The impact of tax incentives on economic activity of entrepreneurs

Jarkko Harju and Tuomas Kosonen

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Abstract

Based on existing evidence, we know little of how taxation of small businesses affect the economic activity of their owners. To shed new light on this topic, this paper studies the effect of two Finnish tax reforms in 1997 and 1998 on economic growth, employment and profit margins of small businesses. The reforms affected the income tax burden of business owners by changing the share of income taxed as capital income. The tax changes applied only to noncorporate firms, leaving corporations out. Therefore we are able to use difference-in-differences strategy to estimate a causal impact of tax incentives on economic activity of small businesses. The change in incentives grew with the size of the firm, enabling us to study heterogeneous treatment effects. The results imply that lighter taxation leads to a modest increase in turnover and profit margin of firms, but no significant increase in employment.

Government institute for economic research (VATT)

1 Introduction

Small businesses are seen as one key source of economic growth. For this reason, myriad economic policies have been devoted to promote this growth (Buss 2001). Various theories exist about which kind of activity in small businesses leads to economic growth and how this can be affected with taxation. One explanation is that taxation affects risk taking opportunities of entrepreneurs (Cullen and Gordon, 2007), and another is that taxation affects opportunities for maintaining external funds (Carpenter and Petersen, 2002). The puzzle is that major share of entry is made by firms that never grow very large. Therefore, from perspective of economic growth, the few firms that eventually grow large are important. This paper argues that one reason for small firm to grow larger relates to economic activity of entrepreneur. This activity can be promoted or hindered with taxation in a similar way than labor effort of employees. We establish this in a theoretical model and study empirically how much output of firms react to changes in tax burden of entrepreneurs.

We are interested in determinants of real economic activity decisions of entrepreneurs. Earlier literature has established that the effect of tax system on effort of entrepreneurs is ambiguous (Carroll *et al.* 2001) and depend on type of entrepreneur and opportunities (Kanniainen *et al.* 2007). Earlier literature has not succeeded in making it clear how much and in what way real economic activity of entrepreneurs can be promoted through taxation. We build a simple theoretical model that answers this question. In the model it is essential that entrepreneur can affect her own tax burden and consumption opportunities either through increasing effort or shifting income from one period to another. The former is a real economic decision that entails utility cost on top of consumption opportunities, while the latter merely affects lifetime consumption timing opportunities as well as tax planning. We establish that in this environment more lenient taxation can increase or decrease effort, a real economic activity, put forward by an entrepreneur. This depends on how forward looking the entrepreneur is.

Empirically entrepreneurs and small businesses have turned out to be

elusive to analyze. The first problem is to identify the effect of taxation on behavior of small businesses. We contribute to this by being able to analyze two Finnish reforms that affected taxation of unincorporated firms but left taxation of corporates intact. Therefore we can apply natural experimental approach that allows us to get rid of the severe endogeneity problems usually present in correlation between taxes and firm outcomes. We compare estimate how large change in outcome was associated with tax change of certain size and control for unobserved changes by comparing with similar firm that only has different legal form than the treated firm.

The second problem is to observe actual economic activity. We have access to firm level tax record data that include output of firms. Thus we contribute by assessing how much changes in taxation affected output of small businesses. We argue that increase in output value of firm is first indication of economic growth. We can then confirm our results by checking with other firm level information such as profit margin and cost characteristics.

The results indicate that decreasing marginal tax rate of an entrepreneur increases turnover from her firm. Our main specification that compare partnerships with companies indicates that 10 reduction in marginal tax rate leads to 2 percent increase in turnover. The result for smaller sole proprietors is zero. we also find that more lenient taxation led to increase in profit margin. Wage sums increase, but especially for partnerships there is no indication of employing more personnel.

Earlier literature has established that more progressive income taxation reduces the willingness to take risk, and thus would lead to less entrepreneurial activity (Kerr and Nanda 2009) and lower economic growth (Cullen and Gordon 2007). Our results indicate that more progressive taxation might also reduce the entrepreneurial effort and affect economic growth in that way. Carroll et al. (2001) find a large elasticity on gross receipts from the firm. However, our empirical result that is able to control for many selection problems do not indicate a very large elasticity. Moreover, the result is significant only for a fraction of firms.

Apart from changing their output, an entrepreneur could respond by tax planning. One indication of this kind of activity is that more firms choose

legal forms that are more leniently taxed (Gordon and Mackie-Mason 1994). The dead-weight loss resulting from taxation has been empirically studied by regressing tax differential of different legal forms on share of legal forms (Mackie-Mason and Gordon 1997, Goolsbee 1998b and 2004). As one outcome we check how much tax reforms affected the switching of legal forms, as well as entry and exit behavior. We do find that switching from partnerships to corporations was significantly reduced after the reform that made partnerships more leniently taxed than before. We also find that the number of firms that switch their legal status is so small that the switching behavior does not affect our main result of changes in output in large number of treated firms.

We also contribute to literature studying policies that aim to boost employment directly. The 1997 reform added part of the wage sum to the income splitting rule, therefore making taxation of those firms having higher wage sums more lenient. Earlier papers have analyzed policies where payroll taxes paid by companies are reduced. The results indicate that employment increased only very modestly, if at all (Korkeamäki and Uusitalo 2009). Bennmarker *et al.* (2009) found that wages increased as a result of payroll tax abolishing, but employment did not. This is in line with our result from partnerships. Also, Duranton *et al.* (2011) find that increases in local tax rates can reduce labor demand of firms.

The rest of the paper proceeds as follows: section 2 presents the macroeconomic conditions at the time of the reforms, describes the institutional aspects of firm taxation and presents a theoretical model that describes how an entrepreneur would respond to changes in tax incentives. Section 3 presents the econometric specification and discusses identification issues. Section 4 presents the data and descriptive statistics derived from them. Section 5 presents the preliminary results and section 6 concludes the study.

2 Economic conditions and institutions

2.1 Macroeconomic situation surrounding the reforms

The mid 1990s were a period of economic growth in most developed countries. This is true for Finland as well, but the deep recession between 1991 and 1993 makes Finnish situation particular; the economy was just recovering from it in 1997.

The severity of recession and the subsequent growth can be seen from figure 1, where the development of Finnish GDP per capita and unemployment rate is compared with neighboring Sweden and the OECD average. The vertical line marks year 1997, when the first reform studied here took place. In early 1990s in Finland GDP fell heavily and unemployment rose compared to other countries. Finland experienced a very deep recession. However, when the reforms of 1997 and 1998 targeting partnerships and sole proprietors took place, the Finnish economy had been already growing for few years. Note also that there is no visible deviation from the general time trends in Finland on 1997 or 8. This indicates that the reforms did not have significant and immediate macroeconomic consequences. This is not a concern for the current study, since the reform was targeted to small part of Finnish economy. Moreover, significant macroeconomic effect would have weakened our identification strategy, since then the general equilibrium effects would have caused a concern, a feature that we could not control for.

