

ABSTRACT

This paper studies capital income taxation and household saving from three different points of view.

Firstly, we work through the effects of capital income taxation in a life cycle model. There are income and substitution effects to consider, and the relative importance of these will determine the final outcome. Secondly, we look at the long-run effects of capital income taxation. It is argued that the long-run effects need to be considered if we are to use it as a policy instrument. Finally, we have a look at how the actual tax system treats the return to savings. In practice, capital income tends to be lightly taxed because of various provisions.

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CAPITAL INCOME TAXATION AND HOUSEHOLD SAVING

TIIIVISTELMÄ

Paperissa selvitetään pääomatuloveron ja kotitalouksien säästämistä kolmesta näkökulmasta.

Ensiksi käydään läpi pääomatuloveron vaikutuskanavat elinkaari- mallissa. Lopulliset vaikutukset riippuvat tulon- ja substitu- tiovaikutusten keskinäisestä suuruudesta. Tulokset tarkastelevat pääomatuloverotuksen vaikutuksia pitkällä aikavälillä, jotka on syytä pitää mielessä, mikäli pääomatuloverotusta halutaan käyttää talous- poliittisen instrumenttina. Lopuksi tarkastellaan, miten pääom- talouksen veroaste määräytyy nykyisessä verojärjestelmässä. Käytän- nössä pääomatuloja ei veroteta kovin korkeasti, koska pääomalle myönnetään erilaisia veronjaksotuksia.

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## ABSTRACT

This paper studies capital income taxation and household saving from three different points of view.

Firstly, we work through the effects of capital income taxation in a life cycle model. There are income and substitution effects to consider, and the relative magnitude of these will determine the final outcome. Secondly, we study some long-run issues related to capital income taxation. It has quite a few long-run effects that need to be considered if we are to use it as a policy instrument. Finally, we have a look at how the actual tax system treats the return to savings. In practice, capital income tends to be lightly taxed because of various provisions.

## TIIVISTELMÄ

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Ensiksi käydään läpi pääomatuloverotuksen vaikutuskanavat elinkaari-mallissa. Lopulliset vaikutukset jäävät riippumaan tulo- ja substituutiovaikutusten keskinäisistä suuruuksista. Toiseksi tarkastellaan pääomatuloverotuksen vaikutuksia pitkällä aikavälillä, jotka on syytä pitää mielessä, mikäli pääomatuloverotusta halutaan käyttää talouspolitiikan instrumenttina. Lopuksi perehdytään siihen, miten pääomatulojen veroaste määräytyy suomalaisessa verojärjestelmässä. Käytännössä pääomatuloja ei veroteta hyvin raskaasti, koska pääomatuloille myönnetään erilaisia verohuojennuksia.



CONTENTS

		page
1	INTRODUCTION	7
2	THE BASIC FRAMEWORK, THE LIFE CYCLE MODEL	8
3	RELAXING THE ASSUMPTIONS OF THE BASIC FRAMEWORK	13
	3.1 Capital Market Imperfections	13
	3.2 Multi-period models	16
	3.3 Variable labor supply	18
4	CAPITAL INCOME TAXATION AS A POLICY TOOL - THE LONGER-RUN EFFECTS	19
	4.1 Budget constraints	20
	4.2 Empirical evidence on welfare effects	23
	4.3 A shift from capital income taxation to expenditure taxation	24
	4.4 Tax incidence	25
	4.5 Time inconsistency of capital income taxation	27
5	THE ACTUAL TAX SYSTEM	30
	5.1 Taxation of the yield	30
	5.2 Capital gains taxation	32
6	CONCLUDING COMMENTS	34
	REFERENCES	36



CONTENTS

1	INTRODUCTION
2	THE BASIC FRAMEWORK, THE LIFE CYCLE MODEL
3	RELAXING THE ASSUMPTIONS OF THE BASIC FRAMEWORK
3.1	Capital market imperfections
3.2	Multi-period models
3.3	Variable labor supply
4	CAPITAL INCOME TAXATION AS A POLICY TOOL - THE LONGER-RUN EFFECTS
4.1	Budget constraints
4.2	Empirical evidence on welfare effects
4.3	A shift from capital income taxation to expenditure taxation
4.4	Tax incidence
4.5	The inconsistency of capital income taxation
5	THE ACTUAL TAX SYSTEM
5.1	Taxation of the yield
5.2	Capital gains taxation
6	CONCLUDING COMMENTS
7	REFERENCES

## 1. INTRODUCTION

The recent decline in the household saving rate and the worsening current account deficit have stimulated a lot of discussion. The thrust of the argument is that if household saving could be encouraged then that would help to improve the current account. After all, the current account is the difference between aggregate saving and investment. Then, if we can influence household saving, we can presumably also influence aggregate saving and eventually the current account. Note, however, that this line of reasoning implicitly assumes that changes in other components of aggregate saving (e.g. saving in the public sector) do not offset the changes in household saving. But this needs not be the case if, for example, we install some policy measures to stimulate household saving. When studying household saving we should keep this in mind.

One of the ways in which household saving may be affected is through capital income taxation. Intuitively it seems plausible that lighter capital income taxation would make saving more profitable and thus give the households an incentive to save. This paper takes a look at the issue from a theoretical point of view. The first section of the paper starts from a very simple framework and studies the effects of changes in the capital income tax. The emphasis is on finding the ways in which capital income taxes affect individual behavior. The second section goes briefly into some long-run issues related to using capital income taxation as a policy tool and hopefully gives the reader some insight into the trade-offs involved. Finally, the paper is concluded by a section on how the actual tax system treats the return to savings.



## 2. THE BASIC FRAMEWORK, THE LIFE CYCLE MODEL

Saving amounts to transferring resources over time, and it may occur for several reasons. Traditionally theorists have distinguished three main types of saving (see e.g. Sandmo (1985)):

- 1) life cycle saving which arises from adjusting the optimal lifetime consumption pattern to the pattern of lifetime income
- 2) saving for bequests which may be considered as a variant of the life cycle model (a bequest can be thought of as consumption in the last period of life)
- 3) saving as a precaution against uncertainty about future expenditures, income, the rate of return on saving etc.

In this paper we will focus on life cycle saving under certainty, as it will provide a good starting point for clarifying the basic concepts. It should be noted, however, that explicit modelling of uncertainty might change some of the results.

