NORDIC DUAL INCOME TAXATION OF ENTREPRENEURS

VESA KANNIAINEN
SEPPO KARI
JOUKO YLA-LIEDENPOHJA

CESIFO WORKING PAPER NO. 1623
CATEGORY 1: PUBLIC FINANCE
DECEMBER 2005

CESifo *Working Paper No. 1623*

NORDIC DUAL INCOME TAXATION OF ENTREPRENEURS

Abstract

The paper shows how entrepreneurial taxes interact with the career choice of individuals, the quality of entrepreneurs, and their effort and investments. It is particularly relevant to differentiate the early effects on start-up enterprises with substantial uncertainty from the tax effects on mature firms where the uncertainty is resolved. That is why the neutrality results of dividend taxation from mature company theory do not carry over to start-up enterprises. The Nordic dual model encourages (discourages) the establishment of new enterprises by entrepreneurs who anticipate high (low) profitability.

JEL Code: H25.

Keywords: dual income taxation, enterprise taxes.

Vesa Kanniainen
University of Helsinki
Department of Economics
P.O. Box 17
00014 University of Helsinki
Finland
vesa.kanniainen@helsinki.fi

Seppo Kari
Government Institute for Economic Research
Finland
seppo.kari@vatt.fi

Jouko Ylä-Liedenpohja
University of Tampere
Department of Economics and Accounting
33014 University of Tampere
Finland
jouko.yla-liedenpohja@uta.fi

November 8, 2005.
This paper has matured and expanded from a start-up version, with the results of the initial effort presented at the Third Norwegian-German Seminar on Public Economics, CESifo, Munich, June 20-21, 2003. The authors are grateful to Sören Bo Nielsen and other conference participants for their useful comments on those early versions. Vesa Kanniainen gratefully acknowledges the financial support of the Yrjö Jahnsson Foundation and Jouko Ylä-Liedenpohja that of the Nordic Tax Research Council.

1 Introduction

In the early 1990s Finland, Sweden and Norway implemented ambitious reforms of personal and corporate income taxation. By adopting so-called dual income taxation, hereafter DIT, they gave up the principle of global income taxation that had long guided the evolution of their income tax systems. In global income taxation, all economic income is subject to a single progressive tax schedule. The Nordic innovation was to divide personal income into capital income and earned income, say labor income, pensions and social benefits. Only earned income is taxed at a progressive schedule while income from capital is taxed at a flat rate. This is the fundamental idea of DIT.

Therefore, in DIT dividends and realized capital gains from *widely-held (e.g. listed) companies* are always treated as income from capital. But, income from *closely-held companies* and *unincorporated businesses* (*sole proprietors*) is split into income from capital and earned income. Prior to such a personal tax, profits from incorporated and unincorporated businesses are taxed at a flat rate, which is typically the same as the capital income tax rate. The split rule defines the maximum that is capital income for tax purposes, using a *presumptive rate of return* either on the gross or net assets of the enterprise.

The explicit goals of those reforms were to improve savings incentives, alleviate the problems arising from taxing inflationary gains, limit opportunities for tax arbitrage and reduce the distortion caused by the non-uniform treatment of different kinds of income from capital in the old system (Nielsen and Sørensen 1997). In a word, the tax reforms were designed to produce significant efficiency gains. Tikka (1993) and Cnossen (2000) also see DIT as a small country response to increasing international capital mobility. The idea of DIT was first developed and implemented in Denmark (Sørensen 1988), but the benefits of a separate proportional tax on all types of capital income were also recognized outside the Nordic countries[1]; cf. King (1987). Theoretical support for this tax system is provided by the Johansson-Samuelson theorem, explicated by Sinn (1987), saying that a uniform tax on all capital income, net of true economic depreciation, is neutral in respect of investment decisions. Subsequently, Sørensen (1994) suggested that DIT may cause fewer distortions than conventional income tax. Nielsen and Sørensen (1997) argued that the latter has a distortionary bias against investment in non-human capital, which can be offset by DIT.[2]

The current paper develops a relevant framework for a start-up enterprise run by an owner-manager. Entrepreneurs adopt the role of risk-taking by establishing and running their own enterprises, providing effort and private money to undertake investment decisions. The life-cycle of an enterprise has both a

[1] Subsequently, Italy also adopted a DIT system with some similar, though not quite identical features as in the Nordic DIT.

[2] DIT with its split rules may be arousing wider policy appeal as reflected by the recent DICE Report of CESifo (DICE 2004). In the German popular debate, DIT is seen as a practical solution to tax competion from economies in transition, in particular, with the German Council of Economic Experts (2003) proposing it for Germany.

start-up phase and an expansion phase. Unsuccessful ideas are wiped out. Only successful ideas can lead to a mature corporation, allowing the entrepreneur to cash profit. While earlier studies have produced models which abstract from business risks, we introduce entrepreneurial risk. We argue that the Domar-Musgrave result of the insurance function of income taxation does not apply in the case of start-up enterprises. The government does not share losses from the start-up phase and no insurance is available for the genuine business risk because of moral hazard.

Our analysis is carried out in a framework where the wage rate and market interest rate are given. These assumptions are consistent with the idea of enterprises being hosted by a small open economy with the wage rate being determined on the basis of productivity in the tradeable sector and with the residence principle applied for the taxation of worldwide interest income. The start-up firm is assumed to be domestically owned. Therefore the domestic taxes on its dividends and capital gains remain relevant.

DIT is designed to eliminate excessive taxation of entrepreneurial income due to progressivity, but this has a striking implication. The profitability distribution of enterprises becomes important. Entrepreneurs expecting positive profitability, but lower than the presumptive rate, may face a higher tax rate in the dual tax system than without it. Entrepreneurs expecting high profitability face high marginal tax rates on earned income, though the split approach reduces their average tax rate. For this group of entrepreneurs, the dual tax creates an incentive to transform entrepreneurial income into more leniently taxed capital income. To prevent that, the split rule is needed.

Our main findings are as follows. We show that it is particularly relevant to differentiate the early tax effects on start-up enterprises with substantial uncertainty from the tax effects on mature firms where the uncertainty is resolved. Our analysis of Nordic DIT reveals differences between the Nordic countries, showing also that the neutrality results of dividend taxation from the tax theory of mature companies do not carry over to start-up enterprises. For an incorporated enterprise, we find that the entrepreneur's ability threshold rises with the tax rate when there is a tax structure with uniform tax rates. In particular, Nordic DIT encourages (discourages) the establishment of a new enterprise by an entrepreneur who expects high (low) profitability. The incentive effects on enterprise formation of DIT among the two types are thus opposite. The low types face a higher cost of capital for start-up and expansion investments and a higher tax cost of effort provision than without DIT and its split rule. But, depending on the details of the split rule, for high-profitability enterprises the DIT rules may give a boost to expansion investment and mitigate the penalty on start-up investment caused by taxing dividends as earned income. The size of the boost to expansion investment depends on what view one takes the undervaluation of undistributed profits (business assets) at the time when the entrepreneur exits his enterprise, being of course the strongest with no undervaluation. But undervaluation may have most detrimental effects on the incentives of sole proprietors. Instead, the start-up investment is not affected by undervaluation, but our model enables us to derive an explicit expression for

Sinn's (1991a,b) problem of how the initial cost of capital exceeds the classical one predicted by double taxation of dividends, when a realization-based capital gains tax is also applied.

The structure of the paper is as follows. Section 2 provides a literature review and section 3 presents the component of the model without taxation. Section 4 introduces the Nordic DIT rules, first for the taxation of sole proprietors and thereafter for the taxation of incorporated enterprises. Section 5 analyzes the career choice between an entrepreneur and a laborer. Section 6 concludes.

2 Literature: A Review

Enterprise Taxation Models of the interaction of taxation and capital formation have traditionally analyzed publicly traded mature companies. In this framework, the cost of capital for investments has centered on the issue of whether double taxation of dividends matters for marginal investments (the old view) or whether it is that of retained earnings (the new or trapped equity view), the dividend tax falling upon inframarginal investments.[3] Therefore, such models have distanced themselves from the pertinent entrepreneurial issues and fully lack relevant links to the intrinsic characteristics of a start-up enterprise.

There are few models that focus on enterprise formation. Kanbur (1979), one of the first to introduce a model of entrepreneurship and occupational choice, argued that progressive taxation tends to encourage entrepreneurs to enter the market if their risk aversion is high. The result derives from the Domar-Musgrave property of ideal progressive income taxation that it shares in the risks of entrepreneurial activities. One should, however, note that entrepreneurs working on a single project cannot benefit from loss offset provisions to the same extent as companies, consisting of several uncorrelated projects. Ilmakunnas and Kanniainen (2001) introduced differential social insurance of labor and entrepreneurial income in a welfare state, establishing its detrimental impact on enterprise formation.

In his analysis of the birth and death of firms, King (1989) assumed that the implementation of an innovation, a business idea, requires a corporate form. Therefore an entrepreneur must either sell equity claims to outside suppliers of finance or sell his business idea to an existing mature company. The corporate form entails an additional tax beyond the sole proprietor. But then the tax is capitalized in the market price of the issue of equity, trapped in the corporate form. The alternative of dealing with a mature company results in an implicit tax caused by the cost of bureaucracy. If such costs are higher (smaller) than the degree of undervaluation of the corporate form equity, business ideas are embodied, if at all, in new companies (implemented in existing firms). The larger the additional tax on companies, the smaller the fraction of business ideas that lead to the birth of new companies. Deaths of companies occur

[3] The two views are summarized by Auerbach (1983). The "new view" was developed by King (1974, 1977), Bergstöm and Södersten (1977), Auerbach (1979) and Bradford (1981).

through takeovers in King (1989). Due to undervaluation, the acquired assets are cheaper, but also entail higher adjustment costs than new investment goods.

A dividend tax induced enterprise growth was analyzed by Sinn (1991a, b). He showed that with a dividend tax the initial cost of capital for external equity is higher than the old view suggests. That is why the firm underinvests in respect of its long-run stock of capital. More importantly, the firm thereafter enters a purely internally financed growth phase, during which no dividends are paid and no new shares are issued. Having reached its long-run optimal stock of capital, the new view applies. Building on Keuschnigg (2001), Dietz (2003) extended the Sinn framework in a general equilibrium framework.