2.2 The institutional background and reforms

The income tax system in Finland for income from firms is a variant of imputed income method (Boadway and Bruce, 1984) or a variant of comprehensive business income tax (Auerbach *et al.* 2010). It is called Dual Income Tax (DIT) system and has been in place since 1993 (Kanniainen et al. 2007). In DIT income from a company is taxed as a part of personal income, which is different from an allowance for corporate equity (ACE) system. Income from firm is split into capital and earned income by a predetermined rule (Lindhe et al. 2004). The split is made according to a fixed share of net

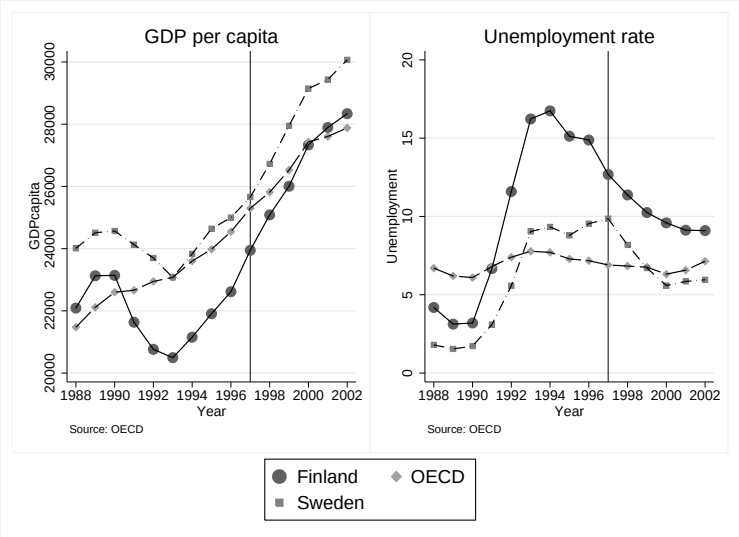


Figure 1: GDP per capita and unemployment in Finland, Sweden and OECD average over time.

assets of previous year. The earned income tax is progressive with highest marginal tax rates being over 60 % and capital income tax proportional 28 % in 1997. Therefore when total income is high enough, earned income is substantially more heavily taxed than capital income.

The reforms in 1997 and 1998 affected the income split rule from unincorporated firms. The 1997 reform had been planned for a while, but the details were changed last minute (HE 105/1996). It was only in September 1996 that the government announced that there is going to be a new tax rule, where part of the wage sum is added to the net assets of the firm. Thus the firms did not have time to anticipate this reform. The law was passed in last weeks of 1996 and there was not much discussion about it in Finnish news papers prior to the end of 1996.

In 1996, prior to the reform, a sum of 15 % of net assets of previous year was considered as capital income. This changed in 1997 to 18 % of net assets. Even larger change was that 30 % of the wage sum of previous year was added to net assets. Therefore marginal tax rate declined for all entrepreneurs who had an unincorporated firm and who had enough income so that their earned income tax rate was higher than capital income tax rate.

The change can be presented as a formula as follows:

$$CI = p(A + xWL)$$

where CI is capital income, A assets and WL wage sum. The 1997 reform increased p from .15 to .18 and x from 0 to .3.

The 1998 reform ended a transit rule where long term debt had been added to the asset side of net assets (ITL 1992). Therefore the 1998 reform reduced the net assets of an affected firm, contrary to the 1997 reform. As a result the tax burden increased for firms that had any long term debts and whose earned income tax rate was higher than capital income tax rate. The transit rule was created in a law that took effect from the beginning of 1993. This is the same law that created the dual income tax system for unincorporated firms.

The total marginal tax rate for the income from the firm is defined as the marginal tax paid from marginal increase in income. It depends on how much it is splitted into capital income and how high is the marginal tax rate on earned income. The latter depends on the total earned income of the taxpayer. Figure 2 presents four different scenarios of total marginal tax rate and how this changes in the dual reforms. The dip in the marginal income tax schedules occurs when the earned income tax rate kicking in, that is lower than capital income tax rate for the lowest incomes. The total marginal tax rate features two polar cases depending on the size of net assets. It is possible that some firms have so much net assets that they only pay capital income taxes. On the other hand, if they do not have positive net assets, they only pay taxes according to earned income tax schedule. These polar cases are neither interesting for the analysis, since we are interested in cases where marginal tax schedule shifted due to change in splitting into earned and capital income.

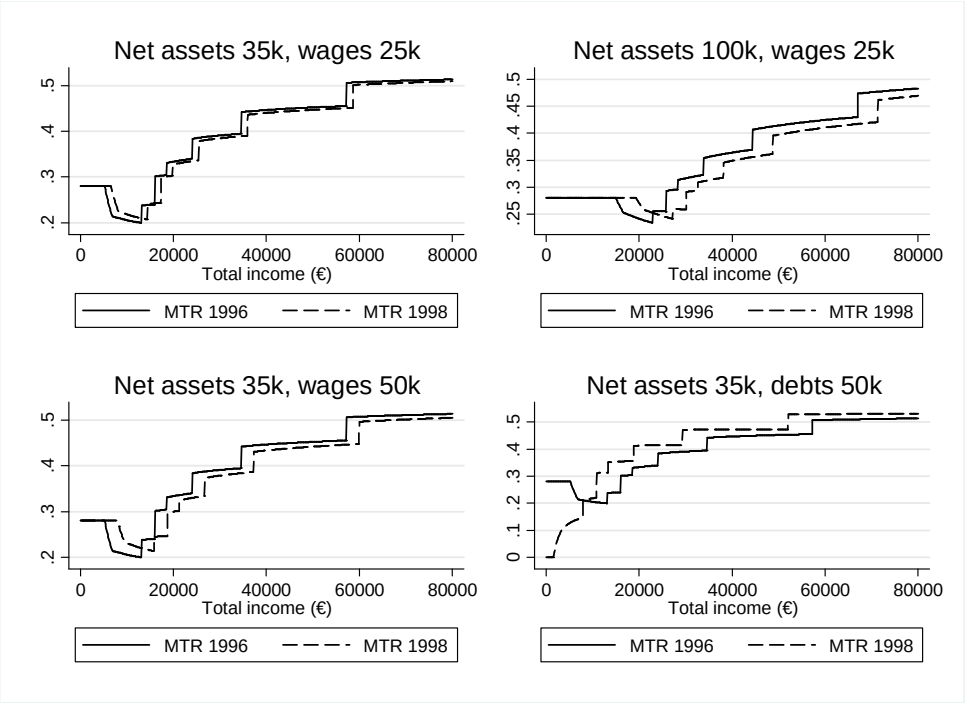


Figure 2: Marginal tax rates before and after the two reforms

Note: Each panel shows marginal tax rate schedule of total income from unincorporated company before and after the two reforms in 1997 and 1998. Figure presents four different combinations that affect the splitting rule between capital and earned income.