In a life cycle model the consumer chooses the time path of his consumption so as to maximize his utility subject to his budget constraint. If the optimal time path of consumption differs from that of income, the consumer will save. Saving may be positive, in which case the consumer is a net lender, or it may be negative, if the consumer is a net borrower.

Consider now a consumer who lives for two periods (again, see e.g. Sandmo (1985)). Assume, for simplicity, that his income in both periods is exogenous. His choices are constrained by the fact that the present value of his consumption must equal the present value of his income. That means that his budget constraint is, in the absence of taxes,

$$(1) \quad c_1 + (1/(1+r))c_2 = y_1 + (1/(1+r))y_2$$

where  $c_i$  = consumption in period  $i$ ,  $i = 1, 2$   
 $y_i$  = income in period  $i$   
 $r$  = interest rate

When writing the budget constraint in the above fashion we are implicitly assuming that the consumer is able to borrow or lend freely at interest rate  $r$ , i.e. we are assuming the existence of perfect capital markets. Later we will have a look at what happens if this assumption is relaxed.

Suppose that the consumer's preferences can be represented by a well-behaved<sup>1</sup> utility function of the form

$$u = u(c_1, c_2).$$

Then the consumer solves

$$\begin{aligned} \max u(c_1, c_2) \\ \text{subject to (1)} \end{aligned}$$

Given the linear budget constraint and the assumptions about the properties of the utility function we know that the problem has a well-defined solution  $(c_1^*, c_2^*)$ . Furthermore, by using the implicit function theorem we can find the partial derivatives of  $c_1^*$  and  $c_2^*$  with respect to exogenous variables which tell us how changes in the exogenous variables affect the optimal solutions.

Since income in the first period can be either consumed or saved we must have that

$$c_1 + s = y_1 \quad \Leftrightarrow \quad s = y_1 - c_1 \quad s = \text{saving}$$

From this it follows that

<sup>1</sup>In other words, we are making the standard assumptions about the utility function: increasing, strictly quasi-concave, and differentiable.



$$ds/dr = -dc_1/dr$$

which says that when the interest rate changes, saving and first-period consumption move in opposite directions by equal amounts. Then we can study changes in saving by just reversing the signs of changes in first-period consumption.

Now, introduce taxes on capital income to the model and suppose that capital income is taxed at the rate  $t^1$ . The budget constraint then becomes

$$(2) \quad c_1 + (1/(1+(1-t^1)r))c_2 = y_1 + (1/(1+(1-t^1)r))y_2$$

If the tax on capital income is reduced, say from  $t^1$  to  $t^2$ , the effective interest rate for the consumer is increased, from  $(1-t^1)r$  to  $(1-t^2)r$ , so that we can analyze the effects of the tax change by analyzing the effects of an increase in  $r$ .

The effect of a change in the interest rate can be written in the form of a so-called Slutsky equation (see Sandmo (1985)):

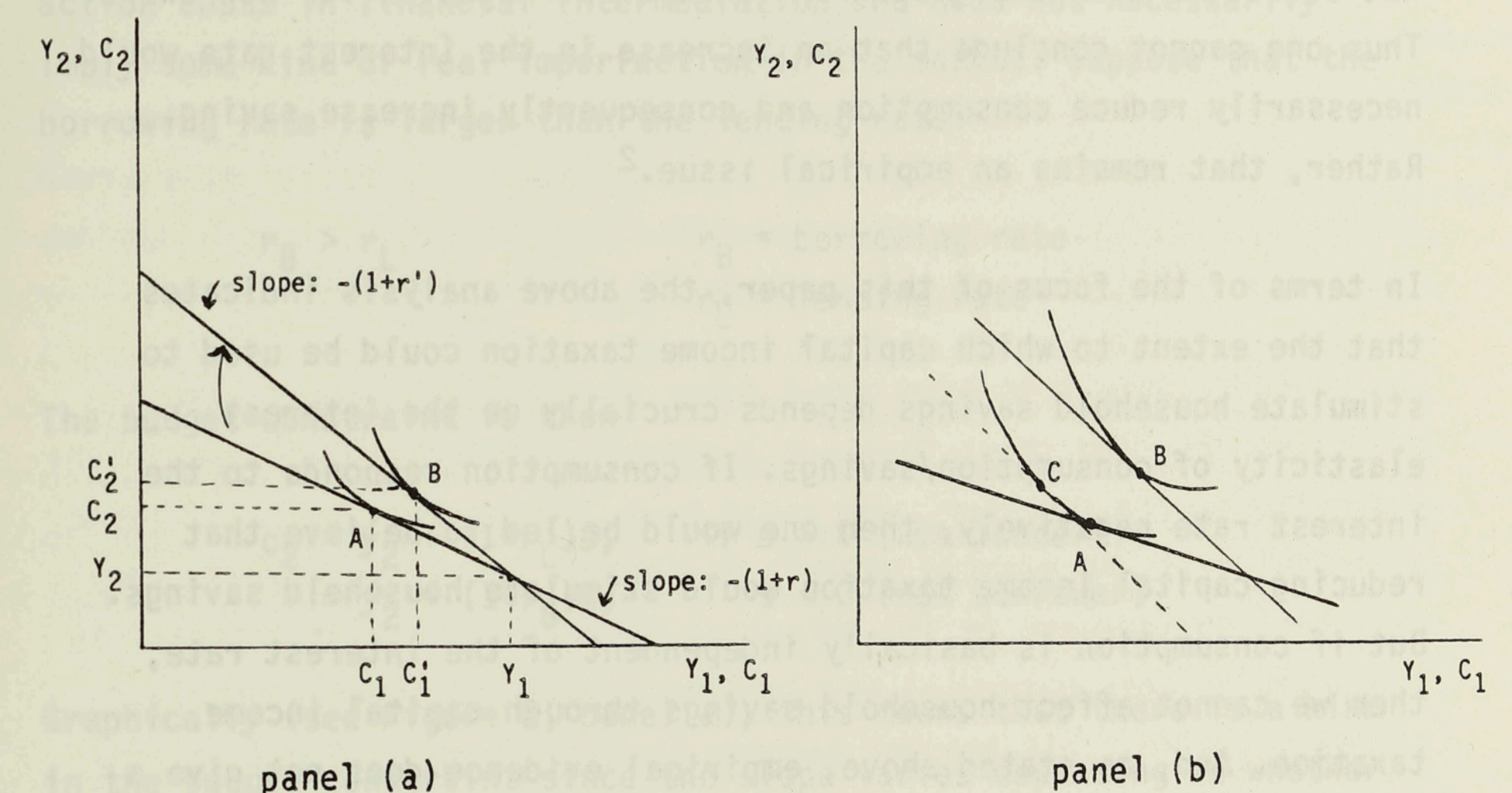
$$(3) \quad dc_1/dr = (y_1 - c_1)dc_1/dy_2 + (dc_1/dr)_U$$

The equation tells us that a change in the interest rate has two kinds of effects. The first term is the income effect which is positive for a lender ( $y_1 > c_1$ ) and negative for a borrower ( $y_1 < c_1$ ), assuming that consumption is a normal good ( $dc_1/dy_2 > 0$ , an increase in income raises consumption). Then, if the interest rate is increased, the income of lenders goes up, which gives them an incentive to consume more. Correspondingly, the income of borrowers is decreased which dampens their consumption.

