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THE ACHILLES HEEL OF THE DUAL INCOME TAX: THE NORWEGIAN CASE*

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The dual income tax provides the self-employed individual with large incentives to participate in tax minimizing income shifting. The present paper analyses the income shifting incentives under the Norwegian split model when real capital investments are risky. It concludes that high-income self-employed individuals can incorporate and use the legal form of a widely held corporation as a tax shelter. In addition, real capital investments with a low risk profile are means to shift income from the labor income tax base to the capital income tax base for the high-income self-employed. (JEL: H24, H25, H32)

1. Introduction

In contrast to the global income tax, which levies one tax schedule on the sum of income from all sources, the dual income tax levies separate tax schedules on income from labor and capital. It combines a low proportional tax rate on capital income with a progressive tax rate on other income, mostly labor income. The dual income tax was introduced in the Nordic countries in the early 1990ies.[1] Later Austria, Belgium, Iceland, Italy, Israel, Japan, and Portugal have introduced tax systems that are similar to a dual income tax, with separate tax schedules for labor income and capital income. As stated by Sørensen (1994), the taxation of small businesses is the Achilles Heel of the dual income tax.[2] For medium and high income classes, there is a large difference in the marginal tax rates on capital and labor income, providing great incentives for income shifting from labor income to capital income in order to minimize tax payments. Thus a system for imputing the return to capital and labor in small businesses is required to counteract this kind of income shifting and erosion of the tax base. The challenge is which imputation system to choose, and in particular,

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[1] *The dual income tax was introduced in Sweden in 1991, Norway 1992, and Finland 1993. The idea originated in Denmark, and was implemented in their 1985 tax reform. Later they introduced a hybrid system, mostly due to redistributive concerns. See Sørensen (1994, 1998) for more on the dual income tax.*

[2] *But, as Boadway (2004) states, the problem of dealing with personal business income is one that plagues virtually every tax system.*

how to set the imputation rate. This has previously been analyzed under two related tax systems. Bond and Devereux (1995, 2003) show that under a tax system with allowance for corporate equity, the imputed rate of return to capital that ensures investment neutrality is the risk free nominal interest rate on government bonds. Panteghini (2001), on the other hand, shows that the neutral imputation rate under the dual income tax system must be higher when investments are irreversible, which is an argument in favor of additional risk compensation in the imputation rate.

The Nordic countries have implemented different income splitting systems to impute the return to labor and capital for small businesses. The present paper uses the Norwegian imputation system as an example and analyzes how the dual income tax induces the sole proprietor to participate in tax minimizing income shifting in the presence of technology risk. It concludes that the widely held corporation serves as a tax shelter for high-income self-employed individuals. The higher the business income of the self-employed and the higher the difference between the marginal tax rates on labor and capital, the larger is the tax-minimizing incentive to incorporate. Real capital investments also serve as means to shift income from the labor income tax base to the capital income tax base for the high-income self-employed. The risk compensation under the split model is an investment tax subsidy, and it counteracts the investment disincentives of the technology risk and increases the investment level of the self-employed. The latter result formalizes the verbal analysis of Hagen and Sørensen (1998), who argued that owners of sole proprietorships and closely held corporations cannot diversify risk to the same extent that owners of widely held corporations, and that they are risk averse. Hence sole proprietors and closely held corporations might under-invest in risky capital compared with the social optima.[3] Even though the Norwegian variant of the dual income tax and the imputation system are used as an example, the results and the discussion have relevance for other countries as well, both the Nordic countries and other countries contemplating introducing the dual income tax.

This issue has been studied by authors in the other Nordic countries as well. Kari (1999) analyzes the Finnish income splitting model and shows that it provides entrepreneurs who face high marginal tax rates with high investment incentives. Lindhe, Södersten and Öberg (2004) present all the Nordic income splitting models and analyze their effects on the cost of capital of different types of firms in the absence of risk. They concluded that the cost of capital is approximately the same for closely and widely held corporations. The exception is debt financed investments of closely held Norwegian corporations, where the split model represents a tax subsidy. Lindhe, Södersten and Öberg nevertheless ignore an important aspect in their analysis, namely the endogeneity of a firm's tax system: by changing organizational form the firm can experience a shift in the taxes it faces.

Most of the literature on tax effects on the choice of organizational form is based on U.S. data, where taxes discourage incorporation due to the double taxation of dividends. Most papers conclude that even if the tax code provides incentives for smaller corporations with high revenue to shift out of the corporate form, this effect is rather small. Gordon and MacKie-Mason (1994), Ayers, Cloyd, and Robinson (1996), and MacKie-Mason and Gordon (1997) all conclude that non-tax factors seem to dominate the choice of organizational form. Goolsbee (2004), on the other hand, reports large negative effects on incorporation by the U.S. tax code. Similarly, Gordon and Slemrod (2000) document substantial income shifting from the corporate to the personal tax base following the 1986 U.S. tax reform.

There is little empirical work on the effects of the dual income tax on income shifting between tax bases. Two recent exceptions are Romanov (2006) and Pirttilä and Selin (2006). Romanov explores two recent Israeli tax increases on wage and self-employed income. The number of Israeli corporations increased by 5% during this period, and Romanov identifies many of these new corporations as tax shelters for high-income professionals. He concludes

[3] *Sandmo (1985), Apel and Søndersten (1999), and Weisbach (2004) discuss in detail how taxes distort investments in risky assets.*

that high-income individuals seem to have responded to these tax increases by incorporating in order to receive their income as tax favored dividends instead of wages. Pirttilä and Selin evaluate the effect on taxable income by the Finnish 1993 dual tax reform and its introduction of a split model of business taxation. They document an increase in taxable capital income of the self-employed individuals after the reform. This they interpret as the result of tax minimizing income shifting from the personal to the capital income tax base by the self-employed individuals. However, they do not explicitly consider the effects of tax induced incorporation of the self-employed. In addition, Fjærli and Lund (2001) analyze how owners of corporations choose to pay wages and dividends during a transition period into the dual income tax in Norway. They conclude that owners pay themselves more wages than optimal from a short term tax minimizing view, and suggest that this can be optimal from a long-term view, as wage payments are the basis for future pension benefits. The effects of the dual income tax on related issues as taxable income, demand for debt and tax progressivity are studied by Aarbu and Thoresen (2001), Fjærli (2004), and Thoresen (2004) on Norwegian data. Similar studies are conducted on Swedish data by Selén (2002) and Hansson (2004).

The outline of the paper is as follows. Section 2 describes the tax system and provides empirical motivation. In section 3, the basic model is presented, and the choice of organizational form is limited to two forms. The entrepreneur can organize either as a self-employed or as a widely held corporation. Section 4 and 5 analyze tax effects on the entrepreneur's investment behavior in the presence of technology risk under the two organizational forms, and section 6 analyzes the tax effects on his incentives to incorporate. Section 7 concludes.

2. Background

2.1 The Norwegian imputation system – The split model

The Norwegian split model applies to sole proprietorships and closely held corporations. A corporation is defined as closely held if 2/3 or more of the shares are held by active owners, where an owner is characterized as active if he works more than 300 hours annually in the firm and passive otherwise. Spouses or under-aged children of active owners are not recognized as passive owners. A corporation is defined as widely held if more than 1/3 of the shares are held by passive owners, and it is then taxed according to corporate tax rules. Employer's social security contributions apply to all wage payments made by the corporation.