The trapped equity models contain two different reasons for equity undervaluation in equilibrium. The King-Auerbach-Bradford undervaluation of mature companies is due to the capitalization of the owners' future dividend taxes over their capital gains taxes into the current share price. Instead, the King (1989) long-run undervaluation arises from the capitalization of the underlying corporation taxes on future dividends and is therefore independent of the owners' tax rates.[4] The discrepancy between the two arises from the fact that the former is based on a partial equilibrium insight while the latter builds upon a general equilibrium analysis of Auerbach and King (1983)[5] and explicitly models acquisitions as an alternative strategy to new investments.

Some studies have addressed the optimal taxation of enterprises under asymmetric information (Moresi 1998). Such papers show that the cost of market entry and entrepreneurial efforts are important mechanisms which are absent from company tax models.[6]

Dual Income Taxation There are a few studies on the behavior of enterprises under DIT. Hagen and Sørensen (1998) discussed at length the division of income from small businesses. Kari (1999) argued that, depending on how the ceiling of imputed capital income is determined, the Finnish dual income tax may lead to a strong investment incentive for closely held companies. Lindhe et al. (2002, 2004) showed that the Swedish splitting scheme, which is based on the acquisition value of capital assets (company shares), is neutral in its treatment of investments by a closely-held company (CHC) financed by retained earnings in respect of those by a widely-held one. Investments by a CHC financed by new share issues may, however, be affected by the Swedish splitting scheme. Lindhe et al. (2002) argued about the old Finnish scheme similarly to Kari (1999). The Norwegian scheme was found to be distortive, though the direction of the incentives was ambiguous. Norway and Finland differ from Sweden in that in

[4] The precise definition of the degree of undervaluation is "the ratio of the maximum net dividend which could be paid after the combined weight of corporate and personal taxation to the maximum net dividend which could be paid if there were no separate corporate tax system", the ACID Test Statistic in King (1977, 80).

[5] King (1986) contains the necessary details.

[6] There are also mechanisms which tend to limit the actual tax liability of entrepreneurs. Gordon (1998) has argued that entrepreneurs have access to methods of transforming labor income into capital income. For a comprehensive treatment, see Parker (2004).

the former two the split is based on the current value of assets. Alstadsaeter (2003) considered the Norwegian case, suggesting that it provides entrepreneurs with great incentives to participate in tax-minimizing income shifting. She also concluded that the Norwegian dual income tax leads to overinvestment and that the corporate organizational form serves as a tax shelter for high-income entrepreneurs.

Moreover, both Kari (1999) and Lindhe et al. (2002) found that the split system substantially raises the cost of capital for initial investments financed by outside equity because the resulting residual dividends are taxed as earned income. Lindhe et al. (2002) simulated such an initial cost of capital to be three to five times the steady-state one. Hagen and Sørensen (1998), Panteghini (2001) and Sørensen (2003) address the important issue of whether the presumptive rate of return should, in addition to a default-free rate of interest, include a risk premium. Fjaerli and Lund (2001) report that the choice of the type of payout from CHCs to their owners is strongly, but not uniquely, motivated by taxes.

3 Model of an Entrepreneur

In contrast to publicly traded mature companies, unincorporated enterprises and closely-held corporations with a dominant owner operate in a different stage of the life-cycle of the firm. In a sense, an owner-managed enterprise can be viewed as a premature prototype of the former and may never become a mature company. Indeed, empirical figures indicate that about half of new start-ups default or vanish within the first five years of their life-cycle (Geroski (1995)). This means that the economics of an owner-managed enterprise also is different from that of a mature corporation with diversified share ownership and a management team working on an incentive scheme. Limited ability to bear and share risks and typically unlimited liability restrict market entry of individuals who have to face substantial uncertainty in the early stage of the project, before uncertainty recedes.[7] This is different from an enterprise in the expansion phase with a proven track record of success that can rely on outside capital markets to finance its expansion investment, business risks being undertaken by diversified ownership. Because the theory of an enterprise with a start-up phase cannot be copied from the theory of a mature corporation, this section develops the pertinent tools of an entrepreneurial model.

Entrepreneurial qualities Potential entrepreneurs possess a project idea. Some are more productive and innovative than others. There is a continuum of entrepreneurs, indexed by ability $a \in (0, \overline{a})$. There are three stages, indexed by time, $t = 0, 1, 2$. In stage $t = 0$ individuals face a career choice between forming an enterprise and entering the labor market. The allocation of individuals to

[7] When the project is fully financed from outside sources in conditions of asymmetric information, the problem is different. Low-quality projects get subsidized by high-quality projects (de Meza and Webb (1999)). As they do not havea reputation or outside assets to pledge, outside financiers face a lemon's problem, distorting the early cost of capital.

risky industries occurs by self-selection. Commitment to entrepreneurship requires an initial effort, $e > 0$, and an initial investment, $k > 0$, at time $t = 0$. Effort represents a non-replicable input, like sweat capital.[8] The effort cost is convex, $c(e) = \frac{1}{2}e^2$. The first production stage provides entrepreneurs with a signal, θ, of the profitability of their idea. Investment in a first-stage project thus provides a risky return $af(e, k; \theta^i) + k$. Entrepreneurs do not know ex ante the true profitability θ of their project, only its distribution. The signal can take three values, $\theta^o < \theta^L < \theta^H$. With the probabilities π^L, π^H, the project will be a success, the initial investment being recovered and an operating profit made with $af(e, k; \theta^H) > af(e, k; \theta^L) > 0$. We assume f to be jointly concave in e and k. Success the occurs with the probability $\pi^L + \pi^H < 1$. Failure occurs with the probability $1 - \Sigma\pi^i$, when the project is of the type $\theta = \theta^o$, returning nothing. Thus the expected first-stage return is $\Sigma\pi^i \left[af(e, k; \theta^i) + k\right]$.

Enterprises with a bad signal leave the market. Those with a good signal have the option to allocate the first-stage cash flow to an immediate dividend, d, or to expansion investment $K > 0$ at time $t = 1$. To highlight the idea that risks are greatest at the early stage of a project, we assume that the second-stage return is not subject to uncertainty. The enterprise is assumed to be sold at its net asset value at time $t = 2$.

To emphasize the fundamental differences between start-up enterprises and mature companies, we introduce different technologies in the two stages, $af(e, k; \theta^i)$, $F(K; \theta^i)$, with access to the second obtainable stochastically.[9] The second-stage technology can be viewed as an advanced version of the first-stage technology, formally expressed as $F(a, x; \theta^i) = af(0, x; \theta^i)$. It does not require specialized inputs. Hence, no effort is needed and the return is given by $F(a, K; \theta^i)$ which, given θ, is increasing and strictly concave in a and K. To economize in notation, we work in the following with $F(K; \theta)$, surpressing a. The second-stage return is thought to be greater for an H-firm than for an L-firm, i.e. $F(K; \theta^H) > F(K; \theta^L)$. In the second stage, a successful entrepreneur also has access to private benefits, bK, related to the amount invested, $b > 0$.[10] Note, however, that private benefits in later stages do not represent a free lunch for surviving entrepreneurs who had to undertake costly efforts in the earlier stage.

We assume that the first-stage capital k depreciates fully and that the depreciation charges of the second-stage capital K are fully reinvested. This distinction also highlights the heterogeneity of capital over the life-cycle of the enterprise. In the second production stage the successful enterprise accumulates net assets, $\Delta V = F(K; \theta^i) + K - k$. The firm is sold in a trade sale or it goes public through an initial public offering (IPO), allowing the entrepreneur to exit. The time line of our three-stage model is given in Figure 1.

[8] In this respect, our model offers a broader view of the birth of enterprises than King (1989).

[9] Intuitively, as the start-up technology is a prototype of the mature company, the difference arises from learning and business experience. To survive successfully into an expansion stage, it is also necessary for the entrepreneur to develop a proper organizational set-up for his business, a well functioning entrepreneurial or corporate culture.

[10] This mechanism has been well known in the liteture on corporate finance since Jensen and Meckling (1976).

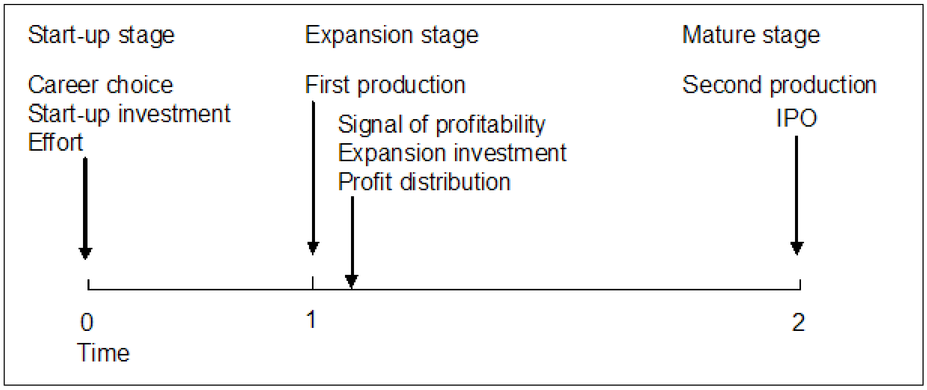

Figure 1: Time Line of the Model

The value of an entrepreneurial career Assume risk neutrality and let V denote the value of an entrepreneurial career in a risky industry. The cash flows in periods 1 and 2 are

$$d = af(e, k; \theta) + k - K; \quad D = F(K; \theta) + K. \tag{1}$$

Let r = the interest rate. Only the first-stage cash flow d is subject to uncertainty. The second-stage cash flow D, the liquidation of the project, is conditional on success in the initial stage, but deterministic for any successful project. In terms of backward induction, the project value at the beginning of the second stage is

$$V_1(K; \theta) = -K + \frac{D + bK}{1 + r} \tag{2}$$

Then, the optimal risky career satisfies

$$V_0^*(a, \theta) = \max_{e,k} \left(-(c(e) + k) + \Sigma_i \pi^i \frac{1}{1+r} [af(e, k; \theta^i) + k + V_1^*(\theta^i)] \right), \tag{3}$$

where $V_1^*(\theta) = \max_K V_1(K; \theta)$, provided that the participation constraint (7) below is satisfied.