The second term is the substitution effect which can be shown to be negative. An increase in the interest rate makes future consumption less expensive (relative to today's consumption), which gives both lenders and borrowers an incentive to substitute consumption tomorrow for consumption today, i.e. to save more.

The interaction of the income and substitution effects can be illustrated graphically (Figure 1). The second-period consumption and income are represented on the vertical axis, the first-period consumption and income on the horizontal axis. The budget constraint is a straight line through  $(y_1, y_2)$  with the slope  $-(1+r)$ . The consumer's optimum point is A, where the indifference curve is tangent to the budget constraint. The figure has been drawn for a lender who does not consume all of his first-period income.

FIGURE 1



Consider now an increase in the interest rate. That makes the slope of the budget constraint steeper, and the new optimum is achieved at point B. At B, saving will be reduced and consumption in the first period increased. The increase in consumption today is the net effect of the income and substitution effects. The substitution effect is the change in consumption which would occur if the consumer faced the new relative prices but were compensated in income so that he could stay on the original indifference curve. In terms of the figure, this would be the move from A to C (see panel b). But the increase in the interest rate increases the lender's life-time income which in turn increases consumption through the income effect (C→B).



As can be seen from the figure, the final outcome of these effects that work in opposite directions is ambiguous a priori, and depends on the shape of the indifference curves. The figure was drawn for a lender for whom the income effect dominates so that consumption in the first period is increased. But if the indifference curves had a different shape, the substitution effect could be dominating.

For a borrower the situation is different in that both the income effect and the substitution effect work in the same direction (both are negative), tending to reduce consumption and increase saving. The net effect is then ambiguous for lenders and negative for borrowers. Thus one cannot conclude that an increase in the interest rate would necessarily reduce consumption and consequently increase saving. Rather, that remains an empirical issue.<sup>2</sup>

In terms of the focus of this paper, the above analysis indicates that the extent to which capital income taxation could be used to stimulate household savings depends crucially on the interest elasticity of consumption/savings. If consumption responds to the interest rate negatively, then one would be led to believe that reducing capital income taxation would stimulate household savings. But if consumption is basically independent of the interest rate, then we cannot affect household savings through capital income taxation. And, as stated above, empirical evidence does not give a very clear indication of the sign and size of the interest effect.

<sup>2</sup>Empirical evidence on this tends to be mixed. There are many technical difficulties in empirical work; e.g. how to properly account for the complicated real-life tax systems. However, there seems to be some empirical support for the hypothesis that the real after-tax interest rate affects negatively the level of consumption (see Starck (1988)).

### 3. RELAXING THE ASSUMPTIONS OF THE BASIC FRAMEWORK

#### 3.1 Capital Market Imperfections

The analysis above was carried out under the assumption of perfect capital markets in which the agents can freely borrow or lend at the same interest rate. Now what if this is not the case?

Consider first the case of differential borrowing and lending rates (see Sandmo (1985)). Of course, this may occur because of some transaction costs in financial intermediation and does not necessarily imply some kind of real imperfection in the market. Suppose that the borrowing rate is larger than the lending rate:

$$r_B > r_L \quad \begin{array}{l} r_B = \text{borrowing rate} \\ r_L = \text{lending rate} \end{array}$$

