of 113%, a decrease of nearly 30 percentage points. While it may seem unlikely that an individual would only possess assets that are actively invested, the reality is that only a portion of an individual's total wealth is taxed. Most wealth taxes provide an exemption for

a set amount of wealth and only tax the portion of the individual's wealth in excess of this threshold. The main source of non-productive (excluding gains from capital appreciation) wealth holding for the average family is their primary residence, however typically are also generous allowances and favorable valuations for housing that minimizes homeownerships impact on the individual's wealth. The Norwegian wealth tax, discussed in detail in Section 2, provides both of these reductions to the burden of the wealth tax

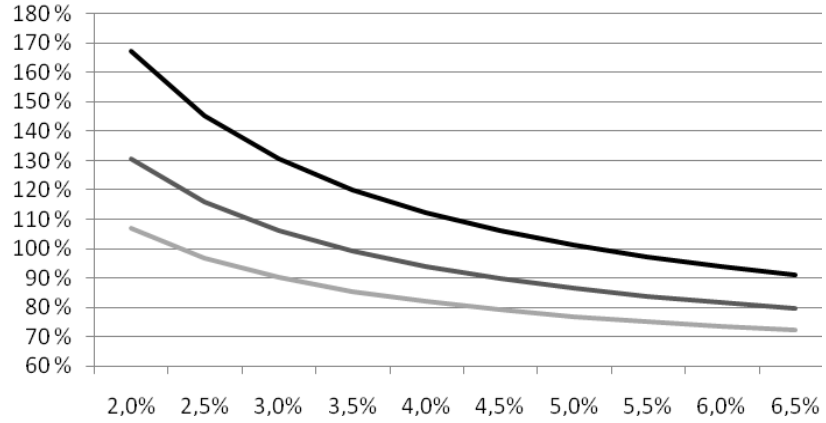
Figure 1. Effective tax rate by percentage of capital generating returns



ETR was calculated using a rate of return of 4%, an inflation of 2%, a corporate tax rate of 56%, and a wealth tax rate of 1.1%. The assumed rates are identical to the OECD assumptions used to generate table 1.

Unlike an income tax the wealth tax rate is also highly variable depending on the rate of return that an asset is earning. The cost of the wealth tax is greater on underperforming assets, but lower for assets with higher rates of return (Figure 2). The wealth tax therefore does not discourage investment in general; instead it discourages holding non-performing or underperforming assets.

Figure 2. Effective tax rate as return varies



Calculated using a rate of return of 4%, an inflation of 2%, a corporate tax rate of 56%, and a wealth tax rate of 1.1%. Three ratios of non-productive assets were used, 50%, 75%, and 100%.

The Remainder of this paper is organized as follows. Section 2 outlines the relevant details of the current Norwegian wealth tax laws. In Section 3 the models use in this investigation and the motivation for their choice is discussed, followed by a description of the panel of firms used as data in Section 4. The findings of this report are shown in Section 5, and a brief discussion of the findings is included in Section 6.

2. The Norwegian Wealth Tax

The 2006 Norwegian tax change is a useful event to study because the motivation behind the change was not to effect more efficient capital investment, but increasing the fairness and redistributive profile of the national tax system. Unless otherwise noted the information in this section is from Report No. 11 to the Storting: Evaluation of the 2006 Tax Reform (Norwegian 2011). The Norwegian governmental report states that "From the time it took over in autumn 2005, however, the Government has been concerned with strengthening the distribution profile of the tax system, and that wealth tax should play an important part in this respect." The reasoning behind the tax changes is important for a study of investment effects, because it helps determine the risk of other exogenous government regulatory changes could be responsible for the results observed.

Before 2006 the Norwegian Wealth tax applied to any personal wealth over 151,000 NOK regardless of whether the wealth was owned by a single or married individual. Wealth above this level was subject to a 1.1% yearly tax.[1] An equity allowance allowed 35% of the total value of equity holdings to be excluded from the tax, and an 80% rule where the wealth tax was only applied at 1.1% until the point where the total tax obligation exceeded 80% of the individual's ordinary income. Once the total tax exceeded this threshold the remaining wealth was taxed at a rate of 0.6%. In 2006 the allowance was increased to 200,000 NOK per taxpayer, which increased the allowance to 1.4 million for a married couple. At the same time the rules for the equity discount and the 80% rule were slowly phased out. The overall change shifted the tax burden to the higher wealth individuals while also increasing the level of tax paid by these individuals. In 2012 the allowance is 750,000 NOK for single tax payers and 1,500,000 for married couples.

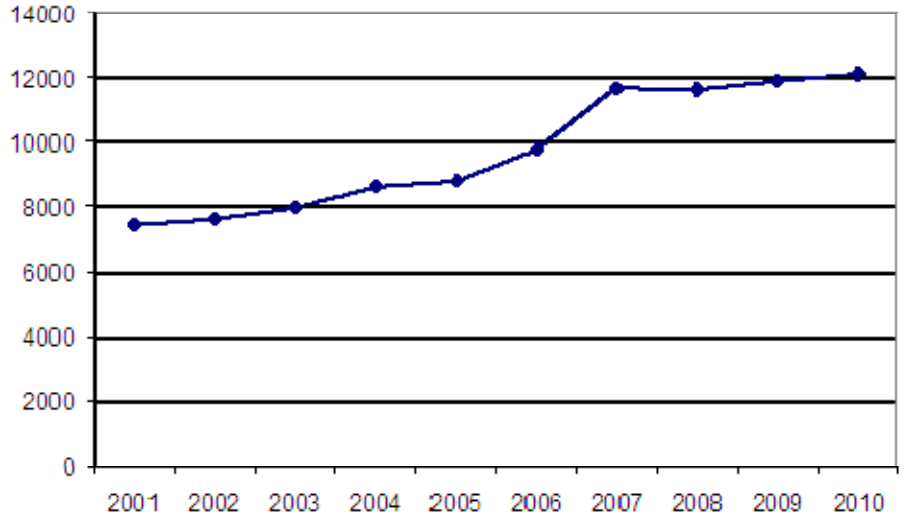
[1] There was a local flat tax rate of 0.7 percent and progressive national rates of 0.2 and 0.4 percent.

Figure 3: Wealth Tax Rule Changes

Year	Individual Allowance		Married Allowance		Equity Discount	The 80% Rule
	Local (0.7%)	National (=0,4%)	Local (0.7%)	National (=0,4%)		
2005	151,000	540,000	151,000	580,000	35%	.6% if tax > 80% OI
2006	200,000	540,000	400,000	1,080,000	20%	.6% if tax > 80% OI
2007	220,000	540,000	440,000	1,080,000	15%	.6% if tax > 80% OI
2008	350,000	540,000	700,000	1,080,000	0%	.8% if tax > 80% OI
2009	470,000	470,000	940,000	940,000	0%	No discount
2010	700,000	700,000	1,400,000	1,400,000	0%	No discount
2011	700,000	700,000	1,400,000	1,400,000	0%	No discount

The change in the allowance has reduced the number of taxpayers paying the wealth tax from 33 percent in 2005 to only 17 percent in 2011. The overall effect of these changes has been an increase in wealth tax revenue while narrowing the tax base.