It becomes important to analyze separately the costs of capital for the first-stage (initial investment) and for the second-stage (expansion investment). The optimal expansion investment of surviving enterprises satisfies

$$F_K(K; \theta^i) = r - b; \quad i = H, L. \tag{4}$$

Thus private benefits reduce the second-stage cost of capital because they operate as perfect substitutes for cash dividends.[11] Recall, however, that this effect is relevant only for successful enterprises.

[11] Their role is important as they are unobservable and represent an untaxed source of entrepreneurial income.

The first-order condition for the optimal initial investment is

$$\Sigma_i \pi^i f_k(e, k; \theta^i) = \left(\frac{1}{a}\right)(1 + r - \Sigma_i \pi^i). \tag{5}$$

The probability of success $\Sigma\pi^i$ raises the expected return (left-hand side) and reduces the cost of capital (right-hand side). The latter is the skill-scaled asset cost, $1/a$, multiplied by the full opportunity cost of funds employed, or cost of depreciation and interest adjusted for the success probability. Consequently, the risk of failure raises the initial cost of capital, high failure risk $(1 - \Sigma\pi^i)$ discouraging early investment. More able entrepreneurs invest more. Moreover, note that when the two conditions (4) and (5) hold with equality, they describe an interior solution for optimal dividend along the growth path. [12]

With $c(e) = \frac{1}{2}e^2$, the first-order condition for effort satisfies

$$\Sigma_i \pi^i f_e(e, k; \theta^i) = \left(\frac{e}{a}\right)[1 + r]. \tag{6}$$

The left-hand side represents the marginal expected return on effort. The right-hand side is the forward value of the skill-scaled marginal cost of effort. A high first-stage cost of capital also reduces entrepreneurial effort.

The entry threshold in terms of the marginal entrepreneurial a^m ability is affected by taxes. Entrepreneurs do not know the true type of their project, θ, only its distribution. They compare various candidate projects using the discount rate, r, to provide a ranking. Those who enter as entrepreneurs evaluate the expected value of their career, V, and compare it to the life-time value of an outside option, w. This can be viewed as labor income, insured by social insurance. Then, the entry threshold is given by

$$V_0^*(a) \geq w. \tag{7}$$

Evaluating, $\partial V_0^*(a)/\partial a = \frac{\pi}{1+r} f(\widehat{e}, \widehat{k}, \theta) > 0$ holds because by the envelope theorem we need to consider only the direct effect of a parameter change on the optimized function (3). The project value is proportionately increasing in entrepreneurial ability. The most able agents become entrepreneurs, given that the outside option is unrelated to the entrepreneurial skill. For the marginal entrepreneur with ability a^m, $V_0^*(a^m) = w$ holds.

This completes our basic framework.

4 Taxation of Enterprises

4.1 Sole Proprietor

The sole proprietor is only taxed on profits at the rate on earned income, τ_w. The business is assumed to be sold at the book value of assets at the end of

[12] We can also have a corner solution with all cash flow invested and no dividends paid out if the second-stage investment is expected to be highly profitable with $F_K(\widehat{K}) > r - b$. Excluding the possibility of a negative dividend (share issue), the cost of capital does not determine the amount invested. In this paper, we do not analyze corner solutions in depth.

the second stage. Therefore, no additional taxable income will be generated.[13] Denoting the tax rate on interest income by τ_p, the net rate of interest is given by $r = (1-\tau_p)\widetilde{r}$, with $\widetilde{r}$ denoting the gross interest rate. The tax liability then reads

$$T(e,k,K;a,\theta) = \tau_w \frac{af(e,k;\theta)}{1+r} + \tau_w \frac{F(K;\theta)}{(1+r)^2}. \tag{8}$$

The sole proprietor maximizes

$$V^{\tau}(\theta) = \max_{e,k,K} [V_o(e,k,K;a,\theta^i) - \Sigma_i \pi^i T(e,k,K;a,\theta^i)]$$

where $V_o(\cdot)$ is given by condition (3). The first-order conditions of the optimization problem reduce to the following conditions for the second- and first-stage cost of capital as well as for the supply of effort:

$$F_K(K,\theta^i) = \frac{r-b}{1-\tau_w}; \qquad i = H, L \tag{9}$$

$$\Sigma_i \pi^i a f_k(e,k;\theta^i) = \left(\frac{1}{a}\right) \frac{1-\Sigma\pi^i + r}{1-\tau_w} \tag{10}$$

$$\Sigma_i \pi^i f_e(e,k;\theta^i) = \left(\frac{e}{a}\right)\left(\frac{1+r}{1-\tau_w}\right), \tag{11}$$

which, as a matter of fact, are the benchmark values of a Johansson-Samuelson (JS) tax, taxing all income comprehensively once, including interest income, i.e. $\tau_w = \tau_p$. The JS tax is generally regarded to be neutral in respect of the project choice.[14] But in this model it clearly is not neutral in respect of the first-stage investment subject to a prospective capital loss of $(1-\Sigma\pi^i)$ of a unit because such a loss is not deductible from taxable income, in contrast to the Domar-Musgrave (1944) case. Because the firm can fail in the initial stage, the tax-adjusted return which the entrepreneur must earn is $1/(1-\tau_w) > 1$ times the expected unrecoverable initial stake.

Lastly, the founding entrepreneur recognizes the potential undervaluation of the business assets, brought about by the tax system, when he comes to sell them at date $t = 2$. Let γ stand for the sale price of the sold assets in respect of their book value. It means that with $\gamma \leq 1$ he cashes an amount

$$\frac{1}{(1+r)^2}(1-\gamma)\left[(1-\tau_w)F(K;\theta) + K\right]$$

less in present value terms from such a sale. This affects the cost of capital for expansion investment

$$F_K(K,\theta) = \frac{r-b}{(1-\tau_w)\gamma} + \frac{1-\gamma}{(1-\tau_w)\gamma} \tag{12}$$

[13] We assume no goodwill gains at the instant of realization, which is equivalent to assuming that the subsequent future cash flows satisfy the rate of return requirement but do not create additional value.

[14] Under such an income tax with economic depreciation, the tax rate-invariant valuation of investment projects holds (cf. Sinn 1987, 119, King 1977, 117), though the intertemporal distortion of saving and investment decisions remains.

If the rate of undervaluation $1-\gamma=\tau_c$ is due to corporation tax at the rate τ_c, as in King (1989), we see that unincorporated enterprises are subject to double taxation in their expansion phase via two venues, the tax multiplier and a tax system caused capital loss, and therefore face a higher cost of capital than the "new view" suggests for mature companies. A sole proprietor cannot escape the effect of double taxation if he is forced to sell his assets as a going concern to the corporate sector.

4.1.1 Nordic split rules

Nordic DIT splits the entrepreneur's total business income into income from capital and earned income using the concept of a *capital base*, B. This consists of the entrepreneur's initial investment and the subsequently reinvested business income, net of taxes. The accounting rules and tax laws vary among the Nordic countries, but the fundamental idea of the split is filtered by a somewhat simplified version, as follows. Denoting the tax liabilities by T_1, T_2, the capital bases at the end of the first and second stages are defined

$$B_1 = af(e,k,\theta)+k-T_1;\ \ B_2 = F(K,\theta)+K-T_2. \tag{13}$$

The tax authorities impute the amount of capital income by a *presumptive rate of return*, say ρ, and tax them, ρB_1 and ρB_2, at the flat rate on capital income, τ_p. Any remaining business profits are taxed at the rate of earned income, τ_w^i. This is the tax rate determined by the realized total business income in the respective income band i on the progressive rate schedule, but we assume it to take only two values $\tau_w^L < \tau_p < \tau_w^H$.

Thus, we obtain the entrepreneur's first- and second-stage tax liabilities

$$\begin{aligned} T_1 &= \tau_p \rho B_1 + \tau_w^i[af(e,k,\theta)-\rho B_1] \\ T_2 &= \tau_p \rho B_2 + \tau_w^i[F(K,\theta)-\rho B_2]. \end{aligned}$$

Inserting B_1 and B_2 from (13), we solve for

$$\begin{aligned} T_1 &= \frac{\rho\tau_p+(1-\rho)\tau_w^i}{1-\rho(\tau_w^i-\tau_p)}af(e,k,\theta)-\frac{\rho(\tau_w^i-\tau_p)}{1-\rho(\tau_w^i-\tau_p)}k \\ T_2 &= \frac{\rho\tau_p+(1-\rho)\tau_w^i}{1-\rho(\tau_w^i-\tau_p)}F(K,\theta)-\frac{\rho(\tau_w^i-\tau_p)}{1-\rho(\tau_w^i-\tau_p)}K. \end{aligned}$$

We notice that the coefficient of the operating profit, $\frac{\rho\tau_p+(1-\rho)\tau_w^i}{1-\rho(\tau_w^i-\tau_p)}$, is the sole proprietor's effective marginal tax rate. His total tax liability is then

$$T(e,k,K;a,\theta)=\frac{T_1}{1+r}+\frac{T_2}{(1+r)^2}$$

4.1.2 Investment Incentives

The first-order condition for the optimal expansion-stage investment is

$$F_K(K,\theta^i) = \frac{\left[r - b - \rho(\tau_w^i - \tau_p)\right]\left[1 - \rho(\tau_w^i - \tau_p)\right]}{1 - \tau_w^i}; \qquad i = H, L$$

and is clearly affected by the DIT split rule. There is an additional cost of capital effect which depends upon the split parameter ρ and the realized profitability which determines the tax rate differential $\tau_w^i - \tau_p$. Uncertainty about the profitability of the project, θ, is revealed before the expansion investment. In contrast to (9) of a JS tax, the split rule[15] offers an enormous incentive for expansion-stage investment if realized total business income settles in the income band of a progressive tax rate schedule where the entrepreneur faces a tax rate $\tau_w^H > \tau_p$. But, if the business generates relatively little total income so that $\tau_w^L < \tau_p$ holds in that income band, we observe that the split relief of the DIT alters into an additional tax on the entrepreneur's expansion-stage capital, leading to a higher cost of capital than without the DIT.