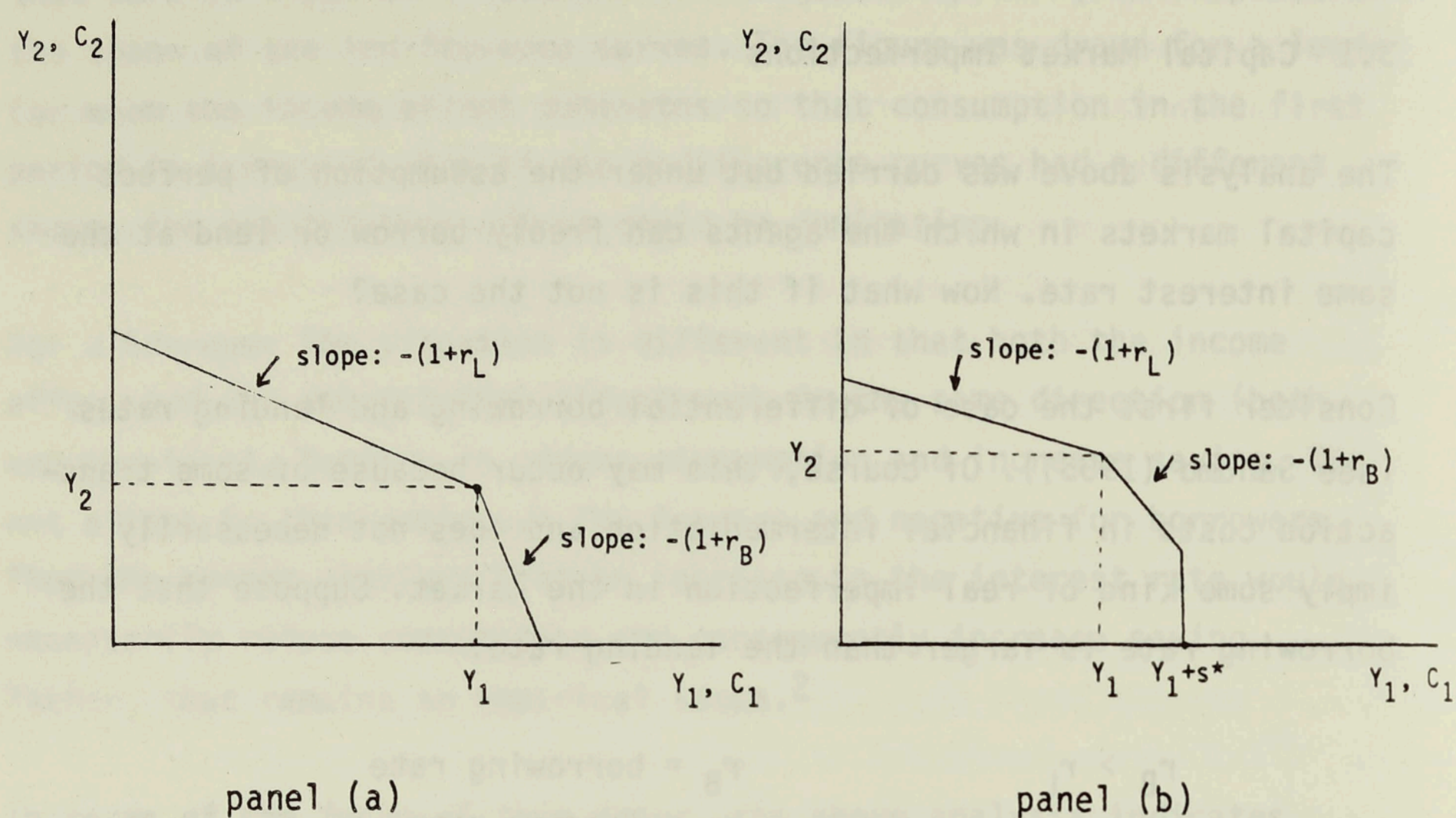
The budget constraint is then

$$\begin{aligned} c_2 &= y_2 + (1+r_L)s, & \text{if } s > 0 \text{ (net lender)} \\ &= y_2 + (1+r_B)s, & s < 0 \text{ (net borrower)} \end{aligned}$$

Graphically (see Figure 2, panel a), this means that there is a kink in the budget constraint since the slope varies depending on whether the consumer wants to borrow (to the right of  $(y_1, y_2)$ ) or to lend (to the left of  $(y_1, y_2)$ ). Given the shape of the indifference curves (which follows from the assumptions made about the properties of the utility function), it is likely that the optimum solution would lie in the kink point for at least some consumers. These consumers could be "liquidity constrained" in that they would like to borrow at the lending rate and lend at the borrowing rate.



FIGURE 2



The economy would then have three types of individuals; net savers, net borrowers, and those that are liquidity constrained. To obtain the aggregate saving function, one would have to integrate over all types of individuals. An example of this is Koskela and Viren (1989). They show that an increase in the effective borrowing rate (an increase in the wedge between borrowing and lending rates) will unambiguously increase saving. This happens because in their model the net savers are not affected by the change, and, as mentioned in the previous section, an increase in the interest rate will induce borrowers to restrict their consumption. Also, the increase in the wedge will drive some consumers from borrowing to being liquidity constrained, which reduces their consumption as well.

It should be noted that a wedge between the borrowing and the lending rates could also be the result of differential tax treatment of interest expenses and interest income. If interest income is taxed but interest expenses are not tax deductible, the effective interest rate that lenders and borrowers face is different, even in the absence of any other imperfections. The lender would earn  $(1-t)r$  whereas the borrower would have to pay  $r$ , so that  $r_B > r_L$  would hold.

Casual observation of market interest rates tells us that lending rates tend to be lower than borrowing rates. Also, interest expenses are not fully deductible in the Finnish tax system, as there is an upper limit to the deductibility of interest rates (see section 5 of this paper). Apparently then there is a wedge between the lending and the borrowing rates. Koskela and Viren's analysis suggests that under these circumstances, aggregate household saving could be stimulated by increasing the borrowing rate. One way of doing this would be to reduce the deductibility of interest expenses. If this could be done without affecting the interest rate, then private saving should be stimulated.

Note that it is crucial that the interest rate does not change. If it does, also savers will be affected and the net result may well be ambiguous again. The interest rate would not change if, for example, it is given from abroad (under conditions of perfect capital mobility). Another point to keep in mind is that the net effect on aggregate saving (the sum of private and public) could be unclear if the government goes ahead and consumes the increased tax revenue. Then the decrease in private consumption would be at least partly offset by an increase in public consumption.

In addition to a wedge between lending and borrowing rates, there is another type of imperfection, credit rationing, which is illustrated in Figure 2, panel b. Suppose that there is some upper limit for borrowing, i.e. that  $s$  cannot be a very large negative number:  $s > s^*$ . This means that the consumer cannot borrow enough to consume the full amount of his lifetime resources in the first period. In terms of the figure, there is another kink in the budget constraint. In spite of the recent liberalization of the Finnish financial markets, there probably is some credit rationing left, at least to the extent that consumers are not able to borrow to the full amount of the present value of their lifetime income.

As far as the above analysis is concerned, this should not fundamentally change it. The modification is that some of the borrowers who are constrained by  $s^*$  might not be responsive to small changes in the



interest rate. Even at a slightly higher interest rate they might like to borrow more than  $s^*$ . Thus the increase in the interest rate would not stimulate their saving.

### 3.2 Multi-period models

The assumption that the consumer lives for two periods only is, of course, a very strong abstraction. It is relatively straight-forward to extend the basic framework to include several periods, and the method of analysis will not change.

However, some of the results could change. Sandmo (1985) points out that the sign of the substitution effect is not clear in a multiperiod model. In a two-period model the substitution effect on consumption is necessarily negative: since there are only two goods (consumption today and consumption tomorrow), they must be substitutes if changes in income are compensated for.<sup>3</sup>

But in a multi-period model the relationship is not as clear. There is no theoretical reason why consumption in any future period should be a substitute for first-period consumption; they could be complements just as well. The usual assumptions about the utility function (additivity and strict concavity) make all goods necessarily substitutes so that this result does not emerge but it should be kept in mind that this need not be the case. In terms of the analysis conducted in the basic framework, the reversal of the sign of the substitution effect would not solve the ambiguity related to the net effect on consumption and savings. It will only make the effect on borrower's choices ambiguous (negative income effect, positive substitution effect on consumption) rather than the lender's choices as in the previous case.

Summers (1981) brings up another issue in his study of a multi-period model. The main result is that savings are clearly responsive to

<sup>3</sup>Recall how the substitution effect was derived: it is that change in consumption that would occur if the consumer were compensated in income so that he would stay on the original indifference curve.

changes in the interest rate: Summers argues that for plausible parameter values the interest elasticity of savings is large and positive. It seems that this result comes more or less from what Summers calls "the human wealth effect".