The two reforms affected the marginal income schedule depending on the size of net assets, wages and long term debts in the firm. It is evident that the 1997 reform, which affected net asset rule through wages and increasing the share of capital income, eased the tax burden of everyone high enough in the marginal tax schedule. On the contrary, for those having low income, the reform increased the marginal tax rate. It is also evident that for those that had high enough long term debts and high enough income, the reform increased marginal tax rates.

At the time of the reforms, firms could not choose how the income split was made. However, they could engage in tax planning by altering their net assets, or after the 1997 reform, by increasing their wage sum. Firms can naturally choose their legal form, thus they could switch to less taxed legal forms. In Finland, prior to the 1997 reform, it was thought that corporate

firms were tax favored. Part of the motivation for the 1997 reform was to restore the tax neutrality across legal forms of firms.

2.3 Model of entrepreneurial choices

We investigate the effects of the 1997 and 1998 tax reforms with a theoretical model. The idea of the model is to focus on the choices an entrepreneur makes in imputed income method type of tax system as Kanniainen *et al.* (2007) did. Carroll et al. (2001) also focused on changes in entrepreneurial effort decisions as a response to changes in tax system as we do. The distinction with our model from earlier literature is that we let entrepreneurs to affect their own tax rate through tax planning as well as make the choice to alter their effort choices.

We employ a two period model, since the tax system affects and depends on time dependent decisions, like saving. The model will highlight how time preference, alternative return to savings and tax rules together affect the effort and saving choices of an entrepreneur. The model abstracts from the details of tax system, since the idea is to focus behavior of an entrepreneur in a world of imputed income method tax system. However, we retain enough structure from the actual Finnish tax structure in the model, so that theoretical results can be linked with empirical ones below.

In the model there is an utility maximizing entrepreneur. She produces income by exerting effort in a firm. Entrepreneur enjoys utility from consumption and dislikes effort. There are two periods. In the first period the entrepreneur makes relevant production choices and may transfer negative or positive income to the second period either within firm or from own consumption. In the second period world ends and the entrepreneur enjoys the consumption from savings and exogenous income and assets. The idea of this model is to look at the effect of the special tax rule, that allows taxes to be affected by income transfers within a firm, on the choices of the entrepreneur.

An inter-temporal utility function is written into separable utility form

$$u(c_1) + h(e_1) + \delta u(c_2)$$

where $c_1$and e_1 refer to consumption and effort in period 1 and c_2 consumption in period 2. The utility function has following properties: $u_c > 0$, $u_{cc} < 0$, $h_e < 0$ and $h_{ee} < 0$. The discount rate is $0 < \delta < 1$.

The entrepreneur has a firm that produces income y_i in period $i = 1, 2$. In the first period the entrepreneur produces in the firm using effort. The production function is proportional in effort and is denoted ne_1, $n > 1$. In the second period the entrepreneur earns only exogenous income Y. The entrepreneur can also transfer income from period 1 to period 2 using two different income transfers. The first is to transfer amount of m income within firm. This also reduces the exogenous assets A already in the firm. Income transfer m captures the possibility to increase net assets A within firm over time. The net assets A left in firm are consumed in the second period. The second method to transfer income is to save or dissave amount R from private consumption with interest rate $r > 1$. The incomes from the firm for the two periods are denoted as follows:

$$y_1 = ne_1 - m$$

$$y_2 = Y + m$$

The entrepreneur consumes the income from the firm, but needs to pay taxes from that income. The periodic budget constraints are written as follow:

$$c_1 = y_1 - T_1(y_1, \mu(A - m)) - R$$

$$c_2 = y_2 - T_2(y_2, \mu(A + m)) + rR + A$$

The tax functions and their effect on endogenous variables are the focus of this model. The periodic tax function T_i in period i depends on two arguments; income y_i and net assets within firm $\mu(A - m)$. The special tax rule is affected by the income m transferred from period 1 to period 2. This transfer is multiplied by a parameter μ that reflects the share of net assets used to calculate the share of income liable to capital income tax. We denote

$T(y, \mu(A-m)) = T(y, A)$ to simplify the notation. The more income is transferred within firm, the smaller is tax burden due to the special tax rule ($\frac{\partial T}{\partial m} = T_m < 0$) and this relationship is constant in income ($T_{mm} = 0$)[1]. We also assume $T_\mu < 0$ and $T_{\mu\mu} < 0$. This special tax rule captures the effect the tax policy has that increasing the net assets in the firm allows larger share of profits being taxed at capital income tax rate. For most of the entrepreneurs capital income tax rate is lower than the alternative earned income tax rate, and therefore the special tax rule of the model mimics the real world tax rule we are studying. Finally note that the special tax rule does not affect income saved from private consumption R, which is again similar to the actual tax reform.

We insert the for the consumptions in the utility function from the periodic budget constraints and get as the inter-temporal objective function:

$$\begin{aligned} U &= u_1\left(ne_1 - m - T_1\left(ne_1 - m, A\right) - R\right) + h(e_1) \\ &+ \delta u_2\left(Y + m - T_2\left(Y + m, A\right) + rR + A\right) \end{aligned}$$

We first present conditions from FOCs for tax rates and m. Inserting from 3 to 4, it follows:

$$r\left(1 - T_{1y} - T_{1m}\right) = 1 - T_{2y} - T_{2m}$$

This condition reveals that the net of tax rates in the two periods are linked by the interest rate.

We are interested how these choice variables change as a consequence of marginal change in the policy variable μ. The second order condition and derivation of the following results is presented in the Appendix 6. By utilizing Cramer's rule we get the following results:

$$\frac{\partial e_1^*}{\partial \mu} \gtreqless 0 \Rightarrow \frac{T_{1\mu}}{T_{2\mu}} \gtreqless \delta r \frac{u_{2cc}}{u_{1cc}}$$

[1]The main results are of the same sign even with $T_{mm} > 0$. They are not presented here, since this assumption introduces complicated terms without adding anything interesting to the model.

and

$$\frac{\partial m^*}{\partial \mu} \gtrless 0 \Rightarrow \frac{T_{1\mu}}{T_{2\mu}} \gtrless \delta r \frac{u_{2cc}}{u_{1cc}}$$

These results imply that the special tax rule increase effort in the first period and the positive income transfer within firm when the marginal effect of special rule on tax rate is larger in period one than in period two and when second derivative of utility is smaller in period two than in period one. With concave utility and special tax rule functions, these conditions are fulfilled when more income is transferred from period one to period two. The kind of entrepreneur that cares more about future consumption is more likely to fulfill this.