The first-order condition for the optimal initial investment is accordingly

$$\sum_i \pi^i f_k(e,k;\theta^i) = \left(\frac{1}{a}\right) \sum_i \left\{ \frac{(1 - \pi^i + r)\left(1 - \rho(\tau_w^i - \tau_p)\right)}{1 - \tau_w^i} - \frac{\rho(\tau_w^i - \tau_p)}{1 - \tau_w^i} \right\}.$$

We recall that the JS tax magnifies the risk of failure, $\Sigma(1 - \pi^i)$, effect on the cost of capital for a start-up entrepreneur. If $\pi^H > \pi^L$ is expected, the DIT split reduces the initial cost of capital not only directly, but also indirectly by moderating the risk of failure effect, because an entrepreneur expecting high profitability faces $\tau_w^H - \tau_p > 0$. A striking implication is that in the case $\pi^H < \pi^L$ the DIT split via the two mechanisms now turns into an additional tax on start-up investment because $-\frac{\rho(\tau_w^L - \tau_p)}{1 - \tau_w^i} > 0$. These conclusions follow from the fact that the fraction of taxable capital income is separated first when taxing sole proprietors.

In the first-order condition for optimal effort

$$\sum_i \pi^i f_e(e,k;\theta^i) = \left(\frac{e}{a}\right) \sum_i \left[\frac{1 + r}{1 - \tau_w^i}\right] \left[\frac{1 - \rho(\tau_w^i - \tau_p)}{1 - \tau_w^i}\right]$$

the split rule moderates the marginal cost of effort when $\pi^H > \pi^L$ and $\tau_w^H - \tau_p > 0$ hold. In the opposite case, the DIT split system additionally penalizes the tax cost of effort. So we have proved the following.

[15] The imputed rate of return on assets, ρ, is not the same in every Nordic country, and is potentially highest in Finland. In the Finnish case dividends from a non-listed company are capital income if they do not exceed a 9 per cent return on the (net of debt) asset value of the distributing company. An unincorporated entrepreneur can elect to set the presumptive rate of return on his net business assets at either 20 per cent or 10 per cent. Dividends distributed by listed companies are always taxed as capital income.

Proposition 1 *For those entrepreneurs who expect that $\pi^H < \pi^L$, the split system represents a penalty on start-up investment and effort, magnifying the risk of failure effect. However, for those enterprises which turn out to be highly profitable, the split system provides a strong investment incentive in the expansion stage and mitigates the risk of failure effect on start-up investment.*

As to the effect of the potential undervaluation upon exit induced by the tax system, it is clear from (12) how the King (1989) undervaluation $\gamma = 1 - \tau_c$ affects the cost of capital in the expansion stage

$$F_K(K, \theta^i) = \frac{\left[r - b - \rho(\tau_w^i - \tau_p)\right] \left[1 - \rho(\tau_w^i - \tau_p)\right] + \tau_c}{(1 - \tau_w^i)\,(1 - \tau_c)}, \qquad i = H, L.$$

Undervaluation acts as a counterforce to the boost effect of the split rule (and magnifies its penalty) on high (low) profitability enterprises.

4.2 Dual Income Taxation of Corporations

We stay within classical corporate taxation, which regards an incorporated company and its owners as separate tax entities. We extend our previous work (Kanniainen et al. (2005) to analyze the Nordic split rules. Let $\tau_c, \tau_d, \tau_g, \tau_w$ denote the tax rates on profits, dividends, capital gains and earned income.[16] Consider, first, the expression for tax liability without the split rules

$$\begin{aligned} T(e,k,K,\theta) = {} & \tau_c \frac{af(e,k,\theta)}{1+r} + \tau_d \frac{(1-\tau_c)af(e,k,\theta) + k - K}{1+r} \\ & + \tau_c \frac{F(K,\theta)}{(1+r)^2} + \tau_g \frac{\gamma\left[F(K,\theta)(1-\tau_c) + K\right] - k}{(1+r)^2} \\ & + (1-\gamma)\frac{(1-\tau_c)F(K,\theta) + K}{(1+r)^2}. \end{aligned} \tag{14}$$

The operating profits of the first stage $af(e,k,\theta)$ and the second stage $F(K,\theta)$ form the corporation tax base. The entrepreneur's dividend tax base is $d = (1-\tau_c)af(e,k,\theta) + k - K$ at time $t = 1$. The expansion-stage return is taken as a capital gain. The enterprise is sold at its net asset value at time $t = 2$ subject to a possible undervaluation of its assets in respect of their book value: the after-corporation-tax cash flow $(1-\tau_c)F(K,\theta) + K$ multiplied by their valuation factor γ. The entrepreneur's initial investment k qualifies as a deduction from the base of the capital gains tax liability. Thus the last term represents the cash effect of the undervaluation to the owners of the firm to be sold.

As to the split rules, Finland and Sweden split the dividend, while Norway

[16] We consider enterprises with a domestic owner. Hence, the mechanisms of an open economy in the form of foreign ownership do not arise.

splits the pre-tax profit with the capital base expressed as follows

$$\begin{aligned} B_1 &= \phi(1-\tau_c)af(e,k,\theta) + k; \\ &\quad \phi = 1 \text{ for Finland, Norway;} \quad \phi = 0 \text{ for Sweden} \\ B_2 &= (1-\tau_c)F(K,\theta) + K; \text{ Norway} \end{aligned}$$

B_2 is not needed for Finland and Sweden since no dividend is paid in stage 2. The significance of the current Finnish split rule is that the distributed dividend at time $t = 1$ is included in the capital base since 1999. It was previously deducted so that $B_1 = K$ held true.[17] Only the acquisition cost of shares, k, qualifies for the capital base in Sweden.[18]

The split rules of Finland and Sweden In an incorporated company, the split of the entrepreneur's total business income into income from capital and earned income operates somewhat differently than for an unincorporated company. The tax authority imputes the income from capital at a presumptive rate of return, ρ, taxes it, ρB_1, at the dividend tax rate rate τ_d while the remaining distributed profit, $d - \rho B_1$, is taxed at the rate on earned income, τ_w^i. Then the personal dividend tax paid by the entrepreneur at the end of the first stage is

$$T_1^p = \tau_d \frac{\rho B_1}{1+r} + \tau_w^i \frac{[(1-\tau_c)af(e,k,\theta) + k - K - \rho B_1]}{1+r}. \tag{15}$$

which replaces the second term (the dividend tax term) in (14).

The split rule of Norway It is not possible to include all the details of the Norwegian dual income tax. We confine ourselves to a simplified version. Norway taxes profits at a rate τ_c, which is equal to the capital income tax rate τ_p, and thereafter splits pre-tax income into capital income and personal income, by subtracting the imputed capital income, ρB_1 and ρB_2, from pre-tax profits. Personal income is then surtaxed at the rate $\tau_{ws} = \tau_w^i - \tau_c$ so that, together with the tax on profits, personal income is taxed at the rate of earned income, τ_w^i.[19]. The entrepreneur's tax liability is thus

$$T_1 + T_2 = \tau_c \frac{af(e,k;\theta^i)}{1+r} + \tau_c \frac{F(K;\theta^i)}{(1+r)^2} + \tau_{ws} \left(\frac{af(e,k;\theta^i) - \rho B_1}{1+r} + \frac{F(K;\theta^i) - \rho B_2}{(1+r)^2} \right),$$

or after substitutions for τ_{ws} and B_i and combining the terms

$$T_1 + T_2 = \tau_w^i \left[\frac{af(e,k;\theta^i)}{1+r} + \frac{F(K;\theta^i)}{(1+r)^2} \right]$$

[17] Because the earlier results concerning Finland were derived using this narrower capital base, we will briefly comment below its effect on the expansion-stage cost of capital.

[18] Another difference from Finland is that Sweden always splits the realization gain evenly into earned income and capital income (Lindhe et al. 2004). Therefore, the rate of the capital gains tax in the fourth term of (14) is in fact $\tau_g = \frac{\tau_d + \tau_w}{2}$.

[19] To be more precise, the capital base in Finland is capital minus debt, i.e. net assets of the firm. In Norway, it is the gross non-financial capital. In our model debt is not considered, and the capital base is taken to be the same in Finland and in Norway.

$$-\rho\left(\tau_w^i-\tau_c\right)\left(\frac{(1-\tau_c)af(e,k;\theta^i)+k}{1+r}+\frac{(1-\tau_c)F(K;\theta)+K}{(1+r)^2}\right) \tag{16}$$

which replaces (14) and (15). We have left the undervaluation term out in (16). For the θ^L-state it is as in (14), but for the θ^H-state, the personal surtax additionally reduces the net-of-tax value of the sold assets subject to undervaluation.

4.3 Investment Incentives under Nordic DIT

Finland and Sweden The tax-adjusted value of the enterprise is

$$\begin{aligned}
V^\tau = & -c(e)-k+\sum_{i=L,H}\pi^i\frac{1}{1+r}\left\{af(e,k;\theta^i)+k-K+\frac{F(K;\theta^i)+K(1+b)}{1+r}\right\} \\
& -\sum_{i=L,H}\pi^i\frac{1}{1+r}\left\{\tau_c af(e,k;\theta^i)+\tau_d\rho B_1+\tau_w^i\left[(1-\tau_c)af(e,k;\theta^i)+k-K-\rho B_1\right]\right\} \\
& -\sum_{i=L,H}\pi^i\left(\frac{1}{1+r}\right)^2\left(\tau_c F(K;\theta^i)+\tau_g\left[\gamma(1-\tau_c)F(K;\theta^i)+\gamma K-k\right]+\right. \\
& \left.(1-\gamma)\left[(1-\tau_c)F(K;\theta^i)+K\right]\right)
\end{aligned} \tag{17}$$

For the cost-of capital of the expansion investment, we have

$$F_K(K;\theta^i)=\frac{(r-b)+(1-\gamma)-\left[\tau_w^i(1+r)-\gamma\tau_g\right]}{(1-\tau_c)\,(1-\tau_g)\gamma};\qquad i=H,L. \tag{18}$$

which is the same for both Finland and Sweden because K itself is not part of the capital base B_1 in either country. This is also the reason why the split parameter does not enter (18).