In a multi-period model, the right-hand side of the budget constraint, corresponding to eq. (1), is the net present value of life-time income, i.e. the net present value of the consumer's human wealth (and of physical wealth, too, if the consumer is assumed to have some). Now, a change in the interest rate changes this net present value because it changes the rate at which future income is discounted. If the interest rate goes up, the net present value of human wealth is reduced. Consequently, consumption should be reduced. A two-period model does not capture this effect very well, as there is only one future period from which income is discounted to the present. But in a model with more periods this effect is magnified and, according to Summers' analysis, plays a major role.

If that were the case, one would expect that empirical studies would have found evidence of a large interest elasticity but, as mentioned before, the results seem to support a small rather than a large elasticity and furthermore, the evidence tends to be mixed. Summers explains this by referring to the overall difficulties in estimating the interest elasticity of consumption/saving. Also, the fact that wealth is usually held constant in empirical studies influences the results.

In summary, then, one would conclude that it is not quite clear what the addition of periods to the basic framework entails. On the basis of Sandmo's analysis, it seems that the interest effects on consumption and saving remain ambiguous. Yet Summers presents a theoretical case for large interest elasticities. The point is not well clarified at this stage, but if Summers is correct, that would indicate that lighter capital income taxation would indeed lead to a higher level of household savings.



### 3.3 Variable labor supply

Our simple two-period model assumed an exogenous income which is equivalent to assuming that the amount of labor supplied is not a choice variable. Sandmo draws attention to the fact that this is clearly unsatisfactory if we are to consider and compare different systems of taxation as different tax systems give different incentives for the labor-leisure-consumption choices.

Adding labor as a choice variable does not fundamentally change the analysis. Basically it works like adding periods, in that the sign of the substitution effect is not clear. One could well imagine that leisure and future consumption are substitutes in which case present and future consumption could then be complements. Consequently we cannot determine the sign of the substitution effect a priori. If this possibility is to be precluded we need to place restrictions on preferences.

To conclude this section, one could summarize the findings as follows. Introducing capital market imperfections to the model leads to kinked budget constraints but probably does not qualitatively change the analysis. As far as adding more periods to the model, there is some indication that this might lead to large interest elasticities in consumption and saving and thus to the conclusion that capital income taxation could be used to affect household saving. On the other hand, adding labor supply as a choice variable seems not to significantly alter the results.

### 4. CAPITAL INCOME TAXATION AS A POLICY TOOL - THE LONGER-RUN EFFECTS

Above we have focused on the effects of capital income taxes in the absence of other taxes, and tried to clarify the basic ways in which capital income taxation affects consumer behavior. The analysis boils down to the importance of the interest elasticity of consumption/saving: to the extent that consumption responds to changes in the interest rate, capital income taxation can be used to affect saving.

But so far we have ignored other effects of capital income taxation, which are more long-term in nature. However, if we are to use capital income taxation as a policy tool we should also keep in mind these longer-run issues, and in this section we briefly explore some of them.

With the exception of lump-sum taxation taxes lead to tax wedges and distortions in relative prices. These in turn result in some welfare losses in the long run. Some of these welfare losses may be regarded as necessary, if we take the view that the government must raise some tax revenue and cannot do that by lump-sum taxes alone. But since different tax systems differ in their welfare effects, it is instructive to have a look at the issue, especially if we are considering the use of one tax as a policy instrument.

An important point should be stressed in this context. We cannot change any tax without affecting government revenue, and therefore, if we are to analyze the effects of a tax change, we must also specify what we are assuming about government revenue. If we assume that the tax change does not entail a change in government revenue in any period (i.e. we are looking at pure tax policy, not changes in government deficit), then adjusting one tax requires an offsetting adjustment in another tax, and we maintain the time path of government revenue unchanged. For example, if we lower capital income tax, we must increase some other tax to keep government revenue unchanged.

Basically, if we are to analyze tax policy only and to abstract from the effects of deficit policy, we should impose the restriction that



public revenue and expenditures do not change in any period. But one could argue that it is an unnecessary restriction and maintain unchanged revenue only in a present value sense.<sup>4</sup> We will see how relaxing the balanced-budget requirement produces some perhaps unexpected results, which serves to highlight the importance of the assumptions about the time path of government revenue.

Apart from the welfare effects of capital income taxation and the assumptions about the accrual of public revenue, other long-term issues to be considered are the time consistency of capital income tax as a policy tool and tax incidence, particularly in a small open economy with capital mobility.

We start this section with the study of the welfare effects. As a prelude, we look at how different tax systems affect the consumer's budget constraint. This will be background information for what follows, the welfare analysis of capital income taxation in comparison to other tax systems.

#### 4.1 Budget constraints

Consider again the consumer in the two-period model (the following analysis relies again mostly on Sandmo (1985)). Recall that under capital income taxation only his budget constraint is

$$(2) \quad c_1 + (1/(1+(1-t^1)r))c_2 = y_1 + (1/(1+(1-t^1)r))y_2$$

Now, if all of his income, both capital and labor income, is taxed at the uniform rate  $t$ , his budget constraint becomes

$$(4) \quad c_1 + (1/(1+(1-t)r))c_2 = (1-t)y_1 + (1/(1+(1-t)r))(1-t)y_2$$

<sup>4</sup>In other words, we are assuming that the government can use the capital market to maintain the same time path of government expenditure even if the timing of tax collection varies from one tax system to another.

This tax works like a combination of a lump-sum tax and a capital income tax. The lump-sum tax part is the part that is levied on the exogenous labor income: since labor income is assumed to be exogenous, imposing a tax on it is equivalent to reducing it in a lump-sum fashion. The lump-sum tax has no substitution effects, only income effects, and the capital income tax has the income and substitution effects described in section 2 of this paper. A change in the tax rate would then work much the same way as a change in a pure capital income tax would, only that the income effects would be magnified as the lump-sum part of the tax would also contribute to these effects.

The situation is somewhat different if labor is considered to be a choice variable. The change in the tax rate would affect both the net interest rate and the net wage which would change not only consumption but labor effort as well. The pattern of income and substitution effects is more complex than in the simple two-period model, and one could not conclude that the substitution effect on first-period consumption needs to be negative.