Therefore this model predicts that the tax reform that increases the imputed capital income as a function of net assets increases effort and thus economic growth for those firms that are relatively forward looking. If some entrepreneurs care a lot more about the present than the future, this reform could decrease effort and economic growth, and also net assets of the firm. The intuition for this is that the reform makes the first period taxation lighter and the entrepreneur wants to consume this extra income immediately and need to exert less effort as a consequence. This is the income effect dominating substitution effect result.

3 Econometric specification

3.1 Treatment and control groups

As described in the institutional setting section the tax reforms were designed for partnerships and sole proprietors. Therefore, the firms with these legal forms comprise the treatment group. Corporations comprise the control group, which were not affected by the reforms. The reforms affected the marginal tax rate structure on income from unincorporated firms while it remained constant for corporated firms. Therefore we can analyze the effects of marginal tax rates on firm level outcomes by comparing the changes in taxes and outcomes between these two groups before and after the reform.

3.2 Difference in difference

We apply difference-in-differences (DD) approach with continuous treatment to find out the causal effect marginal tax rates have on the treated unincorporated firms. Basic DD approach just compares treatment and control groups before and after the reform. Since we have rich variation in marginal tax rates due to the reforms, we regress the size of the change in marginal tax rates on outcomes of both groups. The model includes the basic DD approach in that the change in marginal tax rate for control group is zero. We will estimate the following equation:

$$\triangle lny_{it} = \alpha_i + \epsilon \triangle lnMTR(I_{96})_{it} + \beta_2 X_{it} + \upsilon_t + \nu_{it} \quad (1)$$

where y represents an outcome of firm i in year t. We focus on logarithmic turnover, since it is a key variable describing output of a firm. Other outcomes are wage bill, profit and investment. The main explanatory variable is change in log marginal income tax rate, which coefficient ϵ can be interpreted directly as an elasticity with respect to marginal tax rate. X contains a list of control variables coming from account data of the firm. α_i indicates that we utilize fixed-effects specification to control for firm-specific effects. Therefore, with the differential specification that we utilize, this includes firm specific trends. Furthermore, υ_t indicates that we include year fixed effects to control for flexible time trends that is common to all firms. ν_{it} is the residual error term.

The observed marginal tax rates are endogenous, since they depend directly on income. To solve this problem, we utilize changes in marginal tax rates that do not depend on behavior of the firm. We rather use changes in tax law arising from the two reforms. We apply to past (from year 1996) income and other determinants of marginal tax rates the tax laws of different years (1997 and 1998), as Gruber and Saez (2002) did.

Equation 1 identifies the effect of taxes have on outcome variables provided that treatment and control groups would have behaved over time in similar way in the absence of the reforms [2]. Since the estimated equation is

[2]Our approach differs from elasticity of taxable income literature in that we can com-

in difference form and it is estimated using fixed-effects procedure, we can control for time trends that is general for one firm in all observed years. Note that we do not need all firms to develop in the same direction before the reforms, we only need their behavior to stay similar than before the reform in the absence of the reform. When there are changes in these trends that occur at the time of tax reforms, we assign these changes to be caused by tax variable. If we did not have the corporations in the control group, the method we use would not be possible, since the taxation of all firms with similar observable characteristics would have changed in the same way and we could not separate the changes in outcome from general time trends.

3.3 Potential identification problems and solutions

We apply DD strategy and thus the normal DD assumption need to apply; control group should represent the counterfactual of what would have happened to treatment group in absence of the reform. Since we can control for observed time trends of firms, this assumption is most likely violated if there are unobserved shocks affecting the control group at the time of the reforms. In principle the only difference between treated and untreated firms is the legal form. As a consequence they are observationally part of the same economy, face the same fluctuations coming from the global economy and changes in market conditions like demand for their products. In principle there could be differences between these groups and changes in conditions they face. One is international trade. If other group e.g. has a lot of international customers and subsidiaries abroad and other does not, the groups could experience different shocks. we therefore exclude large corporations that have international activity from our sample.

To further convince that our approach works, we present a preview on our data. Figure 3 presents the main estimation approach that compares the growth rate of turnover in the two groups over time. The plot is from an interaction of year dummies and a dummy for being in a control group in

pare firms with similar income instead of comparing e.g. rich firms with poor firms. (Gruber and Saez 2002, Saez 2003, Kopczuk 2005 and Pirttilä and Selin 2011).

fixed effects regression on change in log turnover. The figure demonstrates that partnerships in the treatment group grew slower than corporations in control group. Then at the time of the 1997 reform this changed so that the two groups grow at the same phase. It is reassuring that apart from the change in 1997, the relative growth rates stay constant.

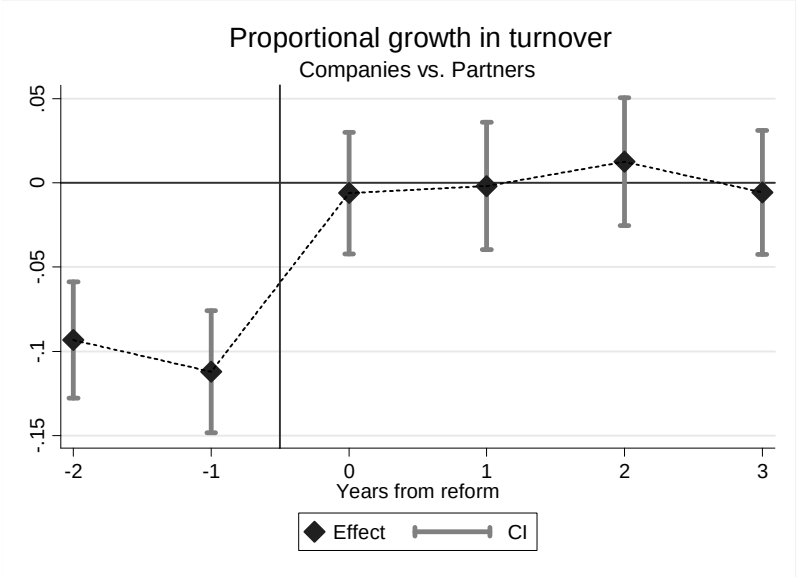


Figure 3: Turnover relative to 1997 reform between treatment and control groups

Note: Figure compares proportional change in turnover between partnerships in treatment group and companies in the control group. The effects are from fixed effect regression where change in logarithmic turnover is regressed against interaction between year and treatment group indicators. The confidence intervals are 95 % interval from robust standard errors.