Figure 4: Wealth Tax Revenue by Year, Million Kroner

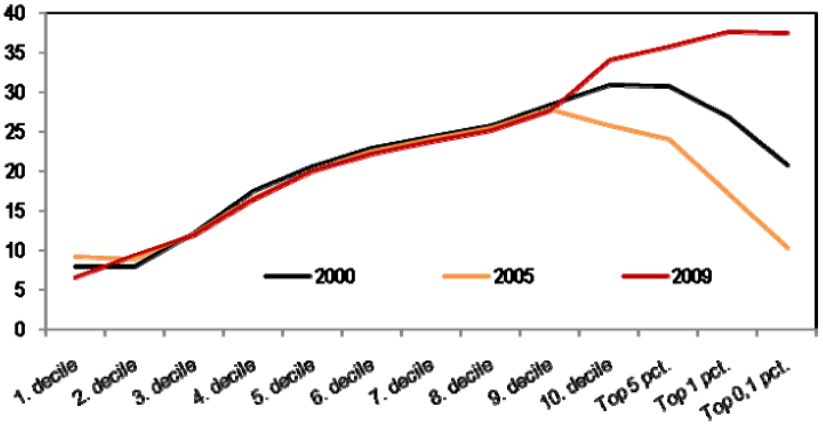


*Source SSB

The Norwegian government believes that this change to the wealth tax is a vital part of correcting the redistributive profile of the total tax in the country. Figure 5 shows the average tax burden of individuals by income decile. The graph shows that since 2001 the Norwegian tax code has failed to properly continue the progressive intentions of the tax system. In 2005 an individual with an income in the top 1% paid the same average tax as an individual in the bottom 40% of the income distribution, significantly less than someone with an income in the 70% range. The wealth tax change was able to correct this issue and lead to a more progressive tax burden based on income distribution. Figure 6 expands the top 10% of the income into ten separate categories and separates the taxes paid into

income and wealth tax, showing that the wealth tax pays an integral part in ensuring the progressivity of the tax system at the highest income levels.

Figure 5: Average assessed tax as a share of gross income by decile



Report on the tax assessment as a share of gross income by decile. Reproduced from the Norwegian report to the Storting on the effects of the tax law reforms.

Figure 6: Average Tax Rate of the top 10% income decile

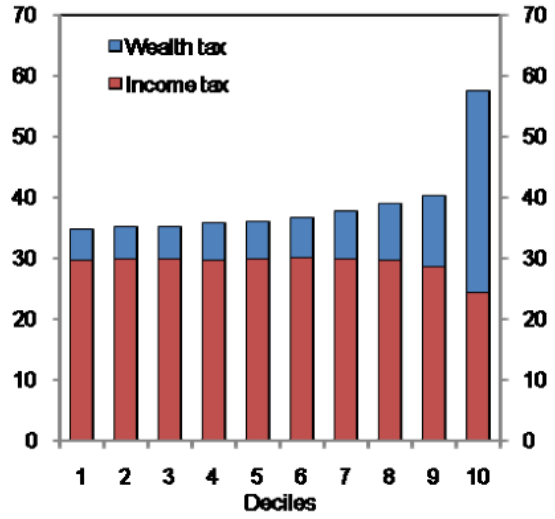


Figure as shown in Report No. 11 to the Storting: Evaluation of the 2006 Tax Reform.

The Norwegian report to the Storting on the effects of the tax reform mentions the possible negative investment effects from the wealth tax, but considers them to be less of a concern than the OECD report. The Norwegian report states that while it does not believe that the wealth tax "makes investment in Norway less interesting than investment abroad for Norwegian investors," it is concerned that the "wealth tax can to some extent limit the supply of capital to enterprises that are

obliged to resort to the Norwegian capital market… reduce(ing) the overall socio-economic return on the capital". There does remain one valuation differential that both reports suggest is problematic and will cause misallocation of investment capital, the greatly reduced valuations provided to residential property. The ultimate conclusion of the Norwegian report is that the wealth tax balances to social need for a progressive and redistributive tax system with the needs of the business community. The OECD report is more critical of the possible consequences of the wealth tax for business investment, and considers the benefits of societal equality and fairness to be of less importance.

3. Cash Constrained Models

3.1 The Sales Accelerator Model

In order to investigate if the wealth tax imposes capital constraints on small privately held firms two models were used: the sales accelerator model and the Caggese (2007) model. The standard models used in investment literature focus on either the Q model of investment or Euler Equations. Both methods are based around the maximization of the market value of equity, and use the capital market arbitrage condition as their starting point. The standard transformation attempts to explain investment in long term fixed assets as a percentage of the firm's total fixed assets, $\frac{I_{i,t}}{K_{i,t}}$, by assuming quadratic adjustment costs. It simplifies to

$$\frac{I_{i,t}}{K_{i,t}} = a_i + \frac{1}{b} Q_{i,t} + \varepsilon_{i,t} \qquad (1)$$

Where $\mathbf{Q_{it}}$ is the ratio of the market value of the firm's equity and liabilities over the book value of the firm's equity and liabilities (Perfect and Wiles, 1994), and a_i is an individual effect to allow for heterogeneous firms. Because calculation of Q_{it} requires market values for the firm, investigations into the cash constraints firms face using the Q model have focused only on publicly traded firms. Likewise the private firms currently being investigated lack the proper information necessary to calculate Q_{it}. This constraint suggests that the sales accelerator model may be the most appropriate and best performing measure of future investment opportunities available to the firm. Accelerator models assume a fixed ratio between output and capital level, at least over a small range of investment levels. Expected sales are given exogenously to the model, but are correlated with historical sales levels and historical changes in sales. Because of the assumed constant ratio an increase or decrease in the rate of sales growth is expected to provide a proportional change in the growth rate of capital

accumulation. Even with relaxed restrictions the growth rate in sales can be shown to still be related to the investment opportunities the firm has available. For this purpose both current sales and the change in sales will be tested as measures, in place of Q , to control for the firm's investment opportunities. The new investment model using the sales accelerator model becomes:

$$\frac{I_{i,t}}{K_{i,t}} = \alpha_i + d_t + \pi_1 \frac{S_{i,t-1}}{K_{i,t}} + \pi_2 \frac{C_{i,t}}{K_{i,t}} - \pi_3 \frac{D_{i,t}}{K_{i,t}} + \varepsilon_{it} \qquad (2)$$

Where I_{it} is the investment in capital, S_{it-1} is the previous period's sales and consists of the previous level of sales and the previous change in sales, C_{it} is the change in financial assets. Each of these measures are weighted by K_{it}, the firm's net capital. The firm's leverage, the ratio of the firm's debt to assets, $\frac{D_{i,t}}{K_{i,t}}$, is included to help account for the increasing cost associated with debt borrowing and the possibility of the firm exhausting their capacity for debt. α_i and d_t are dummy variables to capture individual and year specific effects respectively.