Finally, consider an expenditure or indirect tax. The budget constraint would then be (with the tax rate  $s$ )

$$(1+s)c_1 + ((1+s)/(1+r))c_2 = y_1 + (1/(1+r))y_2$$

$$\Leftrightarrow c_1 + (1/(1+r))c_2 = [y_1 + (1/(1+r))y_2]/(1+s)$$

In the consumer's budget constraint, the expenditure tax is equivalent to a tax on labor income. If labor income is exogenous, the tax is effectively a lump-sum tax, and if labor is a choice variable, the tax amounts to a reduction in the wage rate. In any case, the important difference between a capital income tax and an expenditure/wage tax is that the expenditure tax does not affect the interest rate. Thus it does not distort the price of consumption tomorrow in terms of consumption today.

It might be tempting to conclude that the distortion in the relative price of future vs. present consumption leads to suboptimal choices



and that therefore the optimal tax on capital income is zero. Also, along the same lines, one might argue that a reduction in the capital income tax rate reduces this distortion and improves efficiency. But this is not necessarily true.

Bradford (1980) demonstrates this in a two-period model with endogenous labor supply. Suppose there is some government revenue requirement that the government can meet by collecting taxes on both capital and labor income. This means that there must be some kind of distortions in the economy, since the government must collect a given sum in taxes.<sup>5</sup> The government tries to make the representative consumer as well off as possible, given the government revenue requirement. It turns out that the optimal tax rates derived in this way depend on how sensitive the choices of labor supply and consumption time path are to the tax rates. Then, whether the tax rates should be zero or something else depends on the agents' preference structure.

This also illustrates the fact that less distortions may not be better than more and that one really cannot do welfare analysis by just counting the number of distortions. The final outcome in terms of welfare is determined by a host of things, including the agents' preferences, information available to the government etc. (see also Stiglitz (1987) for a more advanced analysis).

To summarize this section of the paper: the basic difference between capital income taxation and other forms of taxation is that capital income taxation alters the relative price of consumption tomorrow in terms of consumption today. However, it does not follow that the optimal tax rate is zero. Rather, that is determined by various factors, e.g. the preference structure of the agents.

Next, we turn to the welfare effects of different tax systems.

<sup>5</sup>Note that the government does not impose lump-sum taxes. If the government could raise all of its revenue in lump-sum taxes, all distortions in relative prices would of course be avoided.

#### 4.2 Empirical evidence on welfare effects

Summers (1981), Auerbach and Kotlikoff (1983), and Kotlikoff (1984) present results from simulation analyses on the welfare effects of different tax schemes, using multi-period models with several generations. Auerbach and Kotlikoff require the government to maintain the same revenue in present value terms, whereas the other two studies impose the restriction that the actual time paths of government revenue are the same in all tax schemes.

The general outcome from these analyses is that taxing capital income tends to lead to lower levels of savings and of overall welfare than alternative forms of taxation, such as a pure wage tax or a pure consumption tax. The implication is then that distorting the relative price of consumption tomorrow vs. consumption today results in greater welfare losses than the distortions that other tax schemes create.

However, keeping Bradford's analysis in mind, one could argue that since the tax rates were not derived from an optimizing framework, at least part of the welfare losses may be attributable to "suboptimal" tax rates. In other words, if the tax rates had been set so as to make the agents as well off as possible under the government revenue requirement, the simulations might have produced somewhat different results.

Another point should also be brought up in this context (see Bradford). When we lift the restriction that government budget be balanced in each period, as in Auerbach and Kotlikoff, changes in government saving might offset some or all of the changes in private saving, resulting in smaller changes in aggregate saving. The extent to which this happens depends, among other things, on the preferences of the agents and on how well public wealth is substitutable for private wealth.<sup>6</sup>

<sup>6</sup>This relates to the issue of Ricardian equivalence (see Barro (1974)). If it holds, private agents take government debt to mean an equivalent tax burden in the future and do not consider government debt net wealth.



All in all, there seems to be some reason to believe that the simulation results are at least partly attributable to the specifics of the models used. Nevertheless, they should serve as an important reminder of the long-term consequences that capital income taxation can have.

#### 4.3 A shift from capital income taxation to expenditure taxation

As noted above, when we are comparing the effects of different tax schemes, we need to make some assumptions about the time path of government revenue. If there is no balanced-budget-in-each-period requirement, the timing of tax collection may change. This may create some unexpected results.

Suppose now that we start with a system with both a capital income tax and an expenditure tax. Then the capital income tax is lowered (so that the effective interest rate is increased) and at the same time, the expenditure tax is increased correspondingly, so that the consumer's income remains unchanged. This policy would decrease the price of consumption tomorrow, and it would seem intuitively plausible that it would lead to higher levels of saving, since the offsetting income effect is eliminated through the higher expenditure tax. But is this indeed the case?

Koskela (1988) presents an interesting study on the issue. The result is that the effect on savings is still unclear. The reason is that while the substitution effect from the decrease in the capital income tax does stimulate savings, the increase in the expenditure tax works in the opposite direction by changing the time path of taxes. Capital income tax is levied only in the second period when the interest income/expenses are due but the expenditure tax is collected in both periods so that the overall tax burden is increased in the first

period and reduced in the second.<sup>7</sup> This gives a disincentive to saving as resources are transferred from the first period to the second, and it offsets at least some of the substitution effect arising from the change in the relative price. The net effect thus remains ambiguous, and "there is no prima facie case that expenditure taxation is desirable on incentive grounds".

Apart from casting doubt into the argument that a compensated shift to consumption taxation stimulates saving, Koskela's analysis serves as a good reminder of the importance of the timing of tax receipts. It also illustrates the necessity of being very specific about government policy when analyzing tax changes.

#### 4.4 Tax incidence

All the analysis so far has been conducted in a partial equilibrium framework, i.e. under the assumption that the factor prices (interest rates, wages) will not change in response to changed behavior. But generally one would expect some changes also in the factor prices if the consumers adjust their behavior to the new tax rules, at least in the long run. For instance, if aggregate saving were to increase in response to tax policy, interest rates might eventually be reduced. Also, the level of saving affects capital intensity, which in turn plays a role in determining the wage rate. Considerations like these lead us to the question of tax incidence, which is another long-run issue related to capital income taxation.

Taxes are not necessarily borne by those on whom they are directly levied. Sometimes taxes may be partly or even fully passed onto other agents in the economy, and several factors, e.g. demand elasticities and the like, determine to what extent this is possible.