Under the split model, an imputed return to the capital invested in the firm is calculated by multiplying the value of the capital assets by a fixed rate of return on capital, which is set annually by the Parliament on the basis of the average rate of return on government bonds plus a risk premium.[4] These assets include physical business capital, acquired good-will and other intangible assets, business inventories, and credit extended to customers net of debt to the firm's suppliers. The imputed return to capital is taxed at the corporate rate, which equals the capital income tax rate at the individual level. Business profit net of imputed return to capital is the imputed return to labor, which is taxed as labor income independent of whether the wages are actually paid to the owner or not.[5] Employers' social security contribution does nevertheless not apply to the imputed return to labor. If imputed labor income is negative, the loss does not offset other income, but may be carried forward to be deducted against future imputed labor income in the firm. The table in figure 3 in the appendix summarizes the most important parameters of the Norwegian tax system.

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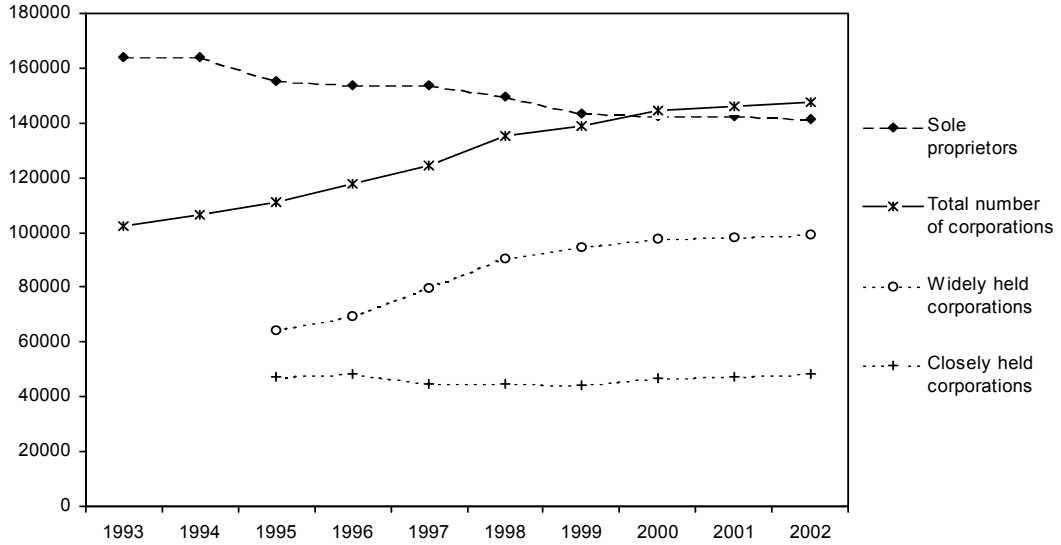
[4] The Norwegian split model is similar to the Finnish split model, as evaluated by Pirttilä and Selin (2006). The major difference is that while the imputed return to capital under the Norwegian model is calculated on the firm's assets, it is under the Finnish model calculated on the firm's assets net of debt. Also, under the Finnish system only corporations listed on the stock exchange are not taxed according to the split model.

[5] If the firm has employees in addition to the owner(s), a salary deduction of a given percentage of the wage bill from taxable wage payments applies before the return to the owner's labor effort is imputed. If the imputed labor income exceeds a given threshold, the remainder is taxed as capital income.

Figure 1. Number of sole proprietors and corporations over time.



2.2 Empirical motivation

An extensive income shifting through increased investments and changes of organizational form seem to have taken place in the years after the 1992 introduction of the Norwegian dual income tax. The total number of self-employed individuals in Norway decreased by 14 percent from 1993 to 2002, while the number of small corporations with four or less employees increased by 16 percent. In 1994, 55 percent of new small corporations were widely held, while this share had risen to 75 percent four years later. It is striking that nearly the whole growth in the number of corporations comes as widely held corporations, as is seen in figure 1. All this indicates that there might have been a change in preferred organizational form as a result of creative tax-minimizing re-labelling activity, a point emphasized by Gordon and Slemrod (2000). Unfortunately, the available data does not allow us to trace the business entities as they change organizational forms.

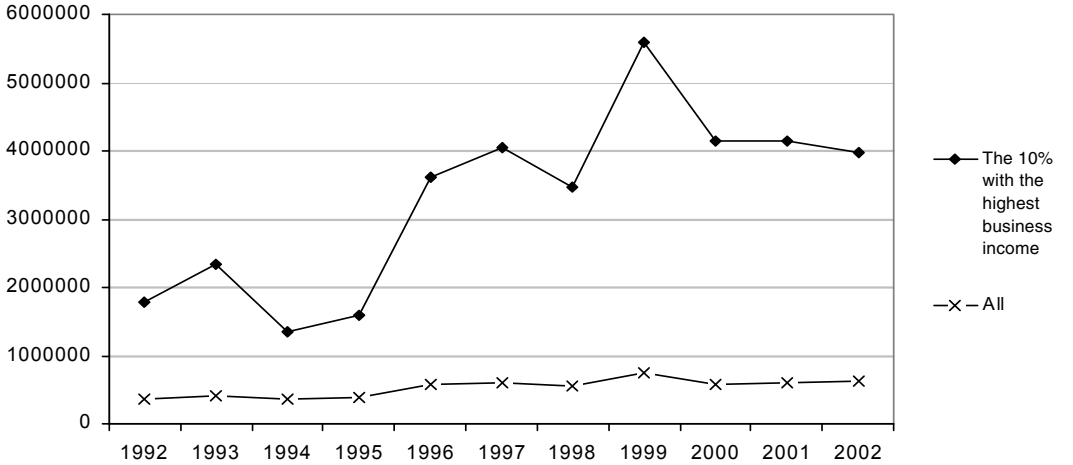
There also seem to have been a response to the investment incentives under the split model. The self-employed individuals with the 10 percent highest business income have increased their firm specific capital dramatically during the 1990ies, as we see in figure 2. On average this group increased its real capital by 124 percent from 1992 to 2002, while the corresponding increase for all self-employed was 68 percent.

Another indication of this income shifting is that while aggregated wages increased by 44 percent from 1993 to 2002, aggregated business income of the self-employed only increased by 26.5 percent. During the same period aggregated dividend receipts increased by 299 percent.

3. The model

For simplicity, the following analysis abstracts from many of the details discussed above. Consider a utility maximizing entrepreneurial individual who lives for two periods and who is about to start a business. He needs to decide how much to invest in real capital in the firm, which has a stochastic second period return, as well as which organizational form to choose. There are many non-tax factors that affect the choice of organizational form, as discussed by Ayers et. al (1996) and MacKie-Mason and Gordon (1997), but in this analysis we simplify by only including risk and taxes as motives be-

Figure 2. The value of firm specific capital of Norwegian self-employed individuals from 1992 to 2002, NOK, in 2002-prices.



hind this choice. As a self-employed the individual is taxed under the split model. If he organizes as a widely held corporation he is subject to corporate tax rules, but is required to pay a part of dividends to passive shareholders. The only reason for the individual to incorporate is to reduce his total tax burden by escaping the split model. A closely held corporation would still be subject to the split model, so in this context he has no incentive for choosing that organizational form. Also, as Lindhe, Södersten and Öberg (2004) conclude in the absence of risk, the total tax burden for the Norwegian sole proprietor is the same as for closely held corporations. Assume thus that the alternative to being a self-employed is to organize as a widely held corporation with the minimum required number of passive shareholders, $(1-\beta)$, where $0 < \beta < 2/3$ is the active owner's maximum allowed share of ownership as a widely held corporation. Individuals differ in their preferences of which is the preferred organizational form. Here consider the marginal entrepreneur who initially has no intrinsic value of either of the two organizational forms, self-employed and widely held corporation, and who chooses the organizational form that maximizes his utility.