Potential problems are selection into exit, selective entry or switching legal form. We can account for these potential selection biases by modeling how the entry, exit and switching decisions depend on changes in the average tax rates. These are of interest by themselves, since these extensive margin responses are potential channels of responding even if they do not affect the responses along the intensive margin. We then take prediction of this effect and include it in the main intensive margin regression as Carroll *et al.* (2001) did for exit. If this extra term affected the marginal tax rate variable in the main regression, it would indicate that these extensive margin decisions are

driving the result.

We impute the marginal tax rates for each year according to tax law of that year and 1996 income and net assets information from each firm as explained above. This might lead to measurement error, if we make a mistake in imputing process. Standard solution in literature (Gruber and Saez, 2001) is to instrument the actual tax rate with the imputed tax rate and use variation from this to explain the changes in outcomes. We present also these instrumented results after the main DD results as a robustness check. DD estimates are the main estimates, because it is more transparent what that estimation uses as an identifying variation. Furthermore, we perform DD estimates using just indicator of treatment group instead of marginal tax rate variable to convince that measurement error in tax variable is not driving the results.

4 Data description

We perform the estimations on comprehensive tax record panel data for years 1994 to 2000. The data come from the Finnish Tax Administration and they include every firm liable to taxation in Finland. The data set contains information on the financial statements and tax records of Finnish businesses, as well as some information on taxation of business owners.

The data contains all important tax information for our analysis. We observe income from the firm, net assets, wage bill and long term debts that influence the marginal tax rates. For partnerships we observe in addition income of the firm owner earned from other sources than the firm. The most relevant outcome for our analysis in the data is turnover of the firm. This variable captures how much output the firm made and therefore is a good indication of economic activity of the firm.

4.1 Descriptive statistics

Table 1 presents descriptive statistics of the three most interesting variables in the data: turnover, profits and wage bills pooled between years 1996

and 1998. Table is for main estimation sample that is restricted by firms needing to have both earned and capital income in 1996. Table is divided according to legal form of the firm. Partnerships and sole proprietors are in treatment group and corporations in control group. It is evident that sole proprietors make the largest fraction of the data but they are smallest in value of measured variables. There are comparable fraction of partnerships and corporations, latter including on average largest firms.

The most important explanatory variable in our analysis is the imputed MTR. Imputed MTR is calculated exploiting variation due to the reform in net assets. As described in 2.2 wage sum affects the net assets 1997 onwards and long term debts affect the net assets 1998 onwards. Imputed net asset is calculated using 1996 firm level turnover, income from the firm, wage bill and long term debts but using different tax rate schedules for each year. We observe all of these variables in the data. However, for sole proprietor owners we have only total income from the firm and not other income from other sources which can affect the calculated assets. Thus, the imputed net assets for sole proprietors is only a proxy for the net assets. For partnership owners we observe also income from other sources than from the firm.

Figure 4 describes how the imputed net assets changed proportionally due to the reforms from 1996 to 1998. The net assets are imputed using financial information from 1996 and applying tax laws if different years, same as our main explanatory variable. The variation in net assets arises due to the inclusion of wages and exclusion of long term debts into the net assets. As figure shows, the reforms induced a lot of variation in net assets. Evidently most of the firms did face an increase in their net assets. Total marginal tax rates decreased for firms which net assets increased and that had higher marginal tax rate on earned income than on capital income (see 2).

By using these imputed net assets we are able to calculate the marginal tax rates for every firm for each year in the data. The correct measure of total marginal tax rate is weighted average of marginal tax rates on earned and capital income marginal tax rates. We weight the imputed marginal tax rates by the share of income earned as a capital and labor income. We use this variation to estimate the effect of the reform on the activity of the

Firm type	Statistics	Turnover	Wages	Profits	Imputed net assets	Imputed MTR
Partnership	Mean	235478	24436	24335	26454	0,379
	N	161830	202295	202295	24422	102437
	SD	668617	81510	248589	67287	0,075
	No. Firms	53812	53812	53812	53812	53812
Sole	Mean	63440	3895	13309	6750	0,247
proprietors	N	659419	802343	802343	106666	590513
	SD	220737	42343	21818	21102	0,148
	No. Firms	159104	159104	159104	159104	159104
Corporations	Mean	435453	76156	41084	45188	0,302
	N	386213	388083	388083	51749	250956
	SD	968182	196308	293986	428557	0,156
	No. Firms	71625	71625	71625	71625	71625
Total	No. Firms	284541	284541	284541	284541	284541

Table 1: Descriptive statistics

entrepreneurs. The imputed variables are describe in figure 2 and statistics of imputed marginal tax rates are in table 1.

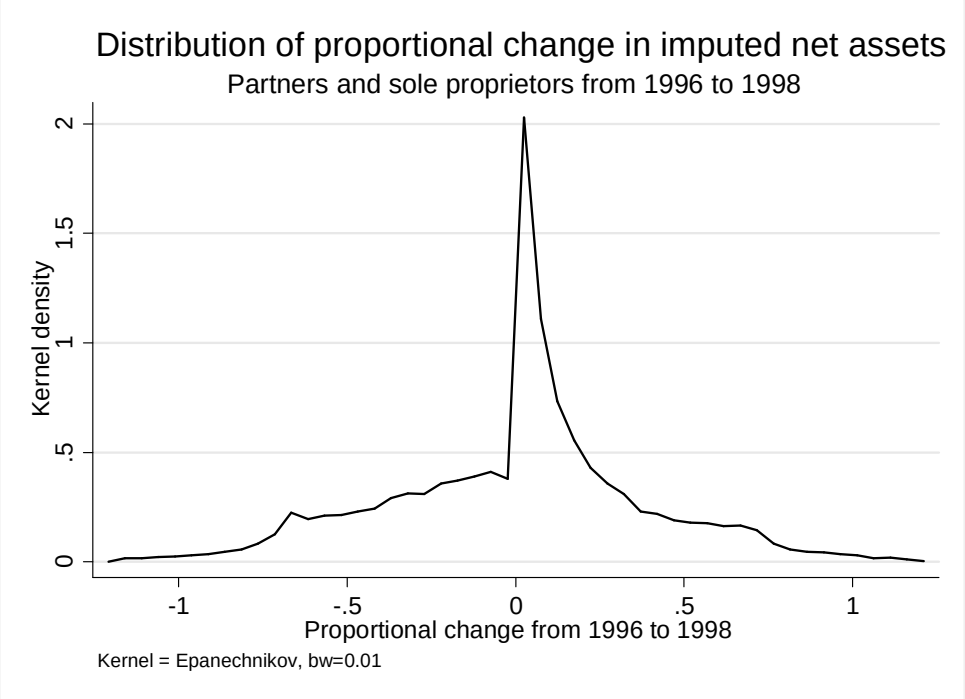


Figure 4: Distribution of proportional change in imputed net assets

Note: Figure shows the distribution of change in logarithmic imputed net assets from 1996 to 1998 due to the double reform. Values of underlying net assets, wages and debts are taken from 1996 and imputed according to reformed rules for each firm.

