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DISKUSSIONSBEITRÄGE

DISCUSSION PAPERS

Company Pensions and Taxation

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A. Katharina Greulich**

94/01

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Company Pensions and Taxation

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Abstract

This article deals with the conditions for profitability of company pensions, comparing the influence of immediate and deferred taxation under different rules of funding the pension contributions. The model provides a systematic general framework to investigate incentive compatibility of such pension schemes in most western countries. The implications of real world complications such as multiple interest rates and progressive income taxation are also considered. The findings suggest that although it might be helpful to discriminate company pension contracts against other forms of private old age securities for the improvement of this special contract itself, one has to evaluate carefully the impact on efficiency in the overall economy.

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1 Introduction

Retirement income provision is commonly said to rest on three pillars the first of which is the public pension system, the second one company pensions and the third one private retirement saving. In most industrialized countries the first pillar has so far been predominant in terms of its overall contribution to people's old age incomes. But due to the aging of societies in combination with the pay-go financed nature of most public pension systems, pillar one pensions are progressively losing their ability to provide a decent living to pensioners. Furthermore, even politicians have become more and more aware of the capital-absorbing nature of pay-go pension systems, first shown by Feldstein (1974). Therefore, an increasing role for second and third pillar pensions is widely expected and often called for by interested parties and scholars. The European Commission (1997) and Mitchell, Myers and Young (1999) provide recent examples for this discussion.

But unfortunately when it comes to company pensions, such calls and expectations are based on very restricted economic analysis. Research concerning company pensions is often confined to labor-market aspects. On the other hand there are very few contributions dealing with questions of efficiency in the overall economy in this context. But since one incentive for firms to participate in such programs is often favorable taxation, such questions are highly relevant. Additionally, individual savings decisions might be influenced by different tax plans, which has an impact on the existing capital stock. Only three efficiency- and tax-oriented approaches in this field have been found in the literature. First, one intensive discussion on whether contributions to tax-discriminated savings programs are so called *new savings* and therefore increase overall efficiency via an extended capital stock of the economy has taken place in the U.S.. However, Poterba, Venti and Wise (1996, 1997, and 1998) as well as Gale and Scholz (1994) and Engen, Gale and Clark (1996) concentrate their investigations to microdata of currently existing U.S. pension plans. This restricts the applicability of their method to systems where tax incentives are directly provided to employees. Systems where also companies gain from this tax discrimination are not considered. To the best of our knowledge Naust (1990) and Krahnén and Merán (1991) have made the only two contributions that explicitly deal with tax aspects of company pensions on the firm side so far. Naust establishes a rule for neutral taxation of company pensions, i.e. taxation that leaves a company's decision regarding the provision of a pension system undistorted. In cases where neutrality does not hold, Naust speaks of preferential taxation. He

argues that from a tax-systematic point of view only the former systems are desirable. Krahnert and Meran apply a firm profits present-value approach but focus their model on the tax treatment of pensions financed by book reserves in Germany in order to show in which cases an employer should offer company pension contracts.

What is missing so far is one systematic general framework applicable to most existing or imaginable company pension systems. The aim of this article, which is based on Greulich (2000), is to provide such a framework to analyze all possible types of funding tax-treatment combinations linked to the context of neutral and preferential taxation. To this end, incentive and efficiency questions pertaining to the taxation of company pensions will be investigated and conclusions regarding the desirability of different tax policies towards company pensions will be drawn. The core of the analysis will be formed by a model of firms' decision regarding the provision of company pensions depending on the mode and level of taxation of such a system, akin to the approach of Krahnert and Meran (1991) but now applicable to other combinations of company pension and tax systems, too. This model is therefore the only one at present allowing for a systematic comparison of tax treatments of company pensions from a desirability point of view. By limiting the incentive analysis to the taxation of company pensions, we do not neglect the other major source of incentives for employers to provide company pensions, which are labor economic considerations. However, as mentioned above, the theoretical discussion of the labor economic effects of company pensions within the new institutional economics has already been extensive as can be seen in Ippolito (1997) for instance.

Our findings suggest that there is not generally an overall efficiency gain in promoting firm pensions. In fact, since taxes needed to pay for such programs are usually levied in a distortionary manner, their total effect could be considerably negative for the economy. For these reasons, as well as several others, it will be argued that preferential tax treatment of company pensions is often not desirable. This conclusion holds even in the face of the decline of public pensions. For, as will be shown, tax discrimination in favor of company pensions is inefficient as an instrument to ensure sufficient old age incomes and thus to avoid dependency on welfare programs among the retirees. This is not to say, however, that subsidies to non-state old age income provision in general must be rejected. By giving subsidies to private pensions and company pensions alike, the negative consequences of granting tax privileges to company pensions alone can at least partly be avoided. This is because company

pensions are then still taxed neutrally in the sense that they are not treated preferentially relative to the employees' alternative of private retirement saving.