The individual has a given time endowment in both periods, which he spends working in his firm and enjoying leisure. In order to study the individual's investment decision and the choice of organizational form separately from his labor supply decision, assume that total time spent working in the firm is given. The remaining leisure is hence also given. A change of organizational form in order to reduce tax payments is only a re-labelling of the existing nature of the self-employed's activity, and he puts in the same amount of labor in the two cases. But the change of organizational form could nevertheless change the return to working, since it affects the net return to entrepreneurial activity in the presence of taxes.

Expected utility The individual's expected utility function is represented by

$$(1) \quad EU = u(C_1) + E[v(C_2)],$$

which has positive and decreasing marginal utilities of both first period consumption, C_1, and second period consumption, C_2, such that $u'(C_1) > 0$, $u''(C_1) < 0$, $v'(C_2) > 0$, and $v''(C_2) < 0$. Assume that the individual has a precautionary saving motive, such that $v'''(C_{2,s}) > 0$. See Sandmo (1970) and Kimball (1990) for more on precautionary saving. The risk averse individual chooses the investment portfolio and organizational form that maximize his expected lifetime utility.

Investments and income In the first period he has initial wealth Y, which he allocates to investing in risky real capital K in the firm, and saving B in the financial market. Investments in the financial market yield the exogenously given safe real rate of return r. Savings may be negative, and then the individual borrows in the financial market. Loans are repaid in full in the second period. The gross return to real capital investments is the sales income. The net of taxes sales income depends on the tax regime and thus on the chosen organizational form. It will be specified separately for each organizational form in the two following sections, as will the expressions for first and second period consumption. Real capital investments are in principle reversible, and are realized at the end of the second period. The sales value of the real capital is the original value K net of the real capital depreciation, which is represented by the shock-related depreciation rate $\tilde{\gamma}$ and discussed more closely below. A high depreciation rate increases the degree of irreversibility in the real capital investments and may work as a disincentive towards investments in the firm. This is discussed more closely by Panteghini (2001).

The entrepreneur is the only person employed in the firm, and thus labor as a production factor is fixed. The firm produces one product, which is sold in the second period at a given price set to unity, $p = 1$. The production level X varies according to the amount of capital invested in the firm, and sales income is thus given by the production function $X = F(K)$, which has a positive and decreasing marginal product of capital; $F_K > 0$ and $F_{KK} < 0$.

Risk The individual invests in real capital in the first period, and he realizes all his capital in the second period. The second period sales value of the capital stock of the firm depends on the depreciation rate, which is given by the stochastic parameter $\tilde{\gamma}$. There will always be some depreciation, and the maximum loss through depreciation is the initial value of the real capital, such that $0 < \tilde{\gamma} < 1$. The expected value of depreciation is positive and given by the ordinary depreciation rate δ: $E[\tilde{\gamma}] = \delta > 0$. The individual demands a risk premium in order to invest in real capital in the firm. Define Θ as the rate of return to real capital required to compensate the individual for the relative expected second period marginal utility reduction caused by the depreciation. The size of Θ depends on two factors; the individual's preferences regarding risk, as well as the probability of a technology shock that reduces the value of the existing real capital dramatically:

$$(2) \quad \Theta \equiv \frac{E[v'(C_2) \cdot \tilde{\gamma}]}{E[v'(C_2)]} = \delta + \lambda,$$

where $\lambda \equiv cov\,[v'(C_2), \tilde{\gamma}]/E[v'(C_2)]$ is the risk premium. A higher probability of a technology shock increases the expected depreciation rate δ. Also, the real capital depreciation reduces the second period consumption. The more risk averse the individual is, the larger is the utility loss from the drop in second period consumption. Thus the risk premium is positive and higher the more risk averse the individual is. The risk premium also varies across different consumption levels for a given individual, such that it is not constant at individual level.

Taxes Let t_w be the proportional tax rate on labor income and t_k the proportional tax rate on capital income. We simplify by assuming that the tax on labor income is proportional, when in fact it is progressive in most countries, including the countries with a dual income tax. But one might think of this tax as the top marginal tax rate on labor income. The progressive labor income tax schedule is then in fact "flat on the top". Assume that the tax rate on labor income is higher than that on capital income, $t_w > t_k$. Total tax payments are given by T. No wealth tax is present in the model.

4. The self-employed

Let the subscript "s" denote the previously described variables when the entrepreneur is a self-employed. First period consumption is given as the initial wealth net of investments:

$$(3) \quad C_{1,s} = Y - K_s - B_s.$$

The self-employed owns the firm and has full disposal over total sales income. His gross sec-

ond period income consists of the return to his entrepreneurial investments, which are the sales income $F(K_s)$ as well as the return to his investments in the financial market, $[1+r] \cdot B_s$. Also, the real capital is capitalized in the second period, and the market value is reduced by the stochastic depreciation: $[1-\tilde{\gamma}] \cdot K_s$. Thus the second period income is given by

$$(4) \quad C_{2,s} = F(K_s) + [1-\tilde{\gamma}] \cdot K_s + [1+r] \cdot B_s - T_s.$$

The imputation rate The self-employed would, if he could and ceteris paribus, have all income taxed as capital income. The tax authorities impute a return to the real capital in the firm. This fixed imputation rate is the sum of the average return to government bonds, r, and a risk compensation factor, μ. The residual of business income is the imputed return to labor, which is taxed as labor income.

Tax payments and the individual's budget constraint Capital income tax is paid on the imputed return to capital, $(r+\mu) \cdot K_s$. Labor income tax is paid on the imputed return to labor, which is the value of the production net of production costs and the imputed return to invested capital. In addition, capital income tax is paid on interest income from the investments in bonds. Total taxes due for the self-employed are thus given by

$$(5) \quad T_s = t_k \cdot (r+\mu) \cdot K_s + t_w \cdot \{F(K_s) - \tilde{\gamma} \cdot K_s - (r+\mu) \cdot K_s\} + t_k \cdot r \cdot B_s,$$

and the second period after-tax income of the self-employed can be written as:

$$(6) \quad C_{2,s} = [1-t_w] \cdot [F(K_s) - \tilde{\gamma} \cdot K_s] + \{1 + (t_w - t_k) \cdot (r+\mu)\} \cdot K_s + [1 + (1-t_k) \cdot r] \cdot B_s.$$

The first part of the right hand side of (6) represents the individual's net of taxes income from his firm if all income were taxed as labor income. But the imputed return to capital is actually taxed as capital income, which increases his net income by a fraction $(t_w - t_k)$ of total imputed return to capital. The larger the difference between the marginal tax rates on labor income and capital income, the more attractive it is to participate in income shifting activities in order to have more of his income taxed as capital income. But this is only relevant if in fact he pays labor income taxes. Thus assume that the expected imputed return to labor is positive, such that $F(K_s) - (\delta + r + \mu) \cdot K_s > 0$.

The investment portfolio The self-employed's optimization problem is given by

$$(7) \quad \max_{K_s, B_s} EU_s = u(C_{1,s}) + E[v(C_{2,s})],$$

where $C_{1,s}$ and $C_{2,s}$ are given by equations (3) and (6).