5 Results

We perform estimations by applying the natural experimental method described in section 3 on firm level data described in section 4. All outcomes are in change of logarithmic form. Therefore the results are about changes of growth rates in outcome variables. The main explanatory variable is change of log of imputed marginal tax rate. Thus the coefficient on this variable can be interpreted as an elasticity with respect to marginal tax rate.

Table 2 presents the main estimation results on turnover. Column (1) presents the differences-in-differences (DD) result where the explanatory variable is a DD dummy. A positive coefficient indicates that the turnover started to grow faster in unincorporated firms after the reform than in corporated firms relative to situation before the reform. Columns (2) through (4) present

	(1)	(2)	(3)	(4)
△lnMTR		-0.029	0.038	-0.173***
		(0.045)	(0.092)	(0.051)
DD	0.074***			
	(0.007)			
N	702,472	641,070	572,562	263,967
R^2	0.024	0.026	0.025	0.034
N of firms	159,856	144,044	128,146	56,355
Groups	S, P, C	S, P, C	S, C	P, C

Note: Fixed effects regressions using as outcome change in log of turnover and applying robust standard errors. Column (1) is on a DD indicator comparing all unincorporated with corporated firms before and after the reform. Columns (2) - (4) use the imputed tax variable as main explanatory variable. Column (2) includes the whole estimation sample, column (3) excludes partnerships and column (4) sole proprietors. All estimations are performed with a comprehensive set of control variables including year dummies, trend for net assets, other income, rent expenses, purchasing expenses and fixed expenses.

Table 2: Main estimation results

specifications with using the imputed tax variable as explanatory variable. The columns are for different sample of firms. Our main estimation result is in column (4), where partnerships are compared with corporations and the sample is restricted to include only those who have both capital and labor income in 1996. The coefficient on tax variable is -0.17, which is also the estimated elasticity of turnover with respect to marginal tax rate. The results are very robust for controlling with various covariates.

To check against potential identification problems discussed in section 3, we present various robustness checks in table 3. The robustness checks include same specification as in main estimates, but check against various potential biases. Columns (1) and (2) are instrumental variables regressions, where observed marginal tax rates are instrumented with imputed marginal tax rates. The first stage is strong and the result on turnover have not been affected from main estimation results in table 2. Thus it seems that measurement errors in tax variable do not cause concern for our strategy.

Columns (3) and (4) control for exit / entry and legal form switching behavior. This is done by regressing predicted tax variable against survival

	(1)	(2)	(3)	(4)	(5)	(6)
△lnMTR	-0.204***	-0.023	-0.121**	-0.193***	-0.002	0.030***
	(0.052)	(0.043)	(0.052)	(0.052)	(0.090)	(0.010)
1st stage	0.997***	1.082***				
	(0.028)	(0.015)				
Exit/entry			1.022***			
			(0.200)			
Switch				1.118**		
				(0.442)		
N	200,265	570,264	263,946	263,946	109,667	302,682
R^2	-0.005	0.023	0.035	0.035	0.027	0.017
N of firms	40,208	120,832	56,345	56,345	49,029	123,949
F test	1100.17	2385.33				
Groups	P, C	S, P, C	P, C	P, C	P, C	S, P, C

Note: Fixed effects regressions using as outcome change in log of turnover and applying robust standard errors. Columns (1) and (2) presents instrumental variable estimates where actual marginal tax rate is instrumented by the imputed marginal tax rate. Column (3) presents the main estimates added with a control for exit and entry of firms. Column (4) adds a control for switching legal form to main estimates. Columns (5) and (6) presents a placebo estimate where reform is pretended to have happened in 1999. Otherwise same specifications as in main estimates are used.

Table 3: Robustness of the results

probabilities in the sample in case of entry / exit and against probability of switching legal form in case of switching. Predicted values from these first stage regressions are then included in the main estimations. We find that mostly our main results are unaffected in these checks, although coefficient in column (3) is slightly closer to zero.

Columns (5) and (6) present a placebo result where the reform is pretended to have happened in 1999 instead of 1997. This is achieved by moving the actual imputed tax variables forward in the data. We find zero when comparing partnerships and companies and small positive number for the whole sample. Thus we conclude that unobserved shocks do not seem to be driving our results.

After documenting how marginal tax rates affect turnover of unincorporated firms, we are interested to see which other outcomes are affected by the reform. Table 4 presents results on profit, wage sum, number of employees,

investment and assets performed in similar way than column (4) in table 2. The results imply that profits increased due to more lenient taxation. The implied elasticity is -0.37, which higher in absolute value than for turnover. If the profit response would have been smaller than for turnover, it could have indicated that the turnover result came from increased costs due to higher price level for inputs. Now that the response is larger, it implies that entrepreneurs responded to lower marginal tax rate by increasing both output of the firm and affecting other determinants of profits, like decreasing costs or selling assets.

Wage sum and number of employees are performed only for indicator variables for firm legal form interacted with reform indicator. This standard DD type of analysis was thought to suit better for these outcomes since it is not clear how marginal tax rates should affect wage sums that partly determine marginal tax rate. We find positive effect for wage sums in treatment groups indicating that the reform that mostly made taxation more lenient for these groups have increased wage sums. On the other hand the number of employees result is negative for sole proprietors and zero for partnerships. These results do not find any indication of increased labor demand. The positive wage sum effect may arise from higher salaries to employees or to entrepreneurs themselves.

Results on investments are negative on assets positive, but neither is significant. These weak results go in natural direction, but it seems that firms responded more through affecting profit and wage margins than with these other outcomes.

Table 5 presents results on turnover divided by the marginal tax rate in 1996. The group in first column had marginal tax rate below 30% and for them the reforms did not reduce the marginal tax burden. Consequently, it is not surprising that we find no effect on their turnover. It is interesting to observe how the effect increases when we move up in the tax rates when going towards right in the table. The higher the marginal tax rate the higher was the income prior to reforms. This introduces potential mean reversion problem, so that the results should be interpreted cautiously. However, since we each time can control with companies that had just as high marginal tax

	Profit	Wage sum	Employment	Invest	Assets
△lnMTR	-0.366***			-0.430	0.023
	(0.068)			(0.265)	(0.040)
DD proprietors		0.075***	-0.067***		
		(0.012)	(0.010)		
DD partners		0.158***	-0.006		
		(0.012)	(0.009)		
N	206,031	346,933	298,422	141,382	221,359
R^2	0.051	0.020	0.021	0.002	0.034
N of firms	51,932	87,524	75,470	43,365	53,990
Groups	P, C	S, P, C	S, P, C	P, C	P, C
X	Yes	Yes	Yes	Yes	Yes

Note:Results are from fixed effects regressions o
log profit, wage sum, number of employees, inv
with a comprehensive set of control variables th
other income, rent expenses, purchasing expe
errors are used throughout.