In arguing the points made above, the schedule of this paper is as follows: in section 2 a model is introduced to analyze a company's incentive to provide pensions under six stylized combinations of tax rules and funding mechanisms. These combinations are chosen to fit onto all possible regulations of most western industrialized countries. In the model the present value change of distributable dividends of the firm is a function of the size of pension promises and is used as an indicator of the firm's incentive to offer pensions to its employees. The latter are assumed to face a trade-off between cash wages and pension payments that makes them just indifferent between a wage-only contract and a wage-pension combination. In section 3 the model is expanded to take into account real-world complications such as multiple interest rates and progressive income taxation. Building in part on the results from the analysis of the model, in section 4 the allocative effects of granting tax preferences for company pensions are discussed. Section 5, eventually, concludes and delineates perspectives for future research.

2 The firm's incentive to provide pensions under different tax regimes

2.1 The Model

The model to be discussed in this paper allows the determination of the profitability of a pension promise from the perspective of a firm only depending on the mode and level of taxation of company pensions. Therefore, we will say that company pensions are taxed neutrally if and only if a pension promise of P does not affect a firm's present value of dividends, PVD , provided the firm's internal rate of return \hat{r} is equal to the market rate of interest r , i.e.

$$\left. \frac{dPVD}{dP} \right|_{\hat{r}=r} = 0. \quad (1)$$

The concept of neutral taxation will be used widely throughout this paper as a point of reference to judge different modes of taxation of company pensions.¹ Only

if taxation leads to $dPVD/dP > 0$ it is assumed to be profitable for the firm to offer a pension plan. The term taxation in this context must be understood as encompassing not only tax rates but also other legal regulations influencing the level of tax revenues, such as discount rates to be applied when forming pension reserves. In the remainder of this article we often use the relationship $P = C(1 + \bar{r})$, where C are the employee's contribution into a pension plan and \bar{r} is the promised rate of return of this plan. Therefore differentiation of PVD with respect to C instead of P always leads to the qualitatively same results.

The model is a highly stylized two-period model with two agents, a firm and its employee. The employee works only during the first period and receives a cash wage. He is retired during the second period. If he receives a pension P during retirement, his pre-tax wage in period one is L . If he has a wage-only contract, his first period wage is W with no payments in period two.

The firm produces in both periods and receives gross profits before payments to the employee and before taxes of X per period. It chooses between giving the employee pure period one wage compensation or compensating him by the described combination of wage and pension. The firm's goal is to maximize the present value of profits, which are completely distributed as dividends in every period.² This is why the firm's target is called present value of dividends, PVD . The constraint to be observed by the firm is that potential wage-pension combinations must be acceptable to the employee. This means that the employee must weakly prefer such a compensation package to a wage-only contract. In fact, for simplicity, in the calculations to be presented here, the employee is held indifferent between the two forms of compensation. Thus, the entire surplus that may arise, depending on the tax rules applied in each case, accrues to the firm. Although an extreme assumption this is of

¹More generally, when non-tax gains from company pensions are not abstracted from, neutral taxation means that tax rules are chosen so as not to influence the employer's decision to provide pensions or not. Neutral tax rules in this meaning do not alter the qualitative effect of a marginal pension promise on the present value of dividends (PVD) as compared to a world without taxes. Expressed formally,

$$\left(\frac{dPVD}{dP}\right)_{notax} \leq 0 \Leftrightarrow \left(\frac{dPVD}{dP}\right)_{tax} \leq 0,$$

²The assumption that no profits are retained does not entail any loss of generality of the results. But without it the firm's decision regarding the fraction of profits to be retained would have to be modeled and a special tax rate on retained earnings would have to be introduced.

no particular relevance since the object here is not to model a potential bargaining process between the firm and the employee, but to show the circumstances under which a rent to be bargained over is created through taxation at all.

Another simplification used in the model might require some justification as well. The employee's indifference between the two contract options is not expressed in terms of utilities, but by setting the after tax present values of the two compensation packages equal. This is possible due to the common assumption that the employee can optimize his intertemporal consumption by borrowing or lending in the capital market at the market rate of interest. The consequence of dropping this assumption will be discussed in section 3.1. As long as it holds, however, all the employee cares about is the present value of his total after-tax compensation. Thus, he is indifferent between the cash wage W and the combination of a cash wage L and a pension P if and only if the two present values after discounting the pension at the market rate of interest are equal.