From the first order conditions of the maximization problem (7) we find the optimal investment condition:

$$F_{K_s} = r + \frac{E[v'(C_{2,s}) \cdot \tilde{\gamma}]}{E[v'(C_{2,s})]} - \frac{t_w - t_k}{1 - t_w} \cdot \mu,$$

which by applying the definition in (2) can be rewritten as

$$(8) \quad F_{K_s} = r + \delta + \lambda_s - \frac{t_w - t_k}{1 - t_w} \cdot \mu.$$

Proposition 1 The split model counteracts the investment disincentive inherent in the technology risk and induces the self-employed to increase his investments in real capital. This effect is stronger the higher the risk compensation rate under the split model is and the greater the difference between the tax rates on capital and labor is.

The proof of proposition 1 is provided in the appendix.

The technology risk represents a disincentive to invest in real capital, which is clearly seen from condition (8). This disincentive is higher the greater the degree of expected irreversibility in the investment, measured by the expected depreciation rate δ. The effect of this investment disincentive on the self-employed's investments in real capital also depends on his attitudes towards risk, represented by the risk premium λ_s. Remember that the individual risk premium is

defined as the variable $\lambda_s \equiv cov\,[v'(C_{2,s}), \tilde{\gamma}]/E[v'(C_{2,s})]$. As we discussed earlier, the risk premium is not given on individual level, it depends on both the level of taxes and other variables. The higher a risk premium the individual requires, the less he invests in real capital when the degree of irreversibility increases. This effect is counteracted by the risk compensation factor under the split model, μ, which isolated considered works as a government subsidy on real capital investments. The total risk compensation under the split model is the relative after tax risk compensation rate, $\frac{t_w - t_k}{1-t_w} \cdot \mu$, which depends positively on the difference in the marginal tax rates on labor and capital income. As is shown in the proof of proposition 1 in the appendix, an increase in the risk compensation rate, μ, will induce the self-employed individual to invest more in firm specific real capital if $(1-t_k) \cdot r \cdot (t_w - t_k) \cdot K < E[v'(C_{2,s})]$. That means if the expected marginal utility of second period consumption is greater than the after tax return to the tax savings under the split model from investing in real capital, and the likelihood for this is greater the lower the initial level of real capital in the firm. This is an equivalent to the Domar-Musgrave (1944)-effect, where the self-employed entrepreneur invests more in real capital than he would in the absence of taxes.

Proposition 2 Increased tax on labor income increases the risk compensation under the split model and can induce the self-employed to increase his investments in real capital.

The proof of proposition 2 is provided in the appendix.

A higher tax rate on labor income reduces the net-of-taxes labor income, which reduces the incentives to invest in real capital such that the income effect is negative. At the same time the higher tax rate on labor income means that the private return to shifting income from the labor income tax base to the capital income tax base increases. It also increases the relative after tax risk compensation rate $\frac{t_w - t_k}{1-t_w} \cdot \mu$, making the individual more willing to invest in risky firm specific real capital, such that the substitution effect of the tax increase is positive. Therefore, the increased tax on labor income induces the individual to increase his investments in firm specific real capital if the substitution effect dominates the income effect. As labor supply is given in this model, there are no effects on labor supply from tax changes.

Proposition 3 An increase in the tax rate on capital income reduces the after-tax risk compensation under the split model and induces the self-employed to reduce his investments in real capital.

The proof of proposition 3 is provided in the appendix.

When the capital income tax rate increases, the incentive to participate in any kind of income shifting decreases, since the difference between the two tax rates, $t_w - t_k$, decreases, as does the private gain from income shifting. Also, a higher tax rate on capital income means a decreased net risk compensation rate under the split model, $\frac{t_w - t_k}{1-t_w} \cdot \mu$. Both factors induce the self-employed to invest less in risky real capital in the firm. The higher the self-employed's capital income is, the larger share of his total income is affected by the tax increase, and the more is his net income reduced.

5. The widely held corporation

The entrepreneur only incorporates in order to reduce tax payments and wants to keep as much as possible of the business income. Thus assume that he holds the maximum allowed amount of shares as a widely held corporation, such that $\beta \approx 2/3$. The full share capital is spent on acquiring real capital in the firm, such that the active owner invests the share β of total real capital, and the passive shareholders invest the rest. The passive shareholder may diversify his investments to a larger extent than the active shareholder, who invests both his capital and his labor effort in the firm. Assume therefore that the passive shareholder does not require a higher risk premium than the active shareholder in order to invest in the firm.

All shareholders receive dividend payments as a return to their invested capital. The shareholder majority, which here means the active owner, decides what wage to pay the active owner as a compensation for his labor effort, as well as how much to pay in dividends. Since an additional employer's social security contribution applies to all wage payments made by the corporation, the total tax burden on labor income is higher under the corporate tax regime than under the split model. At the present top marginal tax rates, the active owner increases his after tax income by 57 percent by paying no wages and instead paying all earnings as dividends, even though some part is paid to passive owners.[6] Assume thus that all profits are paid as dividends in the second period, of which the entrepreneurial individual receives the share β and the passive shareholders $(1-\beta)$.[7] The widely held corporation considered here is typically a smaller, often family owned corporation, whose objective it is to maximize the utility of the active shareholder. This is in contrast to the larger corporations listed on the stock exchange that usually are described in the optimal tax literature, whose goal it is to maximize the stock value of the corporation.

In the following, use the same variables as previously described, with the subscript "l" denoting the variables when the entrepreneur organizes as a widely held corporation.

First and second period consumption First period consumption is given by

$$(9) \quad C_{1,l} = Y - \beta \cdot K_l - B_l.$$

No wages are paid, and thus the net sales income is defined as firm profits, which are taxed at the corporate tax rate t_k at firm level. All profits are distributed tax free to the owners, of which the active shareholder receives the share β. The firm specific real capital is capitalized in the second period, and the sales value depends on the stochastic depreciation. In addition, the entrepreneurial individual receives the net of taxes return to his investments in the financial market. His second period consumption is given by

$$(10) \quad C_{2,l} = \beta \cdot [1 - t_k] \cdot [F(K_l) - \widetilde{\gamma} \cdot K_l] + \beta \cdot K_l + [1 + (1 - t_k) \cdot r] \cdot B_l.$$

The optimal investment condition The entrepreneur's optimization problem is given by

$$(11) \quad \max_{K_l, B_l} EU_l = u(C_{1,l}) + E[v(C_{2,l})],$$

where $C_{1,l}$ and $C_{2,l}$ are given by equations (9) and (10).

Proposition 4 The corporate tax code induces no direct distortion to the widely held corporation's investment decision. But capital income taxes have an indirect effect through the individual's required risk compensation.

Proof The first order conditions from the maximization problem (11) yield the optimal investment condition:

$$(12) \quad F_{K_l} = r + \delta + \lambda_l.$$

The proof of the effect of capital income taxes is lengthy and is presented in the appendix. ■

Real capital is invested in the firm until the value of the marginal product equals the risk adjusted cost of capital. Everything else equal, the optimal level of real capital in the widely held corporation is lower than in self-employment. This is due to the fact that the corporation does not experience any risk compensation

[6] *$100 in gross wage payments generate labor income taxes of $55.3 at the top marginal tax rate. In addition $14.1 are paid by the corporation in social security contributions, such that the active owner is left with $30.6 in after-tax wages. If he on the other hand does not pay wages, the flat corporate income tax of 28% applies on the $100 in increased profits. After paying the passive owners their one third of dividends, the active owner's after-tax dividend income is $48. As the labor income tax schedule is progressive, the real life active owner might choose to pay himself some wages.*

[7] *The passive shareholders will then receive a share of any inframarginal returns to the active owner's labor effort. But as the sole purpose of this activity is tax minimizing income shifting for the active owner, this is unavoidable. One response to this is to have adult children or grandchildren as passive owners. The active owner still avoids the split model and has all his income taxed as capital income, and the dividends paid to passive owners is in fact a tax-exempt intergenerational transfer.*

through the tax system, as the self-employed does.