If the firm has access to the credit markets or can easily issue additional equity, the cash flow to the firm should not affect the firm's level of investment. In this case π_2 is expected to be equal to zero. If π_2 is significantly different from zero we can state that the previous change in cash position of the firm influences the investment decision, controlling for the firm's sales level, change in sales, and leverage. The most common explanation for this influence would be that the firm cannot access enough external financing to pursue all of the available investment opportunities, and is forced to wait for internal financing to accumulate. If the wealth tax increases the level of financial constraint a firm faces, a firm with a primary owner subject to the tax would be expected to have a more statistically significant π_2. The effect of leverage (π_3) is expected to be negative only for firms that are financially constrained, and may be magnified by the wealth tax.

3.2 The Caggese Model

The second model considered was built by Caggese (2007) to address the concerns associated with the non-linearity of investment in physical capital and detect if a firm was cash constrained. Both model arrive a similar reduced form equations with a measure of investment on the left hand of the equation which should be explained effectively by observable firm characteristics. Both models also contain a measure of the firm's liquidity which is theorized to have no impact on the investment decision

assuming that the firm has access to external financing. This model started not with the above capital market arbitrage model, but with the following Cobb-Douglass production function:

$$y_{i,t} = \theta_{i,t} k_{i,t}^{\alpha} n_{i,t} \qquad \text{where } \alpha + \beta < 1$$

Where $y_{i,t}$ is the firm's output measured in sales revenue, $\theta_{i,t}$ is the total factor productivity, $k_{i,t}$ is the firm's fixed long term capital, and $n_{i,t}$ is the firm's short term variable capital. Because this model focuses on types of capital investment labor in not included as an input. While $k_{i,t}$ in the Caggese model is only the fixed long-term portion of the firm's assets, it is functionally similar to $\mathbf{K_{i,t}}$ in the sales accelerator model. This is because $\mathbf{K_{i,t}}$ is the firm's total assets, and with the majority of a firm's variable capital is not capitalized, it will only capture a few asset classes that are not included in the Caggese model's fixed capital, such as inventory.

The firm's wealth is then maximized with respect to a capital constraint based to the firm's internal financial wealth on the investment level and a non-reversible condition on investments in fixed capital $\mathbf{k_{it}}$. The model found that because of the non-reversibility of long-term fixed capital it was a poor instrument for measuring a firm's capital constraints. Instead non-fixed variable capital $\mathbf{n_{it}}$ was expected to be more responsive to constraints on the firm's ability to invest and grow. Non-fixed variable capital is separated from fixed (or quasi-fixed) capital by its non-permanence. This form of "capital" is consumed by the business in the period it is purchased in and not capitalized on the books, it consists primarily of raw materials and inputs to the production process.

The final developed model by Caggese is:

$$\ln n_{i,t} = a_i + d_t + \beta_1 \ln \theta_{i,t-1} + \beta_2 \ln k_{i,t} + \beta_3 \ln w^F_{i,t-1} + \varepsilon_{i,t} \qquad (3)$$

Where the factors $\theta_{i,t-1}$, and $\mathbf{k_{i,t}}$ are from the above Cobb Douglas production function. $\mathbf{k_{i,t}}$ as included in equation (3) is similar to $\mathbf{K_{i,t}}$ used in equation (2), in that they are both measures of firm capital, but due to the assumptions used in the models $\mathbf{k_{i,t}}$ is variable capital and $\mathbf{K_{i,t}}$ is fixed long-term capital. In the Caggese model the firm's financial wealth, $\mathbf{w^F_{i,t-1}}$ is used to calculate the maximum feasible investment, which is shown to be less than the optimum investment for growing firms. Under the assumption that this constraint does not hold, and the firm has access to external

capital, then the firm's wealth is not relevant to the investment decision and β_3 is expected to be equal to zero. The derivation of this model is helpful in that it is able to directly incorporate the wealth tax as a direct decrease in the firm's stock of internal financial wealth, which implies that it will also be irrelevant to the investment decisions of non-constrained firms. The additional constraint caused by the wealth tax is expected to increase the magnitude and significance of β_3, as well as increase the number of firm's whose internal funds are no longer sufficient to cover their investment opportunities.

This model has a few concerns, primarily the simultaneity implied by the model in the determination of the optimal investment among the three factors $n_{i,t}$ and $k_{i,t}$. Another concern for the accurate estimation of the model is that $w^F_{i,t-1}$ can be deconstructed into $w^F_{i,t-2} + y_{i,t-1}$, the period $t-1$ initial wealth and the firm's net income over the period. Therefore any correlation between the firm's variable capital and the previous period's sales would be detected by β_3. This effect is compounded by the fact that cash constrained firms by definition have low financial wealth relative to their yearly income, meaning that in these firms $w^F_{i,t-1}$ will be more correlated with $y_{i,t-1}$ than $w^F_{i,t-2}$ as the previous wealth is expected to be smaller relative to the firm's income. As the stock of wealth in the firm approaches zero then the wealth available for investment at time t becomes simply the income received the previous period.

To address these concerns, Caggese suggested the model could be transformed into:

$$\ln n_{i,t} = \alpha_i + d_t + \pi_1 \ln y_{i,t-1} + \pi_2 \ln w^F_{i,t-1} + e^y_{i,t} \qquad (4)$$

This removes the co-allocated production factors at the same time as explicitly removing the effect of the previous period's income from the measure of the firm's financial wealth. In this specification the estimated coefficient π_2 will behave identically to β_3 in equation (3). Because accumulated wealth, w^F_{t-1}, may be close to zero for any firm whose constraints are such that all income is invested each period the capital constraint may also appear as an increase in π_1, the firm's responsiveness to income, between constrained and non-constrained firms. This transformation is also helpful as it aligns the two models functional forms. The estimated coefficients π_1 & π_2 perform similar roles in each

model, where π_1 captures the firm's responsiveness to market improvements and π_2 captures the excess effect of internal financing on the firm's investment decisions.

The transformation does not however correct the model's primary downside, in attempting to overcome the concerns with the responsiveness of the Q (or sales accelerator) model's focus on fixed capital investment the Caggese model has lost sight of the original question of interest, "does the wealth tax decrease long term economic performance by limiting firm level investments?" The model instead detects if the wealth tax imposes capital constraints on the firm while simultaneously claiming that those constraints have little impact on the firm's investments into long-term fixed capital capacity. Instead the capital constraints are explicitly assumed to be short term limits on the level of production output a firm can manage while still expecting the firm to be able to obtain optimal capital levels in the long-run.

3.3 The Two Models

Neither of the two models is perfect for modeling the investigated firms. The sales accelerator model focuses directly on the question of interest, the firm's investment in physical capital. This focus is also its biggest weakness, as the variation in capital investment proves difficult to fit empirical models to. The Caggese model looks at a much more smooth and responsive variable, but can only speak to the severity of the capital constraints faced by the firms. It is therefore of interest to estimate both models and compare the results in order to ascertain the effects of the wealth tax.

The similarities and differences between the two models are also worth taking a moment to consider. Both models measure a one period flow of resources as the dependent variable. In the sales accelerator model it is the change in the level of fixed capital stock, while the Caggese model looks at the amount of discretionary capital consumed during the period. Both models adjust this measure to account for non-normality in the size of businesses and their investments. In the sales accelerator model, which is based on the Q model of investing, the investment level is theorized to be related to the current size of the firm's capital stock. The Caggese model however uses the exponential nature of the Cobb-Douglas production function to argue that the variables should be log-normal.