It further needs to be pointed out that this model is set in a world of certainty. The consequence of assuming certainty is that no distinction concerning the design of the offered pension contracts as defined benefit plans or defined contribution plans needs to be made because they are equivalent in a two-period context in the absence of interest rate uncertainty.

2.2 Company pension systems and tax treatment

For the purpose of determining the profitability of providing company pensions, it is first of all necessary to classify company pensions according to three criteria. The first one is the point of time at which the employee is taxed for his pension. He can either be taxed immediately upon receiving the pension promise, that is in period one in this model, or taxation can be deferred until the payment of pension benefits, that is period two.³ The second criterion is whether the firm funds the pension promise or not. In the latter case the pension has to be paid for from current surpluses once the employee is retired. In the case of funding, a third criterion applies: a further distinction needs to be made since the firm can either fund the pension externally, for example by making contributions to a pension fund or to a life insurance company, or funding can take place internally in the form of book reserves.

³In a multi-period context the employee would either pay taxes every period for new incremental pension rights, or his pension income would be taxed as he receives it.

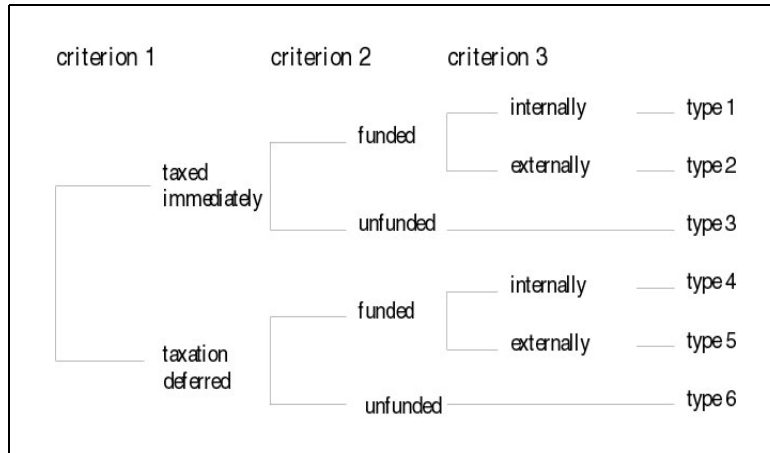


Figure 1: Classification of company pensions

The combination of these three criteria forms six categories of company pensions, summarized in figure 1. For each of them, the profitability of a pension promise from the firm's point of view needs to be calculated separately because each has different determinants of profitability. It will be seen that actual tax rates matter only in some cases and the legally specified discount rate on pension reserves in others. Also, there are forms that are systematically biased towards or against profitability. Thus, the permission or prohibition of some of these six combinations of taxation and pension funding is in itself a crucial parameter determining the profitability of a potential pension promise.

As an introduction to the type of equations to be used, the present value of the firm's dividend distributions when the employee is not offered a pension is calculated by

$$PVD = (X - W)(1 - t_s) + \frac{1 - t_s}{1 + r_s} X. \quad (2)$$

The present value of dividends is the sum of after-tax profits in periods one and two with the latter discounted to present value. The tax rate t_s is the tax rate of the representative shareholder. It is used instead of the firm's tax rate because as mentioned above all profits are assumed to be distributed and dividends are assumed to be taxed at the shareholder's tax rate.⁴ The interest rate used to discount period two profits to present value, $r_s = r(1 - t_s)$, is the after-tax market rate of interest

⁴The latter assumption corresponds roughly to the reality of US and German personal and corporate income taxation, for instance. Although in Germany a new so-called *half income treatment* (*Halbeinkünfteverfahren*) is introduced, its outcome will be basically the same as described above.

for the representative shareholder, where r is the actual market rate. It signifies the after-tax rate of return he could have obtained in alternative investments.

The *PVD*-formulas for the alternative option of a wage-plus-pension contract are specific to each of the six types of company pensions described in figure 1. In order to derive them, it is necessary to establish under which condition the employee is indifferent between the two contract types. For the first three types to be considered now (types one to three in figure 1) this condition is the same. The contributions into the pension system, C , are taxable in period one, i.e. immediately upon promise of the pension. Therefore, the employee is indifferent between the two contracts if

$$W(1 - t_w) = L(1 - t_w) - Ct_w + \frac{C(1 + \bar{r})(1 - t_w) + Ct_w}{1 + r_w}. \quad (3)$$

The left hand side of this equation is after-tax income in the wage-only case with t_w being the employee's tax rate. The right hand side is the present value of income in the wage-plus-pension case. In particular it consists of period one income, determined by net wage income minus tax payments for the contributions to be made, and period two pension income. Since contributions have already been taxed in period one the correction factor Ct_w occurs in period two. Contributions yield promised interest of \bar{r} and have to be discounted by the employee's after-tax rate of interest r_w , with $r_w = r(1 - t_w)$, where r is again the market rate of interest.⁵ Both tax rates, t_w and t_s , are to be understood as effective tax rates comprising all relevant direct taxes. By using equation (3) the first three types of pension systems can now be examined.