The more risk averse the entrepreneur, and the higher the expected depreciation rate, the less real capital is invested in the firm. Taxes have an indirect effect on the level of real capital in the widely held corporation since only the risk premium is affected through taxes. A higher tax on capital income reduces the entrepreneur's total income, which induces him to invest less in all types of capital, including firm specific real capital. Thus the income effect is negative. Nevertheless, he shares the risk of investing in firm specific real capital with the passive owners, which might induce him to increase real capital investments when the tax rate on capital goes up, such that the substitution effect is positive. The tax increase leads to reduced investments in the corporation if the income effect dominates the substitution effect. Labor income tax changes have no effect on the investment behavior of the firm, since no wages are paid.[8]

6. When to incorporate?

Here, the only reason for the self-employed to incorporate is by assumption to reduce tax payments. As a self-employed, the individual keeps 100 percent of the profits, and he enjoys the investment subsidy under the split model. On the negative side, part of his income is taxed as labor income at the higher tax rate, and he carries the whole risk of the operation alone. As a widely held corporation, on the other hand, he may choose to pay no wages, such that all income is taxed as capital income. He reduces his risk exposure by sharing the risk of the operation with the passive owners, but he also has to pay the passive owners their share $(1-\beta)$ of dividend payments. Only if the self-employed has positive imputed personal income has he incentives to incorporate. For simplicity, let the costs of incorporating be zero. In order to determine which is the preferred organizational form, we compare the individual's maximum achievable utility in the two cases, given that his optimal investment portfolio is given by $[\hat{K}_s, \hat{B}_s]$ as a self-employed, and by $[\hat{K}_l, \hat{B}_l]$ as a widely held corporation. The self-employed incorporates if he achieves higher expected utility as a widely held corporation:

(13) Incorporate if $\widehat{EU}_l - \widehat{EU}_s > 0$.

The maximum expected achievable utilities in the two cases are defined by the indirect utility functions. The self-employed's indirect utility function is given by

$$\widehat{EU}_s = u(\widehat{C}_{1,s}) + E\Big[\, v(\widehat{C}_{2,s}) \,\Big],$$

where optimal consumption in first and second period are

$$\begin{aligned}\widehat{C}_{1,s} &= Y - \widehat{K}_s - \widehat{B}_s \text{ and}\\ \widehat{C}_{2,s} &= [1-t_w]\cdot\Big[F(\widehat{K}_s) - \widetilde{\gamma}\cdot\widehat{K}_s\Big]\\ &\quad + \{1+[t_w-t_k]\cdot[r+\mu]\}\cdot\widehat{K}_s\\ &\quad + [1+(1-t_k)\cdot r]\cdot\widehat{B}_s.\end{aligned}$$

Correspondingly, the entrepreneur's indirect utility function if he organizes as a widely held corporation is given by

$$\widehat{EU}_l = u(\widehat{C}_{1,l}) + E\Big[\, v(\widehat{C}_{2,l}) \,\Big],$$

where optimal consumption in first and second period are

$$\begin{aligned}\widehat{C}_{1,l} &= Y - \beta\cdot\widehat{K}_l - \widehat{B}_l \text{ and}\\ \widehat{C}_{2,l} &= \beta\cdot[1-t_k]\cdot\Big[F(\widehat{K}_l) - \widetilde{\gamma}\cdot\widehat{K}_l\Big]\\ &\quad + \beta\cdot\widehat{K}_l + [1+(1-t_k)\cdot r]\cdot\widehat{B}_l.\end{aligned}$$

Consider the entrepreneur who is indifferent between the two organizational forms, such that $\widehat{EU}_l = \widehat{EU}_s$. What effect do changes in the tax parameters have in his incentives to incorporate? Let us now study this by applying the envelope theorem.

Proposition 5 The incentive to incorporate is stronger the higher the tax rate on labor income.

[8] *In the absence of risk, the optimal investment condition reduces to the Fisher condition, and tax changes have no effect on the investment decision in the widely held corporation.*

Proof By differentiating (13) and rearranging by applying equation (2) we find that

$$\frac{\partial(\widehat{EU}_l-\widehat{EU}_s)}{\partial t_w} = \left\{F(\widehat{K}_s) - \left(r+\mu+\delta+\widehat{\lambda}_s\right)\cdot\widehat{K}_s\right\} \cdot E\left[v(\widehat{C}_{2,s})\right].$$

By assumption $F(\widehat{K}_s) - (r+\mu+\delta)\cdot\widehat{K}_s > 0$. Thus $\frac{\partial(\widehat{EU}_l-\widehat{EU}_s)}{\partial t_w} > 0$ as long as $\frac{F(\widehat{K}_s)}{\widehat{K}_s} - (r+\mu+\delta) > \widehat{\lambda}_s$. ■

The optimal investment level in real capital for the self-employed, $\hat{K}_s$, fully exhausts the income shifting possibilities under the split model to minimize imputed return to labor by increasing the real capital base. As long as the imputed return to labor income, net of the risk premium, is positive, a higher tax rate on labor income induces the individual to incorporate in order to minimize tax payments by avoiding the split model altogether. And these incentives to incorporate are then stronger for the high-income entrepreneurs. The factor working against this is the fact that the net risk compensation rate under the split model actually increases when the labor income tax rate increases.

Proposition 6 A higher tax rate on capital income reduces the incentive to incorporate, provided that

$$\left\{\beta\cdot\left[F(\widehat{K}_l) - \left(\delta+\widehat{\lambda}_l\right)\cdot\widehat{K}_l\right] + r\cdot\widehat{B}_l\right\} \cdot E\left[v'(\widehat{C}_{2,l})\right] > \left\{(r+\mu)\cdot\widehat{K}_s + r\cdot\widehat{B}_s\right\} \cdot E\left[v'(\widehat{C}_{2,s}\right].$$

The proof of proposition 6 is presented in the appendix. The first part of the left hand side of the above condition represents the individual's full second period income if he organizes as a widely held corporation. The first part of the right hand side represents only part of the self-employed individual's income, namely the imputed return to capital in the firm and the return to financial investments. Thus, the above condition is likely to hold.

The reason why a higher tax rate on capital income reduces the incentives to incorporate is twofold. First, only part of the income of the self-employed individual is affected by the increased tax on capital income, while all income by the owner of the widely held corporation is affected. Thus, the tax burden of the owner of the widely held corporation increases more by an increase in the tax rate on capital income. Second, the overall incentive for participating in tax minimizing income shifting originates from the difference between the top marginal tax rates on labor and capital income, (t_w–t_k). As the tax rate on capital income increases, the overall tax incentive for the self-employed to incorporate decreases.

Proposition 7 The tax minimizing incentive to incorporate is weakened by an increase in the risk compensation factor under the split model.

Proof From (13) it follows that

$$\frac{\partial(\widehat{EU}_l-\widehat{EU}_s)}{\partial\mu} = -\left[t_w - t_k\right]\cdot\widehat{K}_s\cdot E\left[v'(\widehat{C}_{2,s})\right] < 0.$$ ■

The imputed return to capital is higher the higher the imputation rate, and correspondingly, the higher the risk compensation rate is. The increased risk compensation rate thus reduces the imputed return to labor, which is the part of firm profits to be taxed as labor income. Since a higher share of the sole-proprietor's income now already is taxed as capital income, this makes it less attractive to incorporate.

Proposition 8 A lower required share of passive owners in order to be classified as a widely held corporation, (1– β), strengthens the incentive to incorporate.