The independent variables in each model are similar as well, both models include the previous period's performance and the net financial wealth of the firm. The sales accelerator model includes previous sales and the change in previous sales as the indicators of the firm's previous performance,

while the Caggese model simply uses the previous period's net income. The net financial wealth is separated in the sales accelerator model into the firm's financial assets and total debt, unlike the Caggese model which combines the two measures into the net financial wealth.

4. The Data

4.1 Panel Description

The anonymized data for this project was provided by Statistics Norway (SSB). It was an unbalanced panel of 31,428 individual closely held private firms for the years 2005 to 2009. The data was collated by SSB and included a mixture of firm and owner information. Because the wealth tax is a personal tax and not a direct corporate tax, each firm's accounting data was merged with the primary owner's tax liability information. The firm data consisted of end of the year accounting data, as well as information on taxes paid. The owner data contained all reported tax relevant information, including taxes paid, various types of wealth holdings, and personal and family characteristics. The primary owner of each firm was determined from the business register.

In general the 2005 observations were removed from the tests due to possible contamination from the corporate tax changes that took effect at the end of the year 2004. The exception to this rule is the inclusion of 2005 end of year accounting stock variables in the calculation of 2006's flow variables. For instance the investments made in 2006 were calculated using the change in balance sheet items from the beginning of 2006, which was 2005's end of year data, to the end of 2006, which is recorded in the system as the firm's 2006 accounting data. Most of the 2005 tax reform effects are expected to appear as flow variables during 2004 and 2005 (Alstadsæter & Fjærli, 2009), this implies that the end of year stock variables should have already taken into account any pertinent effects. Because the values are only being used as the baseline for future changes they should not provide any contaminating effects. The removal of the 2005 observations from the regressions will remove approximately a fifth of the sample size. This loss of size is preferable to allowing the possibility of confounding effects into the model estimation.

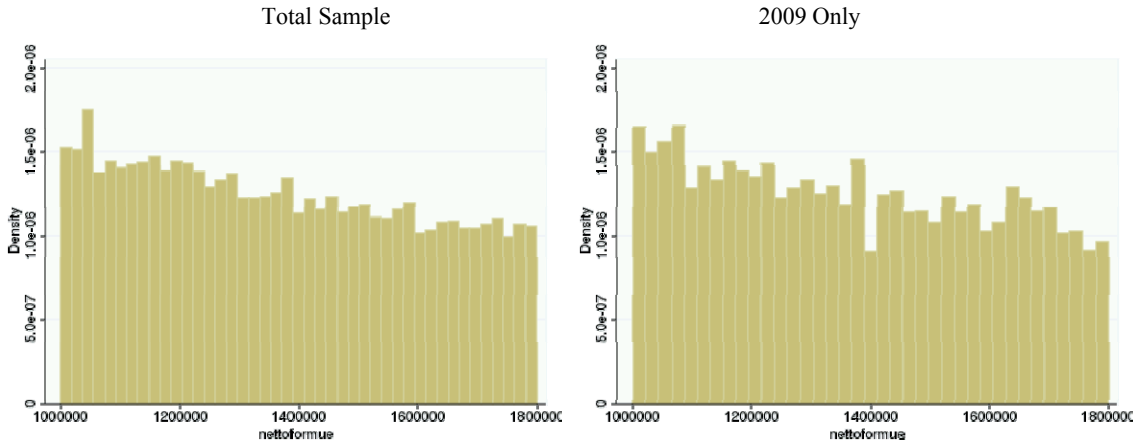
4.2 The Owner's Wealth Tax Obligation

The owner's marginal tax rate on wealth was calculated by Statistics Norway's Lotte-Skatt model. Developed originally in the 1970's the model has been an important policy tool used by the Norwegian Ministry of Finance to calculate tax effects. The model contains detailed information from

individual tax returns and the Norwegian Household Register. This information was used to simulate the change in tax due for an individual if their net worth was increased, the percentage of this additional wealth that was required to be paid as a tax was then calculated as the marginal tax rate on wealth for the individual. (Aasness, 2006)

The average marginal wealth tax rate is 0.50%, with a minimum rate of 0 and a maximum calculated rate of 2.2. The expected maximum rate was 1.1, which is the effective rate stated by Norwegian law, less than 0.5% of the sample exceeded this marginal rate and this anomaly is due to the increased wealth causing the individual to no longer be eligible for unrelated tax breaks and therefore it is an accurate estimation of the cost the individual would face from increasing their taxable net wealth. Approximately 30% of the observations have a marginal rate equal to the 1.1 maximum, and 43% have a marginal tax rate of zero, the minimum rate observed. Any firm whose primary owner has a non-zero marginal tax rate for wealth is considered to be subject to the constraint of the wealth tax for purposes of separation into research groups, even if the owner has a marginal wealth rate less than the stated rate of 1.1%.

Figure 7: Density of Net Wealth around 1.4 Million



There is evidence of tax motivated adjustment to an individual's net wealth directly at the point where it becomes taxable at 1.4 million kroner. Figure 7 is the sample density of individual net wealth around the cutoff point, first for the entire sample then for only the last year of the panel. The lower concentration of observations at 1.4 million increased each year since the 2006 change so that it is easily identifiable by 2008 and 2009. This effect may be due to a form of tax evasion where assets of higher value are not reported or underreported; alternatively it could indicate an investment

disincentive where individuals near the threshold no longer invest because the tax burden from crossing the threshold is too great.

4.3 Data Used

The two models used in this paper are the sales accelerator model

$$\frac{I_{i,t}}{K_{i,t}} = \alpha_i + d_t + \pi_1 \frac{S_{i,t-1}}{K_{i,t}} + \pi_2 \frac{C_{i,t}}{K_{i,t}} - \pi_3 \frac{D_{i,t}}{K_{i,t}} + \varepsilon_{i,t}$$

and the Caggese model

$$\ln n_{i,t} = \alpha_i + d_t + \pi_1 \ln y_{i,t-1} + \pi_2 \ln w^F_{i,t-1} + e^y_{i,t}$$

Table 2 gives an overview of the variables used in these models and how they were calculated.

Table 2: An Overview Variables and their Calculations.

α_i	Individual Dummy Variable	Provied by use of the Fixed Effects Estimator
d_t	Time Dummy Variable	
K_{it}	Total Capital Assets	Book value of fixed assets
I_{it}	Investment	ΔLong-term physical capital
S_{it-1}	Previous Sales	Sales as reported in the Accounting Register
C_{it}	Change in Cash	ΔCash as reported in the Accounting Register
D_{it}	Debt	The firm's total Liabilities
$n_{i,t}$	Change in Working Capital	ΔCurrent Assets + Expenses
$y_{i,t-1}$	Previous Net Income	Net Income as reported in the Accounting Register
$w^F_{i,t-1}$	Previous Stock Financial Wealth	Cash and Liquid Financial Assets less Outstanding Debt

The two equations were defined so that for each model the coefficient π_1 represents the firm's expected change in investment given an increase in the model's measure of business performance. In both of the models π_2 is the coefficient that is expected to be non-zero only in the presence of constraints on the firm's access to external financing.