In contrast to the case of $\tau_d=\tau_w$, where the effects of the split system naturally vanish, the dividend split of DIT is seen from (18), however, to reduce the cost of capital for expansion investment by firms with high expected profitability, $\tau_w^H-\tau_d>0$. Because a marginal euro of dividends is taxed as earned income in this regime, the opportunity cost of a retained post-tax euro is less than without the split. That is, the effect of the early-stage dividend tax avoidance in favour of the later-stage capital gains tax is stronger in the third term of the numerator in (18).[20] For firms expecting low profitability, $\tau_w^L-\tau_d<0$, the split system clearly discourages expansion in contrast to a proportional rate structure, $\tau_d=\tau_w$ or absence of a split system.

The proper double-tax multiplier in (18) is $\frac{1}{(1-\tau_c)(1-\tau_g)}$ if there is no undervaluation of assets at exit, $\gamma=1$. But, it is $\frac{1}{(1-\tau_c)(1-\tau_d)}$ with the standard "new

[20] With K forming solely the capital base of the old Finnish rule, a fourth term $-(\tau_w^i-\tau_d)\rho(1+r)$ would appear in the numerator of (18). This created a second channel on the cost of capital. Because a marginal investment also contributed to the capital base, B, this provided a tax reduction of $\left(\tau_d-\tau_w^H\right)\rho$ per euro of post-tax first-stage profit.

view" undervaluation, $\gamma = \frac{1-\tau_d}{1-\tau_g} < 1$. Utilizing the latter γ in (18), we obtain

$$F_K(K;\theta^i) = \frac{r(1-\tau_w^i) - b - (\tau_w^i - \tau_d)}{(1-\tau_c)(1-\tau_d)}; \quad i = H, L. \tag{19}$$

The conclusions about the effect of the split rule on the cost of capital in the high and low expected profitability regimes, θ^H and θ^L, are even more clear-cut from (19) than from (18).

Being a closely-held company in a regime where residual dividends are taxed as earned income implies, however, a "new view" undervaluation of $\gamma = \frac{1-\tau_w^H}{1-\tau_g}$ as Kari (1999) derived. Plugging this into (18), it results in

$$F_K(K;\theta^H) = \frac{r-b}{1-\tau_c}; \qquad i = H, L$$

which with $b = 0$ is pre-tax interest and is not grossed up by the capital gains tax, though part of our model. Thus the dividend split system is neutral in respect of expansion investment among closely-held and listed companies both in its Finnish and Swedish versions. Our result, however, is different from Lindhe et al. (2002), who derived the same for Sweden only. Had they introduced a capital gains tax into their model, their steady-state cost of capital would have been the standard "new view" one $F_K(K,\theta^i) = \frac{r}{(1-\tau_g)(1-\tau_c)}$ which is higher than ours.[21] In our model, undervaluation produces the result that the marginal expansion-stage investment is taxed once only, though we are explicitly in the framework of double taxation.

The cost of capital for the start-up investment is derived for Finland to be

$$\sum_i \pi^i a f_k(e,k;\theta^i) = \sum_i \frac{1-\pi^i + r + \tau_w^i(1-\rho) + \rho\tau_d - \tau_g/(1+r)}{(1-\tau_c)\left[1-\tau_w^i + \rho(\tau_w^i - \tau_d)\right]}. \tag{20}$$

Assume that $\pi^H > \pi^L$ with $\tau_w^H - \tau_p > 0$ is expected. Then Sweden differs from the Finnish case only by its higher double-tax multiplier

$$\sum_i \frac{1}{(1-\tau_c)(1-\tau_w^i)} > \sum_i \frac{1}{(1-\tau_c)(1-\tau_w^i + \rho(\tau_w^i - \tau_d))}$$

because Sweden allows for neither distributed nor reinvested profits in its capital base. We observe from (20), first, that the taxation of residual dividends as earned income implies a higher double-tax multiplier in (20) than under a flat tax on capital income and, therefore, discourages start-up investment. Second, the split system directly raises the initial cost of capital via its numerator in (20) under such an expectation when $\Sigma_i \tau_w^i(1-\rho) + \rho\tau_d > \tau_g/(1+r)$ holds true for the tax rate on residual dividends. This new result is more specific about the

[21] Kari (1999) and Lindhe et al. (2002) used the old capital base of Finland, $B_1 = K$. Therefore their steady-state cost of capital for expansion investment is less than the standard "new view" one by the term $-\frac{(\tau_w^H - \tau_d)\rho(1+r)}{(1-\tau_c)(1-\tau_w^H)}$, the effect of the capital base "padding".

depressing effect of earned income dividends on the start-up cost of capital than in Kari (1999) or Lindhe et al. (2002). The reason why this differs from the earlier results is that we have two consecutive investment opportunities while the earlier papers focused on utilizing a given set of investment opportunities optimally at each time instant. Notice that the degree of undervaluation at exit does not enter (20) as in Sinn (1991a, b).

For the supply of effort, we obtain for Finland

$$\sum_i \pi^i f_e(e,k,\theta^i) = \left(\frac{e}{a}\right)\sum_i \left[\frac{1+r}{(1-\tau_c)(1-\tau_w^i+\rho(\tau_w^i-\tau_d))}\right]. \tag{21}$$

The Finnish split system interacts with the effort decision via the double-tax multiplier which, in contrast to a progressive personal income tax or absence of DIT, is higher (lower) under low (high) expected profitability, discouraging (encouraging) effort provision, while in Sweden the latter part of this effect is missing.

Norway We consider only the case of no undervaluation of sold assets, $\gamma = 1$. The first-order condition for the optimal expansion-stage investment is

$$F_K(K,\theta^i) = \frac{(r-b)-(\tau_w^i-\tau_c)\rho}{(1-\tau_w^i+(1-\tau_c)\rho(\tau_w^i-\tau_c))}, \qquad i = H, L$$

which is clearly affected by the DIT split rule. The relevant cases are $\tau_w^H > \tau_c$ and $\tau_w^L = \tau_c$ because there is no income left subject to the surtax. In contrast to (9) of a JS tax, the split rule offers an enormous incentive for expansion-stage investment if the realization of total business income settles in the income band where the entrepreneur faces a tax rate $\tau_w^H > \tau_c$. But, if his business generates relatively little total income so that nothing is surtaxed and $\tau_w^L = \tau_c$ holds,[22] DIT has no effect on his expansion-stage capital. Also, notice that the Norwegian system taxes business income only once, the reference tax multiplier being that of earned income, which is mitigated by the split rule if high profitability is expected.

The first-order condition for the optimal initial investment is accordingly

$$\sum_i \pi^i f_k(e,k;\theta) = \left(\frac{1}{a}\right)\sum_i \frac{1-\pi^i+r-(\tau_w^i-\tau_c)\rho}{1-\tau_w^i+(1-\tau_c)\rho(\tau_w^i-\tau_c)}$$

with similar implications for the expected high and low realizations of θ and for the consequent τ_w^i in respect of τ_c as in the case of the cost of capital for expansion investment.

The first-order condition for optimal effort (11) is also affected by the DIT

$$\sum_i \pi^i f_e(e,k;\theta) = \left(\frac{e}{a}\right)\sum_i \frac{1+r}{1-\tau_w^i+(1-\tau_c)\rho(\tau_w^i-\tau_c)},$$

[22] In Norway an entrepreneur as well as an employer receives deductions and allowances only against the "flat tax" section $\tau_w = \tau_c$ of the rate schedule.

in the expected high profitability regime via the mitigated tax multiplier.

Above we have not explicitly taken into account the effect of the potential tax system induced undervaluation upon exit[23]. Its general pattern on the expansion cost of capital follows the principle in (12), but the counterforce created by undervaluation is magnified by the split system in the θ^H-state.

Cross-Country Comparison As regards expansion investment, the three Nordic DIT systems studied show a rather similar qualitative effect both under high and low expected profitability. Though Finland and Sweden seem to represent two opposing extremes in their approach to the capital base, both schemes produce the same cost of capital for expansion investment and treat identically investments by closely and widely held companies. Norway also splits the expansion-stage profit and, therefore, dividend and capital gains taxes do not have separate roles with expansion investment which is an essential general feature (cf. Kanniainen et al. 2005), maintained in the Finnish and Swedish DIT split rules, if there is no tax system induced undervaluation of the sold company at exit.

But as regards initial investment, the system of Norway is the most benign under our modeling because it does not tax the distribution of the freed funds, k, as a dividend as Finland and Sweden do, i.e. it taxes business income only once. Neither does it create those detrimental incentives on entrepreneurs, expecting to be of the low profitability type, which are prevalent in the tax system of Finland. As noted above, the effective rate of the capital gains tax in the Swedish DIT depends on the tax rate on earned income which, in contrast to Finland, penalizes both the initial and expansion investments. Because Sweden does not allow the presumptive income from capital to be determined on the basis of reinvested profits, the Swedish DIT also leads to higher tax multipliers than the Finnish and Norwegian regimes and, therefore, potentially to the most detrimental incentives for effort and initial investment.

5 Career Choice: Entrepreneur or Laborer?

It is a property of the Johansson-Samuelson tax with full loss offsets that the tax structure is neutral in respect of the choice between the outside option and a sole proprietor (an unincorporated enterprise). It need not be neutral in respect of the formation of incorporated companies. For this reason, we examine the entry threshold for incorporated enterprises in general and, thereafter, within the Nordic DIT. It is often thought that the current tax laws, say in the Nordic countries for example, favor the establishment of new enterprises in incorporated form rather than in the form of sole proprietor.

[23] Remember, however, that the company need not be undervalued when sold because the prospective buyers in the corporate sector bid with pre-tax euros, as shown by Kanniainen et al. (2005).