The proof of proposition 8 is presented in the appendix.

As a widely held corporation the entrepreneur has all his income taxed as capital income, but he only gets to keep a share β of the profits generated in the firm. The part (1– β) of dividends is paid to the passive owners, and the minimum limit of this share is set by the tax code. The lower the required share of passive

owners to be classified as a widely held corporation, the more of firm specific profits taxed as capital income may the self-employed keep, and this increases his incentive to incorporate. This effect is greater the lower the tax rate on capital income and the higher the net business income.

Conclusion

The above analysis concluded that the split model, and in particular the risk compensation factor in the imputation rate, can induce the self-employed to increase his investments in real capital in the firm. Capital becomes a means to shift income from the labor income tax base to the capital income tax base. The higher the value of his real capital, the greater is the imputed return to capital, and the more of his business income is taxed as capital income. The incentive to participate in this kind of income shifting is stronger the higher the difference between the two marginal tax rates and the higher the risk compensation rate under the split model. All types of real capital have the same imputation rate regardless of actual risk, and also regardless of whether the risk is systematic or unsystematic. It is thus to be expected that the self-employed canalizes this tax induced investment into less risky types of real capital in order to minimize his risk exposure. If the risk that the self-employed faces is fully unsystematic, he ought in principle be able do diversify away from it. Diversification restrictions due to liquidity constraints is an argument in favour of such a risk compensation via the tax system. The same is the irreversibility of the investments that the technology risk represents. On the other hand, if the risk is fully systematic, there is in principle no such justification for a tax subsidy to investments of the self-employed, since all agents in the economy are exposed to the same risk.

In addition to increasing the capital stock there are several ways to increase the book value of the capital in the firm, for instance by shifting from leased to owned premises and machinery, by increasing stocks at the end of the year, by increasing and extending customers' trade receivables at the end of the year, and by financing private durable goods in the firm. It can even be profitable to borrow in the financial market to invest in business capital. Such debts are private and entitle the borrower to tax allowances against other capital income. High-income self-employed individuals are subject to the top marginal tax rate on imputed return to labor, and these are in particular expected to take advantage of the income shifting possibilities through increasing their capital stock. And as we saw in figure 2, there are indications that this development has taken place.

Only to a certain extent can the self-employed use real capital investments to shift income to the capital income tax base. The high-income entrepreneur thus has incentives to avoid the split-model completely by becoming a widely held corporation. The analysis showed that this tax minimizing incentive to incorporate is stronger the higher the difference between the marginal tax rates on labor income and capital income is, since this increases the return to income shifting. But the larger the required share of passive investors in order to be classified as widely held corporation is, the weaker are the incentives to incorporate. When the active owner substitutes dividend payments for wage payments to himself, it means that he shares any inframarginal returns to his labor effort with the passive owners. One way to make the shareholders compensate for their share of the inframarginal returns is initially to demand higher prices for the shares. He can also avoid this profit sharing with passive owners in both legal and illegal ways. One example of legal tax avoidance is to have grown children or grandchildren as passive owners, which is allowed under the corporate tax code. Then any dividend payment to passive owners is in fact a tax free intergenerational transfer. There are numerous examples of creative tax evasion in order to avoid the split model. For instance, two dentists may be passive owners in each other's widely held corporations. They both pay the required one third of dividends to passive owners, but since they have about the same income potential, the first dentist receives the same in dividends from the second dentist as she herself pays him. Both are then left with their full busi-

ness income taxed at the capital income tax rate. If detected, this is ruled illegal.

Partly as a response to this income shifting activity of small businesses, the Norwegian dual income tax system was remodelled through the 2006 tax reform, as described in Sørensen (2005). The main feature of this reform is the introduction of a tax on income from shares on the individual level, where an imputed normal return to the shares is tax-exempt. This has removed the need for the split model for closely held corporations, and all corporations are now taxed according to the corporate tax code. The imputation rate under the income splitting model for self-employed is reduced trough the removal of the risk compensation element, such that the imputation rate now is the before-tax risk free rate of return.

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9. Appendix

Figure 3. Tax parameters in Norway, 1992–2003.

Corporate income tax	28 percent
Capital income and capital gains tax	28 percent
Dividend tax*	0
Employers' social security contributions**	14.1 percent
Labor income tax (top marginal tax rate) excluding social security contributions***	41 - 47.5 percent
Social security contributions, wage earners	7.8 percent
Social security contributions, self-employed	10.7 percent
Imputation rate under the split model***	10 -16 percent

* There was a dividend tax of 11 percent from September 2000 to December 2001.
** Employers' social security contributions apply on all wage payments. But they do not apply to self-employed income.
*** Rates have varied over the period.

9.1 Proofs

For more details, see the full mathematical appendix, which is available as a supplement on this journal's home page.

Proof of proposition 1 The tax incentive for increased investments in real capital under the split model is inherent in the risk compensation rate, μ, which is seen from condition (8). Comparative static analysis of the first order conditions from the maximization problem (7) yields

$$\frac{\partial K_s}{\partial \mu} = \frac{1}{D} \cdot \left\{ \begin{array}{c} \{(1-t_k)\cdot r\cdot (t_w - t_k)\cdot K - E\left[v'(C_{2,s})\right]\}\cdot u''(C_{1,s}) \\ -\left\{1+(1-t_k)\cdot r\right\}^2 \cdot E\left[v'(C_{2,s})\right]\cdot E\left[v''(C_{2,s})\right] \end{array} \right\}, \tag{14}$$

where

$$\begin{aligned} D \equiv & \left\{u''(C_{1,s}) + \left\{1+(1-t_k)\cdot r\right\}^2 \cdot E\left[v''(C_{2,s})\right]\right\} \\ & \cdot \left\{ \begin{array}{c} u''(C_{1,s}) + [1-t_w]\cdot F_{K_sK_s}\cdot E\left[v'(C_{2,s})\right] + A^2\cdot E\left[v''(C_{2,s})\right] \\ -2\cdot A\cdot [1-t_w]\cdot E\left[v''(C_{2,s})\cdot \widetilde{\gamma}\right] + [1-t_w]^2\cdot E\left[v''(C_{2,s})\cdot \widetilde{\gamma}\cdot \widetilde{\gamma}\right] \end{array} \right\} \\ & - \left\{u''(C_{1,s}) + [1+(1-t_k)\cdot r]\cdot \left\{ \begin{array}{c} A\cdot E\left[v''(C_{2,s})\right] \\ -[1-t_w]\cdot E\left[v''(C_{2,s})\cdot \widetilde{\gamma}\right] \end{array} \right\}\right\}^2 \\ > & \ 0 \end{aligned} \tag{15}$$

and

$$A \equiv [1-t_w]\cdot F_{K_s} + 1 + [t_w - t_k]\cdot [r+\mu] > 0 \tag{16}$$

As $E\left[v''(C_{2,s})\right] < 0$ and $E\left[v'(C_{2,s})\right] > 0$, then $-\left\{1+(1-t_k)\cdot r\right\}^2 \cdot E\left[v'(C_{2,s})\right] \cdot E\left[v''(C_{2,s})\right] > 0$. Then the sign of $\frac{\partial K_s}{\partial \mu}$ depends on the sign of the first part in the paranthesis in equation (14). $u''(C_{1,s}) < 0$. We then see that

1) If $(1-t_k)\cdot r\cdot(t_w-t_k)\cdot K < E\left[v'(C_{2,s})\right]$ then $\frac{\partial K_s}{\partial \mu}$ is definitively positive. That means if the expected marginal utility of second period consumption is greater than the after tax return to the tax savings under the split model from investing in real capital.