5. Testing Specifications

In their seminal paper on firm cash constraints, Fazzari, Hubbard, and Petersen (1988) separated the firms into two groups reasoned *a priori* to either face capital constraints or not and tested for differences in the sensitivity to cash flows between the two groups. Since then this method has been standard for investigating if a firm is constrained or not. The most common separation criteria used are dividend payouts, affiliation to industrial groups or banks, the firm's size and age, the presence of bond ratings, or the degree of shareholder concentration (Schiantarelli, 1996). Of the above criteria, the average dividend payout ratio, the firm's size, age, and degree of shareholder concentration will be tested as sorting criteria.

The dividend payout is slightly problematic as the recent 2004 corporate tax law changes are expected to decrease the firm dividend payouts significantly and much of the variation in dividend levels may have been lost. The firm's size is also problematic due to the possible correlation between large firm size and large owner wealth. Because the only criterion determining if an individual owner is subject to the wealth tax, sorting by firm size may be equivalent to sorting by the owner's wealth tax status. The age and shareholder concentration are therefore expected to be the best sorting criteria.

These sorting criteria will be used to investigate three different concerns relating to the wealth tax's theorized capital constraining effects. The main theory is that the owner being subject to the wealth tax is enough to capitally constrain the firm. If this is not the case then the wealth tax is expected to at least worsen the capital constraints experienced by firms who are already experiencing difficulty accessing external credit markets. The third concern with the wealth tax is that it places an undue burden on young firms, who are the most sensitive to the availability of financing.

Using the framework of *a priori* separation each of the two models will be used to compare different groups of firms' investment decisions sensitivity to internal financing. First, each of the two models previously discussed will be estimated using the Fixed Effects estimator with the firms being separated into two groups based on the owner's wealth tax burden. If the wealth tax does not impose any additional capital constraint then the estimated value of π_2 will be identical between the two groups.

Then the firms will be separated into those expected to be constrained and non-constrained firms based on the standard sorting criteria discussed above. The firms within the constrained and non-constrained groups will then be further split into taxed and non-taxed groups based on the primary owner's wealth tax burden.

	Constrained	Unconstrained
Tax Paying	Group 1	Group 2
Non-Taxed	Group 3	Group 4

The taxed and non-taxed groups will be compared; with the expectation being that if the wealth tax does not add an additional capital constraint there should be no difference in the value of π_2 within the groups expected to be constrained or not. For these investigations to be meaningful the sorting criterion used would need to accurately separate firms into the constrained and non-constrained groups. If π_2 is not significantly different between these two groups then that sorting criterion will not provide any useful information beyond the results from the first investigation.

Testing the wealth tax's effect on firms in different stages of their lifecycle is functionally identical to the previous investigation, however requires a sorting criterion that is capable of distinguishing between firms in different lifecycle stages. The sorting criterion that will be used is the firm's ratio of retained earnings to total equity, as proposed by DeAngelo et al. (2006), who found that this measure was a highly significant proxy for the firm's lifecycle for purposes of predicting dividend payments.

6. Results

6.1 Unit Root Tests

The Harris-Tzavalis unit root test rejected the null hypothesis of the series containing a unit root, Table 3. Because the series were all found to be stationary further differencing is not required before the series can be used to estimate the model.

Table 3: Results of the Harris-Tzavalis Unit Root Test

	Investment /Assets	Sales /Assets	ΔSales /Assets	Cash /Assets	Debt /Assets	Ln(Sales)	Ln(Financial Assets)	Ln(Current Assets)
Harris-Tzavalis	-0.3598	-0.3091	-0.4859	-0.4917	-0.3664	0.1370	0.0329	-0.2836
H0: Unit Root	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The chart shows the estimated rho coefficient for the Harris-Tzavalis test above the p-value for the test

6.2 Separation by Wealth Tax Obligation

The two models, equation (2) and (4) were estimated after splitting the sample into two groups based on the owner's current wealth tax burden. The taxed group consisted of 138,226 individual observations compared to the non-taxed group's 106,085 observations.

For the sales accelerator model, the previous sales were only a significant indicator of investment level for the firms subject to the wealth tax, and the previous period's change in sales was not significant for either group. The leverage was significant and positive for each group, at the 1% level for the non-taxed group and the 5% level for the taxed firms, though the difference was not significant. The firm leverage was expected to detect the decreased investment caused by the increasing cost of debt as the leverage increases, and was therefore theorized to have a negative sign. The positive sign may indicate that the variable is instead detecting the financing structure of the firm's investment. If the firm has access to debt financing and primarily uses it to finance investments in physical capital, the leverage would increase with capital investment. This would indicate that neither group is, on average, strictly capitally constrained and that both groups still have access to the debt markets.

Table 4: the estimated investment sensitivity to cash

	Non-taxed	Significance of Difference	Taxed
Sales Accelerator Model	-.10899 **	1.76	.00344
Caggese Model	.11138 **	-2.15	.08459 **

The chart shows the estimated coefficient used to detect capital constraints in each. The column labeled "significance of difference" contains the t-test statistic of the test that the two adjacent coefficients are equal.
* Significant at 5% ** Significant at 1%

None of the coefficients were individually significantly (at the 5% level) different for this model between the taxed and non-taxed groups. The only variable found to be significantly different between the two groups at the 10% level was the change in firm cash, though the model shows that the taxed firms are less sensitive to changes in cash, the opposite of the expected result. The sign of cash, if significant, was expected to be positive, instead the only significant coefficient was negative. The investment in an unconstrained firm would be expected to be unrelated to the change in the firm's cash, the negative coefficient is therefore detecting an undue interdependence between cash and capital investment in these firms, just not the relationship hypothesized. Instead the model seems to be capturing the firm's forced tradeoff between a high level of investment and accruing financial assets. This tradeoff would be more pronounced in the firms who have lesser access to external funding and rely primarily on internal cash for investments. In this way the excess correlation between the changes in the firm's cash and its investment level would indicate not a capital constraint, but higher investment sensitivity to internal funds. Those firms whose primary owner is subject to the wealth tax were not found to have this high investment sensitivity to internal funds.

In the Caggese model both firms have a positive and significant coefficient for the net financial assets, indicating that the average firm in both groups faces capital constrained investment decisions. This model also found that the investment decisions in firms with a primary owner subject to the wealth tax are on average significantly less sensitive to the availability of internal firm financing, reaffirming the results from the Sales Accelerator Model. There are a few possible causes for this unexpected result. This outcome may be due to the wealth tax status signaling that the primary owners have additional capital available to invest. Because paying the wealth tax is based on the owner's total capital, it may be correlated with the size of the firm or other factors that would prevent the firm from being cash constrained. The final reason could be a social one, as currently only the wealthiest 17% of households in Norway pay the wealth tax this variable can be seen as an indicator of the owner being in the upper echelon of the social network. This social status may afford their businesses easier access to loans or external equity to use for investing.

The lagged value of sales in the Caggese model is significant for the untaxed firms, but has an unexpected sign, which may indicate a misspecification in the model. This coefficient is significantly different between the two groups, with the taxed group having a coefficient closer to zero than the estimated coefficient for the untaxed firms, at a 1% significance level, while still being different than zero at the 5% level.