When incorporated, the entrepreneur maximizes

$$V^{\tau} = \max_{e,k,K} [V_o(e^{\tau}, k^{\tau}, K^{\tau}) - \sum_i \pi^i T(e^{\tau}, k^{\tau}, K^{\tau})],$$

where the notation with the super index τ denotes the variables under taxation. Consider first the entrepreneurial choices under a uniform structure of tax rates, $\tau_c = \tau_d = \tau_g = \tau_w$. In the classical tax system, owing to the double taxation of corporate income, the after-tax enterprise value is lower than the present value of the after-tax outside option with identical cash flows. Though this mechanism is implicitly discussed in the tax literature (Harberger (1962)), it largely abstracts from the question of occupational choice. We therefore report it as a proposition. To complete the description of the tax structure for this proposition, we introduce explicitly the interest tax rate, τ_p, to study taxation with uniform tax rates.[24] We denote the before-tax interest rate by $\widehat{r}$, i.e. $r = (1 - \tau_p)\widehat{r}$.

Proposition 2 *Let a^{τ} denote the marginal entrepreneurial talent under taxation. Then it follows that under a tax structure with uniform tax rates, i.e. $\tau = \tau_c = \tau_d = \tau_g = \tau_w = \tau_p$, there is a positive relationship between the tax rate and the marginal talent, $\partial a^{\tau}/\partial \tau > 0$.*

Proof. See Appendix A. ■

The above theorem holds strictly for a tax structure which does not distort the effort choice e^{τ} and investments k^{τ}, K^{τ}. However, we expect it to hold more generally. We therefore prove

Proposition 3 *Let a^m and a^{τ} denote the marginal entrepreneurial talents in the absence of taxation and under taxation, respectively. Then it follows that under a tax structure with uniform tax rates, i.e. $\tau = \tau_c = \tau_d = \tau_g = \tau_w = \tau_p$, there is a linear dependence between the marginal entrepreneurial talents*

$$a^{\tau} = \beta_o + \beta_1 a^m,$$

where β_1 is a strictly positive constant and greater than one.

Proof. See Appendix B. ■

What our proposition suggests is that even a uniform tax structure $\tau_c = \tau_d = \tau_g = \tau_w$ is distortive in respect of enterprise formation. With identical cash flows, the after-tax enterprise value would be lower in the classical tax system than the present value of the after-tax outside option. The dividend tax is distortionary and affects the career choice of individuals between entrepreneurship and entering the labor force. The non-neutrality of dividend taxation follows from the observation that double taxation of profits reduces the ex ante value of the yet unborn enterprise relative to the after-tax value of the outside

[24] The first of the two propositions below holds for neutral tax systems, the second holds for uniform tax systems.

option. For the equality $V_o^\tau(a^m) = w(1-\tau_w)$ to hold, a^m must be greater with a uniform tax structure than in the absence of taxation, i.e. the new business idea must show greater profitability, cf. King (1989).

With a non-uniform tax structure, an additional distortion is created by the undervaluation at exit. Dividend taxation may thus have larger distortions on enterprise formation than has been previously recognized by the literature emphasizing its capitalization. This mechanism is seldom analyzed in the literature focusing on the neutrality of dividend taxation in respect of expansion investments by mature companies. The exceptions are King (1989), Keuschnigg (2001) and Dietz (2003).

We next examine the effects of Nordic dual model on entrepreneurship. Take the Finnish case (17) for the tax-adjusted value of the enterprise. We prove the following proposition, which also holds for the Swedish and Norwegian model

Proposition 4 *The Nordic dual model encourages the establishment of new enterprises by entrepreneurs who expect to be of the high-profitability type. It discourages the establishment of new enterprises by entrepreneurs who expect to be of the low-profitability type.*

Proof. Take (17). Introduce $\gamma = 1$ (as γ does not play a role in what follows). Introduce it into the indifference condition (26), $Y = V_o^\tau(a^\tau) - w(1-\tau_w) = 0$, totally differentiate it, arriving at

$$\frac{da^\tau}{d\rho} = -\frac{\partial Y/\partial\rho}{\partial Y/\partial a^\tau},$$

where

$$\partial Y/\partial\rho = \Sigma\frac{\pi_i}{1+r}(\tau_w^i - \tau_d)[a^\tau(1-\tau_c)f(e,k;\theta^i) + k]$$

$$\partial Y/\partial a^\tau = \Sigma\frac{\pi_i}{1+r}[(1-\tau_w^i) + (\tau_w^i - \tau_d)\rho](1-\tau_c)f(e,k;\theta^i) > 0.$$

Therefore, $da^\tau/d\rho < 0$, when $\Sigma\pi_i(\tau_w^i - \tau_d) > 0$ and $da^\tau/d\rho > 0$, when $\Sigma\pi_i(\tau_w^i - \tau_d) < 0$.[25] ■

6 Concluding Discussion

In comprehensive (global) income taxation, a taxpayer's entire economic income is subject to a single progressive tax schedule. Dual income taxation (DIT) makes a distinction between income from capital and earned income. DIT was adopted by the Nordic countries to improve savings incentives, limit tax arbitrage and reduce distortions caused by the non-uniform treatment of different kinds of capital income. A further goal of the system was to adjust the Nordic

[25] To clarify the mechanism, we notice that with given tax rates, $\tau_w^H, \tau_w^L, \tau_d$, an increase in the presumptive rate ρ reduces the average tax rate of high-profitable enterprises, creating the incentive suggested by our proposition.

tax systems to a world of increasing mobility of capital. The aim of the rules for closely-held companies and sole proprietors is, on the one hand, to prevent the entrepreneurs from shifting their labor income to the sphere of income from capital and, on the other hand, to continue taxing the former subject to a progressive rate schedule and the latter at uniform proportional rates in response to international mobility of capital and to prevent tax arbitrage among different categories of income from capital.

We have emphasized the need to incorporate the neglected observation, the differential treatment of low and high profitabilty enterprises in DIT, into the theory of enterprise taxation. The rules may in fact raise the tax burden of low-profitability small enterprises because their owners, by dividing business income among family members, for example, would benefit from low marginal tax rates in the beginning of a progressive rate schedule. These entrepreneurs face a higher cost of capital for start-up and expansion investments and a higher tax cost on effort provision than without the DIT rules.[26] But, the opposite incentives are offered to high-profitability enterprises. Their distributed profits would be taxed residually as earned income at a higher rate than the tax rate on capital income. By refraining from distributing such residual dividends and instead by investing and expanding their asset base, the basis of imputed future capital income, the entrepreneurs can smooth their tax payments. Whether the DIT rules offer a subsidy to investment[27] depends, first, on the detailed definition of the capital base, the allowed assets and the instant of their measurement, and second, on the tax system caused undervaluation of the enterprise assets at the entrepreneur's exit, when she sells her enterprise via a trade sale or a stock exchange listing.[28] If there is no undervaluation of assets at exit, as held by the "old view" of corporate taxation, the DIT rules definitely boost investment in high-profitability enterprises.

As regards a comprehensive income tax with full offsetting of losses, which is neutral in respect of the career choice between being an entrepreneur or a laborer, we show that a tax rate increase in a system with a uniform rate structure over all kinds of income increases the ability threshold of individuals who choose entrepreneurship.

With such a rate structure, the effects of the DIT rules themselves vanish by definition. A general tax rate cut within uniform tax rates thus induces a larger proportion of individuals to choose entrepreneurship. But, with non-uniform personal tax rates, the Nordic DIT, with its embedded split rule, tends to lower (raise) the ability threshold of entrepreneurs who expect high (low) profitability from their enterprises. Therefore, we conclude that the Nordic DIT system enhances entrepreneurship where high profitability is expected.

[26] Norway, however, is an example of an ingenious system that avoids these detrimental effects on entrepreneurs.

[27] In some cases even employment is subsidized because the DIT rules allow part of the annual wage bill to be added to the capital base.

[28] The DIT rules prevent the entrepreneur from avoiding the high marginal tax rate on earned income at exit by either double-taxing undistributed profits (Finland), taxing only windfall capital gains (Norway) or by applying the split rule to realized capital gains (Sweden).

References

[1] Alstadsæter, A. (2003), "The Dual Income Tax and Firm's Income Shifting Through the Choice of Organizational Form and Real Capital Investments", CESifo working papers no. 1018, August 2003.

[2] Auerbach, A.J. (1979), "Wealth Maximization and the Cost of Capital", *Quarterly Journal of Economics,* 94, 433-446.

[3] Auerbach, A.J. (1983), "Taxation, Corporate Financial Policy and the Cost of Capital", *Journal of Economic Literature,* 21, 905-940.

[4] Auerbach. A.J and M.A. King (1983), "Taxation, Portfolio Choice and Debt-Equity Ratios: a General Equilibrium Model," *Quarterly Journal of Economics, 98,* 1983, 588-609*.*

[5] Bergström, V. and Södersten, J., (1977), Double Taxation and Corporate Capital Costs, Paper presented at the Econometric Society Meeting, Vienna, 6-9, September 1977.

[6] Bradford, D.F. (1981), "The Incidence and Allocation effects of a Tax on Corporate Distributions", *Journal of Public Economics* 15, 1-22.

[7] CESifo DICE Report, *Journal of Institutional Comparisons*, 2, Autumn 2004.

[8] Cnossen, S. (2000), "Taxing Capital Income in the Nordic Countries: A Model fort he European Union", in Cnossen, S. (ed.) *Taxing Capital Income in the European Union: Issues and Options*, Oxford University Press.

[9] De Meza, D. and D. Webb (1999), "Wealth, Enterprise and Credit Policy", *The Economic Journal*, 109, 153-163.

[10] Dietz, M.D. (2003), "Dividend and Capital Gains Taxation in a Cross-Section of Firms", University of St.Gallen, mimeo.

[11] Domar, E.D. and R.A. Musgrave (1944), "Proportional Income Taxation and Risk-Taking", *Quarterly Journal of Economics,* 58, 388-422.

[12] Fjærly, E. and Lund, D., (2001), "The Choice Between Owner's Wage and Dividends Under the Dual Income Tax", *Finnish Economic Papers*, 14, 104-119.

[13] German Council of Economic Experts (2003), "Steuerpolitik: Vom Chaos zum System", Ch. 5 in *Staatsfinanzen konsolidieren - Steuersystem reformieren,* Annual Report 2003/04*,* Wiesbaden.

[14] Geroski, P.A. (1995), "What do we know about entry?", *International Journal of Industrial Organization*, 13, 421-440.