2) If $(1-t_k)\cdot r\cdot(t_w-t_k)\cdot K > E\left[v'(C_{2,s})\right]$ then $\frac{\partial K_s}{\partial \mu}$ is positive only if $\left\{(1-t_k)\cdot r\cdot(t_w-t_k)\cdot K - E\left[v'(C_{2,s})\right]\right\}\cdot u''(C_{1,s}) > \left\{1+(1-t_k)\cdot r\right\}^2 \cdot E\left[v'(C_{2,s})\right] \cdot E\left[v''(C_{2,s})\right]$.

Proof of proposition 2 Comparative static analysis of the first order conditions from the maximization problem (7) yields

$$
\begin{aligned}
(17) \qquad \frac{\partial K_s}{\partial t_w} &= -\left\{ \begin{array}{l} \frac{F(K_s)-(r+\mu)\cdot K_s}{[1+(1-t_k)\cdot r]} \\ +\left[1+(1-t_k)\cdot r\right]\cdot \frac{E[v''(C_{2,s})\cdot\widetilde{\gamma}]}{u''(C_{1,s})}\cdot K_s \end{array} \right\} \cdot \frac{\partial K_s}{\partial Y} \\
&\quad + \frac{u''(C_{1,s}) + \left[1+(1-t_k)\cdot r\right]^2 \cdot E\left[v''(C_{2,s})\right]}{[1-t_w]\cdot D\cdot E\left[v'(C_{2,s})\right]} \\
&\quad \cdot \left\{ \begin{array}{l} [1-t_w]^2\cdot K_s \cdot \left\{ \begin{array}{l} E\left[v''(C_{2,s})\cdot\widetilde{\gamma}\cdot\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,s})\right] \\ -E\left[v'(C_{2,s})\cdot\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,s})\cdot\widetilde{\gamma}\right] \end{array} \right\} \\ -\left[1-t_k\right]\cdot\mu\cdot E\left[v'(C_{2,s})\right]^2 \end{array} \right\}
\end{aligned}
$$

where D is positive and defined in equation (15). The first component of the above expression is the full income effect. As we have already assumed that $F(K_s)-(r+\mu)\cdot K_s > 0$, and since the characteristics of the utility functions ensures that $u''(C_{1,s}) < 0$ and $E\left[v''(C_{2,s})\cdot\widetilde{\gamma}\right] < 0$, the sign of the total income effect depends on the sign of $\frac{\partial K_s}{\partial Y}$:

$$
\frac{\partial K_s}{\partial Y} > 0 \text{ if } cov\left[v''(C_{2,s}),\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,s})\right] < cov\left[v'(C_{2,s}),\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,s})\right].
$$

Also, $\frac{u''(C_{1,s})+[1+(1-t_k)\cdot r]^2\cdot E[v''(C_{2,s})]}{[1-t_w]\cdot D\cdot E[v'(C_{2,s})]} < 0$, such that the substitution effect of the tax change depends on whether the last parenthesis is positive or negative.

The substitution effect is positive if

$$
\left\{ \begin{array}{l} E\left[v''(C_{2,s})\cdot\widetilde{\gamma}\cdot\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,s})\right] \\ -E\left[v'(C_{2,s})\cdot\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,s})\cdot\widetilde{\gamma}\right] \end{array} \right\} < \frac{[1-t_k]\cdot\mu\cdot E\left[v'(C_{2,s})\right]^2}{[1-t_w]^2\cdot K_s}
$$

As the right hand side is positive, we know that the substitution effect at least is positive if the left hand side is negative, and this can be rewritten as:

$$
cov\left[v''(C_{2,s})\cdot\widetilde{\gamma},\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,s})\right] - cov\left[v'(C_{2,s}),\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,s})\cdot\widetilde{\gamma}\right]
$$

Thus:

$$\begin{aligned}
\frac{\partial K_s}{\partial t_w} &> 0 \text{ if } cov\left[v''(C_{2,s}), \widetilde{\gamma}\right] \cdot E\left[v'(C_{2,s})\right] < cov\left[v'(C_{2,s}), \widetilde{\gamma}\right] \cdot E\left[v''(C_{2,s})\right] \\
&\quad \text{and} \\
1) &: cov\left[v''(C_{2,s}) \cdot \widetilde{\gamma}, \widetilde{\gamma}\right] \cdot E\left[v'(C_{2,s})\right] < cov\left[v'(C_{2,s}), \widetilde{\gamma}\right] \cdot E\left[v''(C_{2,s}) \cdot \widetilde{\gamma}\right] \\
2) &: \text{The substitution effect dominates the total income effect.}
\end{aligned}$$

Proof of proposition 3 Comparative static analysis of the first order conditions from the maximization problem (7) yields

$$\begin{aligned}
(18) \qquad \frac{\partial K_s}{\partial t_k} &= \frac{\partial K_s}{\partial Y} \cdot \left\{ r \cdot \frac{E\left[v'(C_{2,s})\right]}{u''(C_{1,s})} - \left[\frac{(r+\mu) \cdot K_s + r \cdot B_s}{1 + (1-t_k) \cdot r} \right] \right\} \\
&\quad + \left\{ u''(C_{1,s}) + \left[1 + (1-t_k) \cdot r\right]^2 \cdot E\left[v''(C_{2,s})\right] \right\} \cdot \frac{\mu \cdot E\left[v'(C_{2,s})\right]}{D} \\
&< 0
\end{aligned}$$

where D is positive and defined in equation (15).

The first part of the above expression is the full income effect. As the expression in the parenthesis is negative, the full income effect is negative if $\frac{\partial K_s}{\partial Y} > 0$. Analysis in the full mathematical appendix shows that this is true if
$E\left[v''(C_{2,s}) \cdot \widetilde{\gamma}\right] \cdot E\left[v'(C_{2,s})\right] - E\left[v'(C_{2,s}) \cdot \widetilde{\gamma}\right] \cdot E\left[v''(C_{2,s})\right] < 0.$
The second part of of the above expression is the substitution effect, which is negative. Thus,

$$\frac{\partial K_s}{\partial t_k} < 0 \text{ if } E\left[v''(C_{2,s}) \cdot \widetilde{\gamma}\right] \cdot E\left[v'(C_{2,s})\right] - E\left[v'(C_{2,s}) \cdot \widetilde{\gamma}\right] \cdot E\left[v''(C_{2,s})\right] < 0.$$