The two models together suggest that the firms in the panel are on average subject to some amount of influence on their investment decisions based on the available financing. The long term durable assets were found to be highly collateralized for both taxed and untaxed firms, with no significant difference found between the two groups. For this asset group the firms were able to secure any needed external financing. The average firm in the non-taxed group was however found to be sensitive to the amount of internal financing available when making investment decisions. This sensitivity was significantly reduced for the firms subject to the wealth tax, with the firms in being found to have no forced tradeoff between amassing long-term physical capital and financial reserves. The differences found in the investment models between the two groups indicate that the firms whose primary owner is subject to the wealth tax have, on average, better access to external substitutes for internal financing.

6.3 The Wealth Tax Effect on Constrained Firms

In this section we attempt to address concerns that the above results are due to a correlation between the firm's tax status and other causes of capital constraints, or other indicators of capital market access. Table 5 shows the number of observations in each of the four possible groups based on the previously discussed measures of constraint and the owner's tax status. The portion of the untaxed firms that are also considered to be capital constrained is higher for each measure except the dividend measures. The biggest difference can be seen in the firms separated by the median firm size, indicating that the firms subject to the wealth tax are on average larger.

Neither the mean nor median size proved to be effective at separating the firms based on sensitivity to cash in the sales accelerator model. The subsample groups suffered from their reduced sample size, and therefore had larger standard errors than the previous non-separated estimations. The taxed group was found to be significantly more sensitive to cash flows for the subset of firms with long-term fixed assets less than the median value, however the firms in this subset cannot be said to be significantly different from the firms above the median value. The Caggese model found that the firm size was significant at separating the taxed firms into more and less financially sensitive firms, however the smaller firms were found to be less sensitive than the larger firms in both specifications. With the

exception of the group of firms larger than the median value, there was no significant difference in the capital constraints faced by the taxed and non-taxed firms, and that group found the taxed firms to be less sensitive to the firm wealth.

Table 5: Number of Observations by Group Pairing

	Unconstrained & Untaxed	Unconstrained & Taxed	Constrained & Untaxed	Constrained & Taxed	Percent Untaxed	Percent Taxed
Mean Size	10657	35200	95428	103026	90%	75%
Median Size	38536	83311	67549	54915	64%	40%
Share 1	20048	37700	86037	100526	81%	73%
Share 2	44640	68465	61445	69761	58%	50%
Dividend 1	42641	52273	63444	85953	60%	62%
Dividend 2	48169	56247	57916	81979	55%	59%

The percentage of equity held by the primary owner was a borderline significant sorting criterion for the Sales Accelerator if the constrained firms were defined as any firm where the primary owner possessed at least 50% of the total equity. The sorting criterion did not significantly detect differences in capital constraints according to the Caggese model, and the taxed firms were found to either be equivalent to the similarly sorted untaxed firms, or less sensitive to internal financing.

Table 6: The Coefficient Estimations for the Sensitivity to Internal Cash with Firms Separated by Median and Mean Size

Sales Accelerator Mean			
	Non-taxed	Significance of Difference	Taxed
Constrained	-.22948	1.40	.11032
Significance of Difference	1.35		.052
Non-Constrained	-.07686 **	0.83	.0015

Caggese Mean			
	Non-taxed	Significance of Difference	Taxed
Constrained	.07141 **	1.52	.05945 **
Significance of Difference	1.83		2.80
Non-Constrained	.00902	1.68	.12433 **

Sales Accelerator Median			
	Non-taxed	Significance of Difference	Taxed
Constrained	-.01777	2.28	-.1381 **
Significance of Difference	0.89		0.56
Non-Constrained	-.08132 **	1.31	.00229

Caggese Median			
	Non-taxed	Significance of Difference	Taxed
Constrained	.07065 **	0.90	.05753 **
Significance of Difference	0.38		2.57
Non-Constrained	.10652 **	2.07	.09556 **

The chart shows the estimated coefficient used to detect capital constraints in each model. The column and row labeled "significance of difference" contains the t-test statistic of the test that the two adjacent coefficients are equal.
* Significant at 5% ** Significant at 1%

The firm's dividend ratio proved unable to separate the firms based on the severity of their capital constraints. The taxed and non-taxed groups are not significantly different, at the 5% level, in any of the groups tested. Because the dividend policy of the firms is not of any interest outside of a possible signal of capital constraints no further information could be gained from this specification.

Table 7: The Coefficient Estimations for the Sensitivity to Internal Cash with Firms Separated by Concentration of Ownership

	Sales Accelerator Ownership >50%				Caggese Ownership > 50%		
	Non-taxed	Significance of Difference	Taxed		Non-taxed	Significance of Difference	Taxed
Constrained	-.24454 **	1.80	.00631	Constrained	.07723 **	1.35	.08083 **
Significance of Difference	1.90		1.73	Significance of Difference	0.20		1.66
Non-Constrained	-.08861 **	0.79	-.15841	Non-Constrained	.05668	0.30	.03489

	Sales Accelerator Ownership >50%				Caggese Ownership > 50%		
	Non-taxed	Significance of Difference	Taxed		Non-taxed	Significance of Difference	Taxed
Constrained	-.18163 **	2.94	.00683	Constrained	.07629 **	0.65	.08941 **
Significance of Difference	1.49		1.40	Significance of Difference	1.17		1.81
Non-Constrained	-.08743 **	0.29	-.07136	Non-Constrained	.08709 **	3.40	.04591 **

The chart shows the estimated coefficient used to detect capital constraints in each model. The column and row labeled "significance of difference" contains the t-test statistic of the test that the two adjacent coefficients are equal.
* Significant at 5% ** Significant at 1%

Table 8: The Coefficient Estimations for the Sensitivity to Internal Cash with Firms Separated by Dividend Payment Ratio

	Sales Accelerator Dividend Payment < 5% of Income				Caggese Dividend Payment < 5% of Income		
	Non-taxed	Significance of Difference	Taxed		Non-taxed	Significance of Difference	Taxed
Constrained	-.11656 **	0.04	-.09425	Constrained	.07388 **	1.88	.05147 **
Significance of Difference	0.99		0.02	Significance of Difference	1.35		1.15
Non-Constrained	-.00282	0.44	.01984	Non-Constrained	-.0238	1.02	.29231 **

	Sales Accelerator Dividend Payment < 10% of Income				Caggese Dividend Payment < 10% of Income		
	Non-taxed	Significance of Difference	Taxed		Non-taxed	Significance of Difference	Taxed
Constrained	-.11407 **	0.08	-.10822	Constrained	.08927 **	2.09	.0512 **
Significance of Difference	0.51 0.613		0.05 0.959	Significance of Difference	1.60		1.11
Non-Constrained	-.05315 *	1.67	.02011	Non-Constrained	.02108	0.70	.2225 **

The chart shows the estimated coefficient used to detect capital constraints in each model. The column and row labeled "significance of difference" contains the t-test statistic of the test that the two adjacent coefficients are equal.
* Significant at 5% ** Significant at 1%

If the firms are separated into constrained and non-constrained groups based on the classical distinction of capital constraint for a firm, the act of paying a dividend during the period, we find that the separation criterion performs poorly. The firms which pay dividends are on average no more sensitive to the internal financing of the firm than those that retain their earnings. The finding of increased sensitivity to internal financing for firms paying a dividend in the Caggese model, presented in Table 9, contradicts the earlier findings of no difference and is difficult to discuss as the dividend payment is not a valid indicator of capital constraint. Without the separation criterion validly distinguishing between the constrained and non-constrained firms, the proper measure of the effect of the wealth tax would be the results from the total sample presented in Section 6.2.