[15] Gordon, R. (1998), ”Can High Personal Tax Rates Encourage Entrepreneurial Activity?”, *IMF Staff Papers*, 45, 49-80.

[16] Hagen, K.P. and P.B. Sørensen (1998), ”Taxation of Income from Small Business: Taxation Principles and Tax Reforms in the Nordic Countries”, in Sørensen, P.B., *Tax Policy in the Nordic Countries*, London: MacMillan Press Ltd

[17] Ilmakunnas, P. and V. Kanniainen (2001), "Entrepreneurship, Economic Risks, and Risk Insurance in the Welfare State", *German Economic Review,* 2, 195-218.

[18] Kanbur, R. (1979), ”Entrepreneurial Risk-Taking, Inequality, and Public Policy: An Application of Inequality Decomposition Analysis to the General Equilibrium Effects of Progressive Taxation”, *Journal of Political Economy*, 90, 1-20.

[19] Kanniainen, V., S. Kari and J. Ylä-Liedenpohja (2005), The Start-Up and Growth Stages in Enterprise Formation: The "New View" of Dividend Taxation Reconsidered, CESifo Working Papers No. 1476, 2005.

[20] Kari, S. (1999), *Dynamic Behaviour of the Firm Under Dual Income Taxation*, Government Institute for Economic Research, Research Reports 51, Helsinki.

[21] Keuschnigg, C., (2001), "Business Formation and Aggregate Investment, *German Economic Review, 2, 31-55.*

[22] King, M.A. (1974), "Dividend Behaviour and the Theory of the Firm", *Economica,* 41, 25-34.

[23] King, M.A. (1977), *Public Policy and the Corporation*, London: Chapman and Hall.

[24] King, M. (1986), Taxes, take-overs and the stock market, mimeo, London School of Economics.

[25] King, M. (1987), ”Prospects for Tax Reform in 1988”, LSE Financial Markets Group Discussion Paper 10, London School of Economics.

[26] King, M.A.(1989), "Economic Growth and the Life-Cycle of Firms", *European Economic Review,* 33, 325-334.

[27] Lindhe, T., J. Södersten, and A. Öberg (2002), ”Economic Effects of Taxing Closed Corporations under a Dual Income Tax”. *ifo Studien,* 48, 575-609.

[28] Lindhe, T., J. Södersten, and A. Öberg (2004), "Economic Effects of Taxing Different Organizational Forms under the Nordic Dual income Tax", *International Tax and Public Finance,* 11, 469-485.

[29] Moresi, S. (1998), "Optimal Taxation and Firm Formation: a model of asymmetric information", *European Economic Review*, 42, 1525-51.

[30] Nielsen, S.B. and P.B. Sørensen (1997) "On the optimality of the Nordic system of dual income taxation", *Journal of Public Economics* 63, 311-329.

[31] Panteghini, P. (2001), "Dual Income Taxation: The Choice of the Imputed Rate of Return", *Finnish Economic Papers* 14, 5-13.

[32] Parker, S., *The Economics of Self-Employment and Entrepreneurship*, Cambridge University Press, 2004, ss. 1-20, 69-86.

[33] Sinn, H.-W. (1987), *Capital Income Taxation and Resource Allocation*, Amsterdam: North-Holland.

[34] Sinn, H.-W. (1991a), "The Vanishing Harberger Triangle", *Journal of Public Economics,* 45, 271-300.

[35] Sinn, H-W. (1991b), "Taxation and the Cost-of-Capital; the "Old" View, the "New" View, and Another View", *Tax Policy and the Economy* 5, 25-54.

[36] Sørensen, P.B. (1988), "Reforms of Danish Capital Income Taxation in the 1980's", *Finnish Economic Papers* 1, 45-71.

[37] Sørensen, P.B. (1994), "From the Global Income Tax to the Dual Income Tax: Recent Tax Reforms in the Nordic Countries", *International Tax and Public Finance* 1, 57-79.

[38] Sørensen, P.B. (2003), Neutral taxation of shareholder income: A Norwegian tax reform proposal, CESifo working papers no. 1036, CESifo, Munich.

[39] Tikka, K.S. (1993), "A 25 % Flat Tax on Capital Income: The Finnish Reaction to International Tax Competition", in *Tax Reform in the Nordic Countries - 1973-1993 Jubilee Publication*, Nordic Council for Tax Research, Iustus Förlag, Gothenburg.

7 Appendix A. Proof of Proposition 2

We prove the result formally in the case where the tax structure is constructed in an ingenious way in that it is neutral in respect of effort choice e^{τ} and investments k^{τ}, K^{τ}.[29] Consider the indifference condition for occupational choice under taxation,

$$V_o^{\tau}(a^{\tau}) = w(1-\tau_w), \tag{22}$$

[29] We thus assume that there is perfect loss-offset even for a start-up firm. Disallowing for perfect loss-offset would make our proposition hold for a further reason.

or

$$\begin{aligned}
&-(c(e^\tau)+k^\tau)+\pi\frac{1}{1+\widehat{r}(1-\tau_p)}[a^\tau f(e^\tau,k^\tau)+k^\tau+V_1^{*\tau}(b)]\\
&-\pi[\tau_c\frac{a^\tau f(e^\tau,k^\tau)}{1+\widehat{r}(1-\tau_p)}+\tau_d\frac{(1-\tau_c)a^\tau f(e^\tau,k^\tau)+k^\tau-K^\tau}{1+\widehat{r}(1-\tau_p)}\\
&+\tau_c\frac{F(K^\tau)}{(1+\widehat{r}(1-\tau_p))^2}+\tau_g\frac{(\gamma F(K^\tau)(1-\tau_c)+K^\tau)-k^\tau}{(1+\widehat{r}(1-\tau_p))^2}\\
&+(1-\gamma)\frac{(1-\tau_c)F(K^\tau)+K^\tau}{(1+\widehat{r}(1-\tau_p))^2}]-w(\tau_p)(1-\tau_w)=0.
\end{aligned}$$

The occupational choice condition (13) is an identity. We insert a uniform tax structure and derive the impact of an increase in the tax rate on the ability of the marginal entrepreneur. There will be three mechanisms to be considered. First, a marginal increase in tax rates reduces the after-tax cash flows to the enterprise in both production periods. This tends to raise the entrepreneurial threshold. However, there is an offsetting effect to the extent that the discount rate increases. This effect will tend to push up the discounted value of the after-tax cash flows, though they are reduced in size. Third, increased tax on interest income raises the present value of wages in labor contracts. This is also bad news for entrepreneurship because it tends to push up the entrepreneurial threshold as labor market prospects are more attractive than they used to be. The present value of labor income, written explicitly, is

$$w(\tau_p)=w_o[\frac{1}{1+\widehat{r}(1-\tau_p)}+\left(\frac{1}{1+\widehat{r}(1-\tau_p)}\right)^2]$$

and we recall,

$$V_1^{*\tau}(b)=-K+\frac{F(K^\tau)+(1+b)K^\tau}{1+\widehat{r}(1-\tau_p)}.$$

Inserting, we obtain

$$\begin{aligned}
&-(c(e^\tau)+k^\tau)+\\
&\pi\frac{1}{1+\widehat{r}(1-\tau_p)}[(1-\tau_d)(1-\tau_c)af(e^\tau,k^\tau)-(1-\tau_d)K^\tau+(1-\tau_d)k^\tau]+\\
&\pi(\frac{1}{1+\widehat{r}(1-\tau_p)})^2[(1-\tau_g)(1-\tau_c)F(K^\tau)+(1-\tau_g)K^\tau+bK^\tau+\tau_g k^\tau]\\
&=(1-\tau_w)w(\tau_p).
\end{aligned}$$

Totally differentiating with respect to τ and a^τ, we can show that the entrepreneurial threshold is determined as

$$\frac{da^\tau}{d\tau} = \frac{1}{(1-\tau)(2+r)f(e^\tau, k^\tau)}[\frac{2F(K^\tau) + af(e^\tau, k^\tau)(r^2+4r+2)}{1+r} +$$
$$\frac{2(c(e^\tau)+k^\tau))}{\pi(1-\tau)^2} -$$
$$\frac{2((1-\tau)r+b)K^\tau + 2(1-(1-\tau)r)k^\tau}{(1-\tau)^2(1+r).}]$$

This expression is complex. To build an intuition, the entrepreneurial threshold is distorted by taxation even at uniform rates, basically because entrepreneurial income is subject to double taxation in an incorporated enterprise. This is the effect hinted at by King (1989). The ability threshold of the marginal entrepreneur is increased if $\frac{da^\tau}{d\tau} > 0$. The expression for $\frac{da^\tau}{d\tau}$ can be grouped into two positive terms and one negative term. Recall that the opportunity cost r can be thought of as a compound return over a number of years and the operating cash flows are similarly accumulated returns over each stage. Therefore, the positive terms outweigh the negative term.

8 Appendix B. Proof of Proposition 3.

In the absence of taxation, the marginal entrepreneur a^m is identified from the condition$-(c(e)+k) + \pi\frac{1}{1+r}[a^m f(e,k) + k + V_1^*(b)] = w$.