<sup>7</sup>Suppose that capital income tax is reduced and expenditure tax is increased by 100 marks. The 100 marks was previously collected in the second period only, when interest income accrued. But now the sum is collected in two periods, which means that the burden in the first period is increased (part of the 100 marks is collected in the first period) and it is correspondingly reduced in the second period.



To present a very simple example of tax incidence, take the discussion in Kotlikoff and Summers (1987). They analyze the incidence of a capital income tax in a two-period, overlapping generations model. The capital income tax is assumed to be fully rebated to the individuals in the second period of their life so that the income effect of the tax is zero. The tax unambiguously reduces savings<sup>8</sup> and therefore also capital intensity in the steady state. Then the pre-tax return to capital must rise and the wage fall. Thus labor bears at least part of the tax burden. In the extreme case, capital intensity is reduced by so much that even the after-tax return to capital is higher.

But what if we have a small open economy with mobile capital and immobile labor? Kotlikoff and Summers discuss briefly this case, too (see also Kotlikoff (1984)). It turns out that it is very important on whom the tax is levied. If the tax is on domestic residents and on all capital income regardless of where it is earned, savings will be affected as described earlier, and the changes in domestic pre-tax prices will be negligible because the home country is small in the domestic markets. Thus the tax will be borne by domestic capital owners.

On the other hand, if the tax is levied on domestic capital, so that both domestic and foreign residents are taxed on income earned on investments in the home country, there will be a capital outflow until the after-tax rates are equalized internationally. This will reduce capital intensity at home and the domestic wage rate will fall. Thus the tax works like a tax on wages rather than on capital income.

Note that a withdrawal tax could mean a tax on domestic capital, regardless of who owns it. This would happen if firms and financial institutions were required to pay withdrawal tax on all their dividend and interest payments, whether to domestic or to foreign residents. Then a change from a capital income tax system to a

<sup>8</sup>Since the income compensation occurs in the same period as the tax, there will be no redistribution of resources in time, unlike in Koskela (1988). Therefore there will be only substitution effects.

withdrawal tax system could create a capital outflow as described above, and the tax burden would fall on domestic wage earners.

These issues illustrate the way in which the incidence of a tax may differ from what it was initially thought to be. When designing tax policy for any particular purpose, these points should be kept in mind as they could possibly undermine the desired effects of the policy. For instance, a decrease in a withdrawal tax would increase the returns from domestic investment not only for domestic residents but for foreign residents as well, so that it results in a capital inflow. It is difficult to determine a priori what this means in terms of the current account. Increased foreign investment leads to higher interest payments to foreigners which worsens the current account. On the other hand, if the capital inflow increases investment, domestic incomes may rise (worsening the current account) and exports may be stimulated (improving the current account).

#### 4.5 Time inconsistency of capital income taxation

A final point to consider in the context of the long-run issues related to capital income taxation is its time inconsistency. In a dynamic setting, optimal capital income taxation is time inconsistent, i.e. that it is not optimal for the government to keep to its announced capital income tax rate, as pointed out in Fischer (1980). The reason is that capital is "supplied" inelastically in the sense that this period's capital is predetermined by the saving decision taken in the previous period. As with any tax, it is usually optimal to tax those goods that are supplied inelastically. Thus, it may well be optimal for the government to deviate from its originally announced plan and change the tax rate, once the capital has already been accumulated. Of course, this leads to problems with the credibility of optimal capital income tax rates.

The same problem exists with a tax on labor income as well, but to a lesser extent because labor is supplied more elastically. Some solutions to the problem have been proposed. Lucas and Stokey (1983),



and Persson, Persson and Svensson (1987) suggest that even in the absence of a straight-forward commitment to a given policy, optimal wage taxation may be made time-consistent by managing the term structure of debt (Zee (1988) studies the question in an open economy).<sup>9</sup> However, the same kind of a result has not been derived for capital income tax.

In this section of the paper we have been looking at the long-run issues related to the use of capital income taxation as a policy tool. We first had a look at how capital income taxation differs from other forms of taxation. The basic difference is that capital income taxation distorts the price of consumption tomorrow in terms of consumption today. This leads to some welfare losses in the long run, but if there is some government revenue requirement, some taxation of capital income may well be optimal.

Another issue that was discussed in this section was a shift from capital income taxation towards expenditure taxation, keeping the consumer's budget constraint intact. Contrary to what one might expect, that kind of a policy change does not necessarily stimulate savings, in spite of the fact that the offsetting income effect is eliminated. This happens because the timing of tax collection is changed, altering the amounts of resources available in each period. The change in the timing creates an effect that works much like the traditional income effect.

We also had a look at tax incidence in this section. It turns out that the incidence of a tax may differ from what it was initially thought to be; as an example we used a simple model in which labor ended up bearing the tax on capital. Also, we discussed how capital mobility is significant in this context.

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<sup>9</sup>By managing the debt structure, the government's future budget constraint is affected. It is then possible to create a budget constraint which makes it optimal for the government to keep to its original announced policy.

Finally, we had a look at the problem of time inconsistency. Since capital is supplied inelastically in any given period, the government has a temptation to deviate from its originally announced capital income tax rate. Unlike for a wage tax, a solution has not been proposed to this problem with the capital income tax.

All these long-run issues show that the use of capital income tax as a policy instrument is far from straight-forward. There are many effects and trade-offs to consider, and the final outcome may not be easy to determine a priori. It may not be surprising that some writers, such as Summers (1985), end up concluding that the most efficient way by which the government can affect aggregate saving is through its own saving.



## 5. THE ACTUAL TAX SYSTEM

To finish off the paper, let us have a look at how the Finnish tax system actually works. So far we have been discussing the rate at which capital income is taxed rather casually, as if it were quite self-evident what "the tax rate" on capital income is. In reality, of course, the situation is much more complicated. There are all kinds of provisions and regulations in the tax laws, and the interaction of these determines what the effective tax rate in the consumer's budget constraint is. In this section we will briefly look at how the actual Finnish tax system<sup>10</sup> treats the return to saving, i.e. what determines the tax rate on capital income.

Earlier we have referred to the return to saving as "the interest rate",  $r$ . Actually this consists of two parts: yield (interest, dividend) and capital gains. We will first have a look at how the yield is taxed.