Table 4: Other outcomes

rate before the reform, but did not face changes in the tax system due to reforms. This reduces the potential mean reversion and related problems.

	TO1	TO2	TO3	TO4
△lnMTR	0.136	-0.191**	-0.436***	-0.899***
	(0.173)	(0.082)	(0.167)	(0.276)
N	65,066	54,680	28,915	51,938
R^2	0.027	0.036	0.035	0.059
N of firms	13,409	11,250	6,024	10,909

Table 5: Results divided by pre-reform size

Note: Fixed effects regressions on change of log turnover. Tax variable is log of the imputed marginal tax rate. The results are according to marginal tax rate in 1996. TO1 indicates a group that had lowest marginal tax rate (below 30 %) and TO4 a group that had highest marginal tax rate.

Table 5 presents the results on survival and switching legal form probabilities. More lenient taxation affects survival probability positively. Switching is from partnerships to corporations only, since we do not observe that from sole proprietors. The result indicates that this switching behavior reduced with more lenient taxation. The coefficient is not very large in economic terms, though. This indicates that other factors influence switching proba-

	Survival	Switch
△lnMTR	-0.135***	0.021***
	(0.005)	(0.001)
N	2,287,416	2,287,416
R^2	0.212	0.007
N of firms	381,236	381,236

Note: Fixed effects regressions on indicators for survival in the sample and switching from partnership to company. Regressions do not include additional controls, since these are not observed for non-surviving firms. Tax rate is imputed for firms according to observable characteristics of other firms.

Figure 5: Results: Survival and Switch

bility more than tax system.

6 Conclusion

This paper explored the determinants of entrepreneurial activity. The key question in this study was: how much entrepreneurial effort can be promoted by means of taxation. The idea was to link this effort decision with economic growth coming from small businesses.

Theoretical model implied that an imputed income method tax system increases effort decisions if the entrepreneur is forward looking enough. The intuition from the model is that effort decision is real economic decision that entails utility cost. An entrepreneur could respond with less utility cost by saving within firm. In certain cases marginal tax rate can still affect marginal effort decisions.

This prediction was then studied using empirical data. Two Finnish tax reforms affecting only unincorporated firms provided exogenous variation in tax burden of entrepreneurs. The main result supports the theory in that economic activity of larger firms seem to have increased due to more lenient taxation. The elasticity of turnover with respect to marginal tax rate was -0.2 for this group. Small sole proprietors did not react to the reform, which had negligible impact on their marginal tax rates.

We conclude from the main results that economic growth coming from small businesses can indeed be affected through taxation. However, combin-

ing the small elasticity and the fact that some firms did not react to changes in tax system at all indicates that the changing the tax system alone is not very strong method to affect economic growth. This conclusion is local describing the marginal effects of marginal changes in tax rates. Larger regime changes might affect effort decisions differently and affect other behavioral margins, like risk taking more.

Taking entry and exit decisions into account do not change the main estimation results. Interestingly, the reforms influenced legal form switching decisions; less firms switched from partnerships to corporations after the reform. This is expected since the reform made the taxation of partnerships more lenient. However, the number of switchers is small and controlling for them does not influence our main results.

The results for wage sum and number of employees indicate that more lenient income taxation for an entrepreneur did not affect labor demand, but increased wage sums modestly. Entrepreneurs reacted to tax incentives by increasing their profit margin. We did not find significant effects on investments and assets. All these results on other outcomes than turnover indicate that entrepreneurs mostly reacted through affecting their effort and somewhat through tax planning.

The divided sample results revealed that those that higher marginal tax rates prior to reform and consequently larger change in their tax burden due to reform responded more. This is intriguing result. It indicates that there could be some optimization frictions present. With larger change in incentives the entrepreneurs respond more.

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Appendix: First order conditions and Cramer's rule derivations

Take the inter-temporal objective function:

$$\begin{aligned} U &= u_1\left(ne_1 - m - T_1\left(ne_1 - m, A\right) - R\right) + h(e_1) \\ &+ \delta u_2\left(Y + m - T_2\left(Y + m, A\right) + rR + A\right) \end{aligned}$$

Next we take first order conditions with respect to e_1, R and m:

$$\frac{\partial U}{\partial e_1} = u_{1c} n\left(1 - T_{1y}\right) + h_e = 0 \tag{2}$$

$$\frac{\partial U}{\partial R} = -u_{1c} + \delta u_{2c} r = 0 \tag{3}$$

$$\begin{aligned} \frac{\partial U}{\partial m} &= -u_{1c}(1 - T_{1y} - T_{1m}) + & (4) \\ &\quad \delta u_{2c}\left(1 - T_{2y} - T_{2m}\right) = 0 & (5) \end{aligned}$$

We take the second order conditions form the first order conditions

$$\frac{\partial^2 U}{\partial e_1 \partial e_1} = -u_{1c} n^2 T_{1yy} + u_{1cc}\left(n\left(1 - T_{1y}\right)\right)^2 + h_{ee} < 0$$

$$\frac{\partial^2 U}{\partial e_1 \partial m} = \frac{\partial^2 U}{\partial m \partial e_1} = -u_{1cc}\left(n\left(1 - T_{1y}\right)\right)\left(1 - T_{1y} - T_{1m}\right) + u_{1c} n T_{1yy} > 0$$

$$\frac{\partial^2 U}{\partial R \partial R} = u_{1cc} + \delta u_{2cc} r^2 < 0$$

$$\frac{\partial^2 U}{\partial e_1 \partial R} = \frac{\partial^2 U}{\partial R \partial e_1} = -u_{1cc} n \left(1 - T_{1y}\right) > 0$$

$$\frac{\partial^2 U}{\partial m \partial m} = u_{1cc}(1-T_{1y}-T_{1m})^2+\delta u_{2cc}(1-T_{2y}-T_{2m})^2+u_{1c}\left(-T_{1yy}\right)+\delta u_{2c}\left(-T_{2yy}\right) < 0$$

$$\frac{\partial^2 U}{\partial R \partial m} = \frac{\partial^2 U}{\partial m \partial R} = u_{1cc}\left(1 - T_{1y} - T_{1m}\right) + \delta r u_{2cc}(1 - T_{2y} - T_{2m}) < 0$$