Inserting into the indifference condition under taxation, and recalling that $V_1^*(b) = -K + \frac{F(K)+(1+b)K}{1+r(1-\tau)}$, we find that there is a linear dependence between the marginal abilities

$$a^\tau = \beta_o + \beta_1 a^m.$$

Its parameters are given by

$$\beta_1 = \frac{(1-\tau_w)}{(1-\tau_c)(1-\tau_d)}\frac{f(e,k)}{f(e^\tau, k^\tau)}.$$

and by

$$\beta_o = \frac{1}{(1-\tau_c)(1-\tau_d)}[\frac{1}{\frac{\pi}{1+r(1-\tau)}f(e^\tau, k^\tau)}Z + \frac{w(\tau)-w}{1-\tau_w}]$$

where

$$
\begin{aligned}
Z &= (c(e^\tau) + k^\tau) - (1 - \tau_w)(c(e) + k) \\
&+ \pi \frac{1}{1 + r(1 - \tau)} [(1 - \tau_w) V_1^*(b) - V_1^{*\tau}(b)] \\
&+ \pi \frac{1}{1 + r(1 - \tau)} [(1 - \tau_w)(k - (1 + \tau_g) k^\tau)] \\
&+ \pi [\tau_d \frac{-K^\tau}{1 + r(1 - \tau)} + \tau_c \frac{F(K^\tau)}{(1 + r(1 - \tau))^2} \\
&+ \tau_g \frac{(\gamma F(K^\tau)(1 - \tau_c) + K^\tau)}{(1 + r(1 - \tau))^2} + (1 - \gamma) \frac{(1 - \tau_c) F(K^\tau) + K^\tau}{(1 + r(1 - \tau))^2}]
\end{aligned}
$$

We know that under distortive taxes, $e^\tau < e$, $k^\tau < k$, and that $K^\tau < K$. Thus, $\frac{f(e,k)}{f(e^\tau,k^\tau)} > 1$. With a uniform tax rate, $\frac{(1-\tau_w)}{(1-\tau_c)(1-\tau_d)} > 1$. Therefore, $\beta_1 >> 1$. Moreover, the greater the dividend and the corporate tax rates, the greater the coefficient β_1. This tends to make $a^\tau > a^m$. There are both positive and negative terms in Z; yet $\frac{w(\tau)-w}{1-\tau_w}$ is definitively positive. The fact that $\beta_1 >> 1$ makes us think that there is no reason to doubt that there is positive dependence between a^τ and a^m. Note that in fact $\beta_o \geq 0$ is not needed for $a^\tau > a^m$.

CESifo Working Paper Series

(for full list see www.cesifo-group.de)

1561 Carlo Altavilla and Paul De Grauwe, Non-Linearities in the Relation between the Exchange Rate and its Fundamentals, October 2005

1562 Josef Falkinger and Volker Grossmann, Distribution of Natural Resources, Entrepreneurship, and Economic Development: Growth Dynamics with Two Elites, October 2005

1563 Yu-Fu Chen and Michael Funke, Product Market Competition, Investment and Employment-Abundant versus Job-Poor Growth: A Real Options Perspective, October 2005

1564 Kai A. Konrad and Dan Kovenock, Equilibrium and Efficiency in the Tug-of-War, October 2005

1565 Joerg Breitung and M. Hashem Pesaran, Unit Roots and Cointegration in Panels, October 2005

1566 Steven Brakman, Harry Garretsen and Marc Schramm, Putting New Economic Geography to the Test: Free-ness of Trade and Agglomeration in the EU Regions, October 2005

1567 Robert Haveman, Karen Holden, Barbara Wolfe and Andrei Romanov, Assessing the Maintenance of Savings Sufficiency Over the First Decade of Retirement, October 2005

1568 Hans Fehr and Christian Habermann, Risk Sharing and Efficiency Implications of Progressive Pension Arrangements, October 2005

1569 Jovan Žamac, Pension Design when Fertility Fluctuates: The Role of Capital Mobility and Education Financing, October 2005

1570 Piotr Wdowinski and Aneta Zglinska-Pietrzak, The Warsaw Stock Exchange Index WIG: Modelling and Forecasting, October 2005

1571 J. Ignacio Conde-Ruiz, Vincenzo Galasso and Paola Profeta, Early Retirement and Social Security: A Long Term Perspective, October 2005

1572 Johannes Binswanger, Risk Management of Pension Systems from the Perspective of Loss Aversion, October 2005

1573 Geir B. Asheim, Wolfgang Buchholz, John M. Hartwick, Tapan Mitra and Cees Withagen, Constant Savings Rates and Quasi-Arithmetic Population Growth under Exhaustible Resource Constraints, October 2005

1574 Christian Hagist, Norbert Klusen, Andreas Plate and Bernd Raffelhueschen, Social Health Insurance – the Major Driver of Unsustainable Fiscal Policy?, October 2005

1575 Roland Hodler and Kurt Schmidheiny, How Fiscal Decentralization Flattens Progressive Taxes, October 2005

1576 George W. Evans, Seppo Honkapohja and Noah Williams, Generalized Stochastic Gradient Learning, October 2005

1577 Torben M. Andersen, Social Security and Longevity, October 2005

1578 Kai A. Konrad and Stergios Skaperdas, The Market for Protection and the Origin of the State, October 2005

1579 Jan K. Brueckner and Stuart S. Rosenthal, Gentrification and Neighborhood Housing Cycles: Will America's Future Downtowns be Rich?, October 2005

1580 Elke J. Jahn and Wolfgang Ochel, Contracting Out Temporary Help Services in Germany, November 2005

1581 Astri Muren and Sten Nyberg, Young Liberals and Old Conservatives – Inequality, Mobility and Redistribution, November 2005

1582 Volker Nitsch, State Visits and International Trade, November 2005

1583 Alessandra Casella, Thomas Palfrey and Raymond Riezman, Minorities and Storable Votes, November 2005

1584 Sascha O. Becker, Introducing Time-to-Educate in a Job Search Model, November 2005

1585 Christos Kotsogiannis and Robert Schwager, On the Incentives to Experiment in Federations, November 2005

1586 Søren Bo Nielsen, Pascalis Raimondos-Møller and Guttorm Schjelderup, Centralized vs. De-centralized Multinationals and Taxes, November 2005

1587 Jan-Egbert Sturm and Barry Williams, What Determines Differences in Foreign Bank Efficiency? Australian Evidence, November 2005

1588 Steven Brakman and Charles van Marrewijk, Transfers, Non-Traded Goods, and Unemployment: An Analysis of the Keynes – Ohlin Debate, November 2005

1589 Kazuo Ogawa, Elmer Sterken and Ichiro Tokutsu, Bank Control and the Number of Bank Relations of Japanese Firms, November 2005

1590 Bruno Parigi and Loriana Pelizzon, Diversification and Ownership Concentration, November 2005

1591 Claude Crampes, Carole Haritchabalet and Bruno Jullien, Advertising, Competition and Entry in Media Industries, November 2005

1592 Johannes Becker and Clemens Fuest, Optimal Tax Policy when Firms are Internationally Mobile, November 2005

1593 Jim Malley, Apostolis Philippopoulos and Ulrich Woitek, Electoral Uncertainty, Fiscal Policy and Macroeconomic Fluctuations, November 2005

1594 Assar Lindbeck, Sustainable Social Spending, November 2005

1595 Hartmut Egger and Udo Kreickemeier, International Fragmentation: Boon or Bane for Domestic Employment?, November 2005

1596 Martin Werding, Survivor Benefits and the Gender Tax Gap in Public Pension Schemes: Observations from Germany, November 2005

1597 Petra Geraats, Transparency of Monetary Policy: Theory and Practice, November 2005

1598 Christian Dustman and Francesca Fabbri, Gender and Ethnicity – Married Immigrants in Britain, November 2005

1599 M. Hashem Pesaran and Martin Weale, Survey Expectations, November 2005

1600 Ansgar Belke, Frank Baumgaertner, Friedrich Schneider and Ralph Setzer, The Different Extent of Privatisation Proceeds in EU Countries: A Preliminary Explanation Using a Public Choice Approach, November 2005

1601 Jan K. Brueckner, Fiscal Federalism and Economic Growth, November 2005

1602 Steven Brakman, Harry Garretsen and Charles van Marrewijk, Cross-Border Mergers and Acquisitions: On Revealed Comparative Advantage and Merger Waves, November 2005

1603 Erkki Koskela and Rune Stenbacka, Product Market Competition, Profit Sharing and Equilibrium Unemployment, November 2005

1604 Lutz Hendricks, How Important is Discount Rate Heterogeneity for Wealth Inequality?, November 2005

1605 Kathleen M. Day and Stanley L. Winer, Policy-induced Internal Migration: An Empirical Investigation of the Canadian Case, November 2005

1606 Paul De Grauwe and Cláudia Costa Storti, Is Monetary Policy in the Eurozone less Effective than in the US?, November 2005

1607 Per Engström and Bertil Holmlund, Worker Absenteeism in Search Equilibrium, November 2005

1608 Daniele Checchi and Cecilia García-Peñalosa, Labour Market Institutions and the Personal Distribution of Income in the OECD, November 2005

1609 Kai A. Konrad and Wolfgang Leininger, The Generalized Stackelberg Equilibrium of the All-Pay Auction with Complete Information, November 2005

1610 Monika Buetler and Federica Teppa, Should you Take a Lump-Sum or Annuitize? Results from Swiss Pension Funds, November 2005

1611 Alexander W. Cappelen, Astri D. Hole, Erik Ø. Sørensen and Bertil Tungodden, The Pluralism of Fairness Ideals: An Experimental Approach, December 2005

1612 Jack Mintz and Alfons J. Weichenrieder, Taxation and the Financial Structure of German Outbound FDI, December 2005

1613 Rosanne Altshuler and Harry Grubert, The Three Parties in the Race to the Bottom: Host Governments, Home Governments and Multinational Companies, December 2005

1614 Chi-Yung (Eric) Ng and John Whalley, Visas and Work Permits: Possible Global Negotiating Initiatives, December 2005

1615 Jon H. Fiva, New Evidence on Fiscal Decentralization and the Size of Government, December 2005

1616 Andzelika Lorentowicz, Dalia Marin and Alexander Raubold, Is Human Capital Losing from Outsourcing? Evidence for Austria and Poland, December 2005

1617 Aleksander Berentsen, Gabriele Camera and Christopher Waller, Money, Credit and Banking, December 2005

1618 Egil Matsen, Tommy Sveen and Ragnar Torvik, Savers, Spenders and Fiscal Policy in a Small Open Economy, December 2005

1619 Laszlo Goerke and Markus Pannenberg, Severance Pay and the Shadow of the Law: Evidence for West Germany, December 2005

1620 Michael Hoel, Concerns for Equity and the Optimal Co-Payments for Publicly Provided Health Care, December 2005

1621 Edward Castronova, On the Research Value of Large Games: Natural Experiments in Norrath and Camelot, December 2005

1622 Annette Alstadsæter, Ann-Sofie Kolm and Birthe Larsen, Tax Effects, Search Unemployment, and the Choice of Educational Type, December 2005

1623 Vesa Kanniainen, Seppo Kari and Jouko Ylä-Liedenpohja, Nordic Dual Income Taxation of Entrepreneurs, December 2005