Table 9: The Coefficient Estimations for the Sensitivity to Internal Cash with Firms Separated Into Those Paying or Not Paying Dividends in the Current Period

	Sales Accelerator				Caggese		
	Non-taxed	Significance of Difference	Taxed		Non-taxed	Significance of Difference	Taxed
Constrained	-.06579	0.75	-.37399	Constrained	.21473 *	0.96	.03029
Significance of Difference	0.14		0.79	Significance of Difference	1.10		0.77
Non-Constrained	-.09635 *	1.60	-.00159	Non-Constrained	.05947 **	2.21	.0737 **

The chart shows the estimated coefficient used to detect capital constraints in each model. The column and row labeled "significance of difference" contains the t-test statistic of the test that the two adjacent coefficients are equal.
* Significant at 5% ** Significant at 1%

Overall the standard separation criteria proved to be ineffective at distinguishing between the capitally constrained and non-constrained firms. Despite these limitations, in every subset tested the firms subject to the wealth tax were either equivalent to or less sensitive to internal financing than the untaxed firms.

6.4 The Wealth Tax and Immature Firms

The firm's lifecycle measure, as defined by the ratio of retained earnings to total equity, remained as poor at categorizing the firms into more and less capital sensitive as the more traditional measures. This may be due to the arbitrary nature of the decision of where to place the cutoff point, as the theory states no exact level of retained earnings that indicates a firm has left the growth phase. The cutoff points defined split the untaxed firms evenly, while the taxed firms skewed largely to the unconstrained end of the spectrum. This indicates that these firms have either been operating longer, are significantly more profitable, or their financing structure relies more heavily on debt financing than contributed equity.

Table 10: Number of Firms by Group

	Untaxed	Taxed
Unconstrained LC1	61,512	109,066
Constrained LC1	44,573	29,160
Unconstrained LC2	56,948	103,704
Constrained LC2	49,137	34,522

The financial responsiveness of the taxed firms in the sales accelerator model was not found to be significantly different from zero for any of the groups. The investment in non-constrained firms was less sensitive to the firm's cash flow than the non-taxed group at the 1% level, while the capitally constrained groups were not significantly different. The standard error calculated for the constrained firms subject to the wealth tax was much greater than the standard errors for the other groups, which indicates the firms in this group vary widely in their capitally constrained status, compared to the other groups.

The less mature firms, in this instance indicated as capitally constrained, subject to the wealth tax were found to only vary significantly from their non-taxed compatriots in their estimated coefficient of leverage; the significance is not great though, with a p-value of 0.063 and only for using the more restrictive separation criteria. The value of leverage for both groups is, as was discussed in Section 6.2, positive, indicating that the variable is capturing the firm's financing structure rather than the capital constraints. If the significance is not spurious this would lend support to the observation that firms subject to the wealth tax use more debt financing, or have easier access to debt financing in the early stages of their growth. The regressions for the unconstrained firms found the leverage irrelevant in the investment models.

The Caggese model showed a curious effect, while the lifecycle indicator was unable to predict the level of constraint the firm faces, it does find that more mature firms are more sensitive to internal capital when investing. This finding is consistent between the two definitions used to separate firms. This may either be an indication of the wealth tax increasing the firm's capital constraints, or it may simply be the model detecting a correlation between the growth of working capital and financial assets in the more mature firms. The Caggese model has consistently found the investment of firms in the sample to be sensitive to changes in the firm's net financial assets.

Table 11: The Coefficient Estimations for the Sensitivity to Internal Cash with Firms Separated by Their Ratio of Earned Equity to Contributed Capital

	Sales Accelerator Earned Equity < 5% of Contributed Capital		
	Non-taxed	Significance of Difference	Taxed
Constrained	-.10036 **	0.94	-.61275
Significance of Difference	0.29		0.96
Non-Constrained	-.08785 **	4.34	.00614

	Caggese Earned Equity < 5% of Contributed Capital		
	Non-taxed	Significance of Difference	Taxed
Constrained	.08690	0.27	.11978 **
Significance of Difference	1.90		0.20
Non-Constrained	.05477 **	4.83	.07176 **

	Sales Accelerator Earned Equity < 20% of Contributed Capital		
	Non-taxed	Significance of Difference	Taxed
Constrained	-.11366 **	1.67	-.89567
Significance of Difference	0.62		1.72
Non-Constrained	-.08939 **	4.30	.058939

	Caggese Earned Equity < 20% of Contributed Capital		
	Non-taxed	Significance of Difference	Taxed
Constrained	.05147	0.64	.07462 *
Significance of Difference	0.67		0.94
Non-Constrained	.05466 **	2.22	.07284 **

The chart shows the estimated coefficient used to detect capital constraints in each model. The column and row labeled "significance of difference" contains the t-test statistic of the test that the two adjacent coefficients are equal.
* Significant at 5% ** Significant at 1%

6.5 Other Findings

In addition to the wealth tax making investment more sensitive to the financial assets of the firm, there is a possibility that the additional cost associated with the tax may make a firm less responsive to market opportunities. Since knowing the actual investment opportunities are impossible the above models used the firm's sales as a proxy for the firm's investment needs. If a firm subject to the wealth tax cannot take advantage of these opportunities as well then the coefficient in front of sales measure multiplied by the wealth tax dummy in the Chow specification test should be negative and significant. The results in Table 12 show that for the sales accelerator model the investment responsiveness to sales is not significantly different from zero, while in the Caggese model the coefficient for the constrained groups is significant and positive. Therefore the taxed firms are found to be more responsive to sales if sorted by common indicators of capital constraints. Given that the separation criteria proved incorrectly specified in all cases, the best measure for the difference in responsiveness to sales is the estimated coefficient for the total, non-sorted panel.

The coefficients in front of the previous period's sales and the change in sales in the sales accelerator model were not significantly different from zero, meaning that a firm's investment in physical assets was not appreciably less responsive to changes in firm performance if the owner pays the wealth tax. The Caggese model estimated the coefficient of the taxed sales as 0.10, a positive and significant value at a 1% confidence level. The coefficient of sales for the non-taxed firms in the panel was significant and negative, with an estimated value of -0.23. This means that the taxed firms are less responsive to sales, however the untaxed firms are estimated to be responding negatively to sales when investing.