The sign of determinant H need to be negative for the second order conditions of this model to be fulfilled

$$H = \begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial e_1} & \frac{\partial^2 U}{\partial e_1 \partial R} & \frac{\partial^2 U}{\partial e_1 \partial m} \\ \frac{\partial^2 U}{\partial R \partial e_1} & \frac{\partial^2 U}{\partial R \partial R} & \frac{\partial^2 U}{\partial R \partial m} \\ \frac{\partial^2 U}{\partial m \partial e_1} & \frac{\partial^2 U}{\partial m \partial R} & \frac{\partial^2 U}{\partial m \partial m} \end{vmatrix}$$

We insert to the second order conditions the arbitrage condition derived from first order conditions that $r\left(1-\tau\right) = 1 - \tau + T_A(A)$. With a little bit of manipulation, we get the following signs for the terms of determinant H:

$$\begin{aligned} H \;=\; & \underbrace{\frac{\partial^2 U}{\partial e_1 \partial e_1}}_{-} \underbrace{\begin{vmatrix} \frac{\partial^2 U}{\partial R \partial R} & \frac{\partial^2 U}{\partial R \partial m} \\ \frac{\partial^2 U}{\partial m \partial R} & \frac{\partial^2 U}{\partial m \partial m} \end{vmatrix}}_{+} - \underbrace{\frac{\partial^2 U}{\partial R \partial e_1}}_{+} \underbrace{\begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial R} & \frac{\partial^2 U}{\partial e_1 \partial m} \\ \frac{\partial^2 U}{\partial m \partial R} & \frac{\partial^2 U}{\partial m \partial m} \end{vmatrix}}_{+} \\ & + \underbrace{\frac{\partial^2 U}{\partial m \partial e_1}}_{+} \underbrace{\begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial R} & \frac{\partial^2 U}{\partial e_1 \partial m} \\ \frac{\partial^2 U}{\partial R \partial R} & \frac{\partial^2 U}{\partial R \partial m} \end{vmatrix}}_{+} < 0 \end{aligned}$$

Note that the sign of the first line appears ambiguous. However, the sign of H determinant is negative, as long as the following condition is fulfilled from the second square since the first to terms dominate the second square

determinant

$$\frac{\left(1+\frac{1}{r}\frac{T_{2yy}}{T_{1yy}}\right)(1-T_{1y})}{(1-T_{1y}-T_{1m})} < 1+\delta r^2\frac{u_{2cc}}{u_{1cc}}$$

two terms in absolute value.

Now that we have the sign of the H determinant, we derive the effects the parameters of the model has on endogenous choice variables using the Cramer's rule. First we write down the effect a parameter μhas on first order conditions.

$$U_{R\mu} = u_{1cc}T_{1\mu} - \delta u_{2cc}rT_{2\mu}$$

$$U_{m\mu} = u_{1cc}T_{1\mu}(1-T_{1y}-T_{1m}) - \delta\left(u_{2cc}(1-T_{2y}-T_{2m})T_{2\mu}\right)$$

Here we have assumed that $T_{ym}, T_{mm} = 0$ and $T_m < 0$, the special tax rule affects tax function in a negative and linear way. Utilizing a condition from FOC it follows that $U_{R\mu}(1-T_{1y}-T_{1m}) = (1-T_{1y}-T_{1m})(u_{1cc}T_{1\mu} - \delta u_{2cc}rT_{2\mu}) = U_{m\mu}$. The effect on changing μ on optimal effort is:

$$\frac{\partial e_1^*}{\partial \mu} = \frac{\begin{vmatrix} 0 & \frac{\partial^2 U}{\partial e_1 \partial R} & \frac{\partial^2 U}{\partial e_1 \partial m} \\ -U_{R\mu} & \frac{\partial^2 U}{\partial R \partial R} & \frac{\partial^2 U}{\partial R \partial m} \\ -U_{m\mu} & \frac{\partial^2 U}{\partial m \partial R} & \frac{\partial^2 U}{\partial m \partial m} \end{vmatrix}}{H}$$

$$\frac{\partial e_1^*}{\partial \mu} = U_{R\mu}\begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial R} & \frac{\partial^2 U}{\partial e_1 \partial m} \\ \frac{\partial^2 U}{\partial m \partial R} & \frac{\partial^2 U}{\partial m \partial m} \end{vmatrix} - U_{m\mu}\begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial R} & \frac{\partial^2 U}{\partial e_1 \partial m} \\ \frac{\partial^2 U}{\partial R \partial R} & \frac{\partial^2 U}{\partial R \partial m} \end{vmatrix}$$

This complicated calculation is manipulated into:

$$(u_{1cc}T_{1\mu} - \delta u_{2cc}rT_{2\mu})$$
$$\left(\frac{\left(u_{1cc}(1-T_{1y})\left(T_{1yy}+\frac{1}{r}T_{2yy}\right)\right)}{(1-T_{1y}-T_{1m})}\right)$$

where the second line is always negative. Therefore the effect of special tax rule on effort is determined by the first term. The effect is positive as long as

$$\frac{\partial e_1^*}{\partial \mu} \gtrless 0 \Longleftrightarrow \frac{T_{1\mu}}{T_{2\mu}} \gtrless \delta r\frac{u_{2cc}}{u_{1cc}}$$

Similar calculation is done for m. The Cramer's rule produces following determinant, which sign need to be determined:

$$\frac{\partial m^*}{\partial \mu} = \frac{\begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial e_1} & \frac{\partial^2 U}{\partial e_1 \partial R} & 0 \\ \frac{\partial^2 U}{\partial R \partial e_1} & \frac{\partial^2 U}{\partial R \partial R} & -U_{R\mu} \\ \frac{\partial^2 U}{\partial m \partial e_1} & \frac{\partial^2 U}{\partial m \partial R} & -U_{m\mu} \end{vmatrix}}{H}$$

$$\frac{\partial m^*}{\partial \mu} = U_{R\mu} \begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial e_1} & \frac{\partial^2 U}{\partial e_1 \partial R} \\ \frac{\partial^2 U}{\partial m \partial e_1} & \frac{\partial^2 U}{\partial m \partial R} \end{vmatrix} - U_{m\mu} \begin{vmatrix} \frac{\partial^2 U}{\partial e_1 \partial e_1} & \frac{\partial^2 U}{\partial e_1 \partial R} \\ \frac{\partial^2 U}{\partial R \partial e_1} & \frac{\partial^2 U}{\partial R \partial R} \end{vmatrix}$$

The effect of special tax rule on m^* turns out to depend on the same condition as on e^*:

$$\frac{\partial m^*}{\partial \mu} \gtrless 0 \Longleftrightarrow \frac{T_{1\mu}}{T_{2\mu}} \gtrless \delta r \frac{u_{2cc}}{u_{1cc}}$$