Proof of the effect of capital income taxes in proposition 4 Comparative static analysis of the first order conditions from the maximization problem (11) yields

$$\begin{aligned}
(19) \qquad \frac{\partial K_l}{\partial t_k} &= -\left\{ \begin{array}{l} \frac{\beta \cdot F(K_l) + r \cdot B_l}{1 + (1-t_k) \cdot r} - r \cdot \frac{E\left[v'(C_{2,l})\right]}{u''(C_{1,l})} \\ +\beta \cdot K_l \cdot \left[1 + (1-t_k) \cdot r\right] \cdot \frac{E\left[v''(C_{2,l}) \cdot \widetilde{\gamma}\right]}{u''(C_{1,l})} \end{array} \right\} \cdot \frac{\partial K_l}{\partial Y} \\
&\quad + \frac{\beta^2 \cdot \left[1 - t_k\right] \cdot K_l}{M \cdot E\left[v'(C_{2,l})\right]} \cdot \left\{ u''(C_{1,l}) + \left[1 + (1-t_k) \cdot r\right]^2 \cdot E\left[v''(C_{2,l})\right] \right\} \\
&\quad \cdot \left\{ \begin{array}{l} E\left[v''(C_{2,l}) \cdot \widetilde{\gamma} \cdot \widetilde{\gamma}\right] \cdot E\left[v'(C_{2,l})\right] \\ -E\left[v'(C_{2,l}) \cdot \widetilde{\gamma}\right] \cdot E\left[v''(C_{2,l}) \cdot \widetilde{\gamma}\right] \end{array} \right\}
\end{aligned}$$

where

$$
\begin{aligned}
(20)\quad M \;\equiv\; & \left\{u''(C_{1,l}) + [1+(1-t_k)\cdot r]^2 \cdot E\left[v''(C_{2,l})\right]\right\}\cdot\beta \\
& \cdot\left\{\begin{array}{c} [1-t_k]\cdot F_{K_lK_l}\cdot E\left[v'(C_{2,l})\right] + \beta\cdot u''(C_{1,l}) \\ +\beta\cdot G^2\cdot E\left[v''(C_{2,l})\right] - 2\cdot\beta\cdot G\cdot[1-t_k]\cdot E\left[v''(C_{2,l})\cdot\widetilde{\gamma}\right] \\ +\beta\cdot[1-t_k]^2\cdot E\left[v''(C_{2,l})\cdot\widetilde{\gamma}\cdot\widetilde{\gamma}\right] \end{array}\right\} \\
& -\beta^2\cdot\left\{u''(C_{1,l}) + [1+(1-t_k)\cdot r]\cdot\left\{\begin{array}{c} G\cdot E\left[v''(C_{2,l})\right] \\ -[1-t_k]\cdot E\left[v''(C_{2,l})\cdot\widetilde{\gamma}\right]\end{array}\right\}\right\}^2 \\
> \;& 0
\end{aligned}
$$

and

$$
(21)\qquad G \equiv [1-t_k]\cdot F_{K_l} + 1 > 0.
$$

As the expression in the first parenthesis of equation (19) is positive, the total income effect is negative if $\frac{\partial K_l}{\partial Y} > 0$, which holds if
$cov\left[v'(C_{2,l}),\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,l})\right] > cov\left[v''(C_{2,l}),\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,l})\right].$
We also know that $\frac{\beta^2\cdot[1-t_k]\cdot K_l}{M\cdot E\left[v'(C_{2,l})\right]} > 0$, and that
$\left\{u''(C_{1,l}) + [1+(1-t_k)\cdot r]^2\cdot E\left[v''(C_{2,l})\right]\right\} < 0.$
Thus the substitution effect is positive if
$E\left[v''(C_{2,l})\cdot\widetilde{\gamma}\cdot\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,l})\right] - E\left[v'(C_{2,l})\cdot\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,l})\cdot\widetilde{\gamma}\right] < 0.$
This can be rewritten as
$cov\left[v''(C_{2,l}),\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,l})\right] < cov\left[v'(C_{2,l}),\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,l})\right].$

$$
\begin{aligned}
\frac{\partial K_l}{\partial t_k} \;>\; & 0 \;\text{ if } cov\left[v''(C_{2,l}),\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,l})\right] < cov\left[v'(C_{2,l}),\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,l})\right] \\
& \text{and} \\
1)\;:\;\; & cov\left[v''(C_{2,l})\cdot\widetilde{\gamma},\widetilde{\gamma}\right]\cdot E\left[v'(C_{2,l})\right] < cov\left[v'(C_{2,l}),\widetilde{\gamma}\right]\cdot E\left[v''(C_{2,l})\cdot\widetilde{\gamma}\right] \\
2)\;:\;\; & \text{The substitution effect dominates the total income effect.}
\end{aligned}
$$

Proof of proposition 6 By differentiating (13) and rearranging by the use of the first order conditions from the maximization problem (11) we find that

$$
\begin{aligned}
(22)\quad \frac{\partial\left(\widehat{EU}_l - \widehat{EU}_s\right)}{\partial t_k} \;=\; & -\left\{\beta\cdot\left[F(\widehat{K}_l) - \left(\delta+\widehat{\lambda}_l\right)\cdot\widehat{K}_l\right] + r\cdot\widehat{B}_l\right\}\cdot E\left[v'(\widehat{C}_{2,l})\right] \\
& +\left\{(r+\mu)\cdot\widehat{K}_s + r\cdot\widehat{B}_s\right\}\cdot E\left[v'(\widehat{C}_{2,s})\right]
\end{aligned}
$$

We don't know whether $E\left[v'(\widehat{C}_{2,s})\right]$ or $E\left[v'(\widehat{C}_{2,l})\right]$ is larger, as we don't know the $\widehat{C}_{2,s}$ and $\widehat{C}_{2,l}$. We do know that $\widehat{B}_l > \widehat{B}_s$. The reason for this is twofold. Firstly, as shown in section 4, proposition 1, the split model induces the self-employed to over-invest in firm specific real capital, such that $\widehat{K}_l < \widehat{K}_s$. Secondly, the active owner of the widely held corporation only invests a share β of total capital $\widehat{K}_l$. Thus the individual has more capital to invest in the financial market when organizing as a widely held corporation than as a self-employed, $\widehat{B}_l > \widehat{B}_s$.

$\frac{\partial\left(\widehat{EU}_l - \widehat{EU}_s\right)}{\partial t_k} < 0$ as long as $\left\{\beta \cdot \left[F(\widehat{K}_l) - \left(\delta + \widehat{\lambda}_l\right) \cdot \widehat{K}_l\right] + r \cdot \widehat{B}_l\right\} \cdot E\left[v'(\widehat{C}_{2,l})\right] > \left\{(r+\mu) \cdot \widehat{K}_s + r \cdot \widehat{B}_s\right\} \cdot E\left[v'(\widehat{C}_{2,s})\right]$.
The first part of the left hand side represents the individual's full second period income if he organizes as a widely held corporation, while the first part of the right hand side represents only part of the individual's income (the imputed return to capital in the firm and the return to financial investments) if he organizes as a self-employed individual. Thus the above condition is likely to hold. The reason why the expressions on the right and left hand side of the above expression are important for whether an increase in the tax rate on capital income reduces the incentive to incorporate is the following. As only part of the income of the self-employed individual is affected by the increased tax on capital income, while all income by the owner of the widely held corporation is affected, the tax burden of the owner of the widely held corporation increases more by this tax increase.

Proof of proposition 8 By differentiating (13) and rearranging by applying the first order condition from the maximization problem (11) as well as equation (12) we get that

$$(23)\quad \frac{\partial\left(\widehat{EU}_l - \widehat{EU}_s\right)}{\partial\beta} = [1-t_k] \cdot \left\{F(\widehat{K}_l) - \left(r + \delta + \widehat{\lambda}_l\right) \cdot \widehat{K}_l\right\} \cdot E\left[v'(\widehat{C}_{2,l})\right] > 0.$$

We know that $[1-t_k] \cdot E\left[v'(\widehat{C}_{2,l})\right] > 0$. Then $\frac{\partial\left(\widehat{EU}_l - \widehat{EU}_s\right)}{\partial\beta} > 0$ if $F(\widehat{K}_l) - \left(r + \delta + \widehat{\lambda}_l\right) \cdot \widehat{K}_l > 0$. By Applying (12) this condition reduces to $\frac{F(\widehat{K}_l)}{\widehat{K}_l} > F_{\widehat{K}_l}$, which means that the average return to capital in optimum is higher than the marginal return to capital. And this holds, as $F_{\widehat{K}_l}$ and $F_{\widehat{K}_l\widehat{K}_l} < 0$.