Table 12: Responsiveness to sales

Model	SA – Unconstrained	SA – Constrained	Caggese – Unconstrained	Caggese – Constrained
Size 1	.018	.037	.021	.084 **
Size 2	.0057	.0093	.137 **	.071 **
Share 1	.058	.040	.012	.120 **
Share 2	.032	.166 **	.098 **	.110 **
Dividend 1	-.268	.078 *	.086	.082 **
Dividend 2	-.248 *	.071	.097	.087 **
Dividend 3	-.0006	-.018	.105 **	.192 *
Lifecycle 1	.111 **	.036	.063	.076 **
Lifecycle 2	.103 **	.038	.088 **	.157 **

The estimations of the coefficient for sales multiplied by the wealth tax indicator variable.
* Significant at 5% ** Significant at 1%

7. Conclusion

In almost all tested specifications the firms whose primary owner paid the wealth tax were less likely to be sensitive to the internal financing when making investment decisions; these firms did not face the same tradeoff between amassing physical productive capital and financial assets. This effect persisted even after the firms were split into groups based on their expected *a priori* status of capital constraints. The firms in the panel, however, proved to not be separable into constrained and unconstrained using conventional methods. This may be an indication that traditional measures such as size and agency costs may be less relevant for small privately held firm's access to external financing. The wealth tax indicator proved to be the best criteria for separating firms based on their sensitivity to internal financing, though the effect was not in the direction expected.

Because the two models proved to be poor predictors of firm behavior in this panel, it is possible that this paper's inability to find any increased capital constraints from the wealth tax is simply due to the model's poor fit. It is also possible that the wealth tax is an indicator of the owner's social status and financial capacity, both of which would give a small private firm an advantage in accessing to external credit.

The findings in this paper are not a causal relationship, but a correlation. Regrettably the 2004/2005 corporate tax overhaul in Norway, combined with the short timeframe of the available panel made fully exploiting the wealth tax law change to determine a causal relationship impossible. Even without a causal relationship the findings are of policy importance. Because the wealth tax only affects the individual firms within the sample found to be the most robust to changes in internal financing, the wealth tax should not place a capital constraint on the businesses it affects. The tax was also not associated with an excess burden on the less mature firms, as the firms in this subset subject to the wealth tax were not significantly more sensitive to the availability of internal financing than the nontaxed firms but were shown to be more responsive to changes in market conditions.

In all, no evidence was found to support the claim that the wealth tax increases the capital constraints that a firm faces. The findings suggest that non-financial and unobservable characteristics of the firms owned by payers of the wealth tax may allow these firms better access to external resources and to rely less on internal financing than other small private firms. Alternatively the findings could simply indicate that the models used are ill suited to explaining the behavior of non-public firms. If the firms subject to the wealth tax are in fact less reliant on internal funding, then by only taxing the most robust private firms in a market the wealth tax may have less of a negative impact on investment than a corporate income tax which raises a similar level of revenue. This is because a flat corporate income tax will always distribute more of the tax burden on to firms that are more vulnerable.

References

Aasness, Jørgen, John K. Dagsvik and Thor O. Thoresen. 2006. The Norwegian tax-benefit model system LOTTE. *Research Department, Statistics Norway*.

Alstadsæter, Annette and Erik Fjærli. 2009. Neutral Taxation of Shareholder Income? Corporate Responses to an Announced Dividend Tax. *International Tax and Public Finance*, Vol. 16, pp 571-604

Caggese, Andrea. 2007. Testing Financing Constraints on Firm Investment using Variable Capital. *Journal of Financial Economics*, Vol. 86, pp. 683-723

Cummins, Jason G., Keven A. Hassett, and R. Glenn Hubbard. 1996. Tax Reforms and Investment: A Cross-Country Comparison. *Journal of Public Economics*, Vol. 62 pp. 237-273

DeAngelo, Harry, and Linda DeAngelo, Rene M. Stulz. 2006. Dividend Policy and the Earned/Contributed Capital Mix: a Test of the Life-Cycle Theory. *Journal of Financial Economics*, Vol. 81, pp. 227-254

Eurostat. 2009. Taxation Trends in the European Union. ISBN 978-92-79-11171-6

Fazzari, Hubbard, and Petersen. 1988. Financing Constraints and Corporate Investment, *Brookings Papers on Economic Activity*, Vol. 1988, No. 1, pp. 141-206

Hall, Robert E., and Dale W. Jorgenson. 1967. Tax Policy and Investment Behavior. *The American Economic Review*, Vol. 57, No. 3 pp.391-414

Hansson, Åsa. 2002. The Wealth Tax and Economic Growth. *Working Papers,* Department of Economics, Lund University

Hansson, Åsa. 2008. The Wealth Tax and Entrepreneurial Activity, *Journal of Entrepreneurship*, Vol. 17 pp. 139-156

Isaacs, Barry L. 1977. Do We Want a Wealth Tax in America, *University of Miami Law Review*, Vol. 32

Joumard, Isabelle. 2002. Tax Systems in European Union Countries, *OECD Economic Studies*, No. 34

Kocherlakota, Narayana R. 2005. Zero Expected Wealth Taxes: A Mirrlees Approach to Dynamic Optimal Taxation. *Econometrica*, Vol. 37, No. 5 pp.1587-1621

Michalos, Alex C., The Case for a Progressive Annual Net Wealth Tax. *Public Affairs Quarterly*, Vol. 2, No. 2 (April 1988), pp. 105-140

Mieszkowski, Peter. 1969. Tax Incidence Theory: The Effects of Taxes on the Distribution of Income, *Journal of Economic Literature*, Vol. 7, No. 4 pp. 1103-1124

Nerlove, Marc, Assaf Razin, Efraim Sadka, and Robert K. von Weizsacker. 1993. Comprehensive Income Taxation, Investments in Human and Physical Capital, and Productivity, *Journal of Public Economics*, Vol. 50 pp. 397-406

Norwegian Ministry of Finance. 2011. Report No. 11 to the Storting: Evaluation of the 2006 Tax Reform

OECD. 2012. OECD Economic Surveys: Norway 2012, *OECD Publishing*. doi: 10.1787/ eco_surveys-nor-2012-en

Pecorino, Paul. 1993. Tax Structure and Growth in a Model with Human Capital. *Journal of Public Economics*, Vol. 52 pp. 251-271

Perfect, Stephen B. and Kenneth W. Wiles. 1994. Alternative constructions of Tobin's q: An empirical comparison. *Journal of Empirical Finance*, Vol. 1, Issue 3-4, pp. 313-341

Pichet, Eric. 2007. The Economic Consequences of the French Wealth Tax. *La Revue de Droit Fiscal*, Vol. 14, p. 5, April

Schiantarelli, Fabio. 1996. Financial Constraints and Investment: A Critical Review of Methodological Issues and International Evidence. *Oxford Review of Economic Policy*

Slemrod, Joel, William G Gale, and William Easterly. 1995. What Do Cross-Country Studies Teach about Government Involvement, Prosperity, and Economic Growth?, *Brookings Papers on Economic Activity*, Vol. 1995, No. 2 pp.373-431

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Return to:
Statistisk sentralbyrå
NO-2225 Kongsvinger

From:
Statistics Norway

Postal address:
PO Box 8131 Dept
NO-0033 Oslo

Office address:
Kongens gate 6, Oslo
Oterveien 23, Kongsvinger

E-mail: ssb@ssb.no
Internet: www.ssb.no
Telephone: + 47 62 88 50 00

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