### 5.1 Taxation of the yield

Basically, the present tax system treats the yield as part of income and it is taxed at the income tax rate. However, there are two provisions that reduce the effective tax rate:

- all capital income is tax-free up to 2000 FIM a year,
- only 50 % of capital income between 2000 and 18 000 FIM is added to taxable income.

In addition to this, there are some forms of saving that are completely tax-free, such as some bank accounts, some types of government bonds

<sup>10</sup>The Finnish tax system is undergoing a reform. Here we will focus on how the effective tax rate on capital income is determined in the present system; for a discussion of the reform on capital income taxation, see e.g. Korkman (1988) or Ingberg (1987). Also, for a discussion of the new tax system as whole, see Teir (1988).

etc. Also, the implicit return to housing investment is practically tax-free.<sup>11</sup>

To avoid double taxation of dividends, the tax reform introduced the so called "avoir fiscal" system. In this system the tax that the companies pay on distributed dividends is taken into account when determining the tax that the stock holder pays. This ensures that dividends are also taxed according to the investor's income tax rate.

Interest expenses are not fully deductible. Only 90 % of the interest expenses that exceed 900 FIM may be deducted, and there is an upper limit of 22 000 FIM, of which 10 000 FIM may be for loans other than housing loans (the limit is 25 000 FIM for persons with children). This means that there is at least some interest rate wedge in the Finnish market, caused by taxation.

In the present system, then, the effective tax rate on capital income that the consumer faces is determined by:

- his income tax rate,
- the amount of capital income he has,
- the extent to which he is able to deduct interest payments (i.e. the extent to which the tax is imposed on net capital income).

From the consumer's point of view, it does not really matter at which point the tax is collected. If we have a withdrawal tax that gives the same after-tax return as an income tax, then the consumer's choices should be the same under both tax schemes. What matters is the after-tax return. To the extent that the shift to a withdrawal tax system means a reduction in the effective tax rate, we can analyze its

<sup>11</sup>The reason is that the implicit return is calculated on the basis of the taxable value of the housing asset. In practice, these values are considerably under market values.



effects as a lowering of the capital income tax. But, as noted earlier, the two schemes differ in incidence in the presence of capital mobility.

## 5.2 Capital gains taxation

When we write the budget constraint with the return to saving "r" and then impose a tax on this capital income, we are implicitly assuming that capital gains are taxed as they accrue. In practice, this is very difficult to achieve, and the tax systems tend to tax capital gains as they are realized.<sup>12</sup>

In the Finnish tax system, the basic principle is that capital gains on an asset are tax-exempt if the investor has held the asset long enough (10 years for real estate, 5 years for other assets, 2 years for housing investments that have been for own use). Also, the consumer may earn up to 200 000 FIM in capital gains in a given year without being taxed on them.

Capital gains are calculated as the difference between the price at which the asset is sold and the price at which it was originally acquired. However, if the asset has been held for at least two years, taxable capital gains do not exceed 50 % of the selling price (75 %, if the asset has been held for less than two years). In other words, even if capital gains were more than half of the selling price, only the part that exceeds that limit is taken to be taxable income.

If the asset has not been held long enough to qualify for fully tax free capital gains, the gains may still be only partly taxable. Only if the asset has been held less than four years are the gains fully taxable.

<sup>12</sup>It follows that the realization of capital gains is sensitive to the tax rate. This in turn has repercussions in terms of portfolio choice, the timing of realizations and tax arbitrage. For more on the issue, see Auerbach (1988).

On balance, the Finnish tax system seems to treat capital gains quite leniently, even after the recent reforms which brought more of the gains under taxation.

Taking this into account, as well as the different provisions in the taxation of the yield, it seems that capital income is not very heavily taxed in Finland, at least not for many consumers. Only those with a lot of capital income end up being taxed at their income tax rates. As many savers enjoy the different tax breaks it may well be that saving is even less responsive to the tax rate than it would otherwise be. Consequently, the effectiveness of the capital income tax rate as a policy tool may be reduced. To assess the importance of this, one would have to do detailed empirical analysis.



## 6. CONCLUDING COMMENTS

In this paper we have been looking at capital income taxation and its relationship to private savings from three different perspectives.

In the first section we set out to analyze the basic mechanism through which capital income taxation affects the individual's saving decision. It turns out that a reduction in the capital income tax rate, while increasing the effective tax rate to the consumer/saver, does not necessarily lead to increased savings, at least not in a life cycle framework. The basic reason is that although saving is thus made more attractive, a given wealth target is also easier to achieve, requiring less saving. The final outcome depends on the interest elasticity of consumption/savings, on which empirical evidence is mixed.

There are some aspects, though, which could modify this outcome from the simple framework. If there is a wedge between borrowing and lending rates, saving could be stimulated by increasing the wedge in such a way that the lending rate remains intact. Under some conditions, decreasing the tax deductibility of interest expenses would serve this purpose. Another modification is lengthening the planning horizon which should increase the interest elasticity.

In the second section of the paper we explored some long-run issues related to the use of capital income taxation as a policy tool. The fundamental difference between capital income taxation and other forms of taxation is that capital income taxation affects the price at which resources are transferred in time. Thus it may lead to welfare losses in the long run as agents are induced to make suboptimal choices. However, if we are in a situation in which the government has a given revenue requirement and must use some distortionary taxes, it may be optimal to impose some tax on capital income as well.

Tax incidence is another issue that needs to be kept in mind when designing tax policy. If tax policy reduces saving and consequently also long-run capital intensity, also wage earners will be affected.

And, if there is capital mobility, it matters whether the tax is imposed on domestic capital (withdrawal tax) or on capital income of domestic residents.

Finally, we had a look at how the actual tax system treats savings. In the Finnish tax system, the effective tax rate on capital income is determined by the income tax rate, the amount of capital income and the extent to which interest expenses can be deducted. Capital gains are taxed quite leniently, and taking also into account the different provisions in the tax laws, the Finnish tax system seems to tax the income on capital relatively lightly. Also, the effectiveness of capital income taxation as a policy tool may be reduced by the fact that many savers are able to make use of the various tax breaks.

The message that comes through from all this analysis is a bit unclear. On one hand, there is some reason to believe that reducing the tax rate on capital income could stimulate savings. On the other hand, there are all kinds of ramifications that need to be considered if capital income taxation is to be used as a policy instrument. Thus capital income taxation seems to be one of those issues to which economic theory cannot give a clear-cut answer. Determining the extent to which it can be used to stimulate household savings would always require careful empirical analysis.



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