Type 1 If the employee is granted a company pension that is funded internally, the present value of dividend distributions can be expressed as

$$PVD = (X - L - C)(1 - t_s) + \frac{1}{1 + r_s} [X(1 - t_s) + C(1 - t_s)(\hat{r} - \bar{r})]. \quad (4)$$

The two terms on the right hand side of this equation are after-tax distributable profits in period one and period two, the latter discounted to period one. Distributable profits in period two are the sum of after-tax profits without payments to

⁵It should be mentioned that t_w can differ from t_s even though a progressive tax system is not explicitly accommodated in this model for greater tractability of results.

labor and after-tax contributions times the difference between the firm-internal rate of return \hat{r} and the rate \bar{r} . The latter has the meaning of a legally specified discount rate since company and employee agree on a certain pension payment for which book reserves have to be built according to this rate. Depending on the relative size of the actually achieved internal rate \hat{r} the firm has to make further payments or gains from this situation.

Now, solving equation (3) for L and substituting into equation (4) yields

$$PVD = \left(X - W - C \frac{r - \bar{r}}{1 + r_w} \right) (1 - t_s) + \frac{1}{1 + r_s} [X(1 - t_s) + C(1 - t_s)(\hat{r} - \bar{r})]. \quad (5)$$

Differentiating equation (5) with respect to C , the effect of a marginal type 1 pension promise on PVD turns out to be

$$\frac{dPVD}{dC} = \frac{1 - t_s}{1 + r_s} (\hat{r} - \bar{r}) - \frac{1 - t_s}{1 + r_w} (r - \bar{r}). \quad (6)$$

With the result of equation (6) on hand we can state the following proposition.

Proposition 2.1 *Under a system of immediate taxation of company pension contributions, where company pensions are internally funded,*

- i) the firm is indifferent between granting the employee a pension or not if $\hat{r} = \bar{r} = r$, that is to say, if capital markets are perfect. This proposition holds regardless of the relation between t_w and t_s .*
- ii) the profitability of a pension promise is increased if, given $t_w \leq t_s$, the legally specified \bar{r} is lowered.*

What needs to be underlined regarding (ii) is the twofold importance of fixing \bar{r} correctly at the market rate of interest. If \bar{r} is too low the employee could earn a better rate of return on private saving and would therefore give up less of his period one wage for the company pension as if $\bar{r} = r$ held. Expressed by the second term of equation (6) this would *ceteris paribus* make the pension promise unprofitable. However, the second effect of a low \bar{r} is to decrease the cost of finance to the firm, which tends to increase the profitability of the pension as can be seen from the first

term of equation (6) and therefore harms allocative efficiency.⁶ The overall effect of the *incorrect* \bar{r} now depends on the relative values of t_w and t_s . On average it seems reasonable to assume that $t_w \leq t_s$.

The choice of the legal \bar{r} is obviously the task of tax legislators, for the amount of book reserves permitted has a potent effect on the intertemporal distribution of tax revenues. Note that, therefore, in arguing for $\bar{r} = r$ for reasons of allocative efficiency, we have also been arguing for rules of neutral taxation of internally funded company pensions.

Type 2 In the next variant of company pensions to be analyzed, type two in figure 1, immediate taxation is combined with external funding. The employee's side of the problem is the same as in type one. The firm's *PVD* is now determined as

$$PVD = (X - L - C)(1 - t_s) + \frac{1}{1 + r_s} X(1 - t_s) \quad (7)$$

where here C stands for the contribution that the firm makes to some external pension fund or the like. The assumption is that the fund offers a rate of return on this contribution of \bar{r} so that it has grown to P by period two. The meaning of \bar{r} has thus changed slightly compared to type one.

Calculating L from equation (3) again, substituting into equation (7) and differentiating with respect to C one obtains

$$\frac{dPVD}{dC} = \frac{1 - t_s}{1 + r_w} (\bar{r} - r). \quad (8)$$

Since external funding of the pension implies that there is no finance effect for the firm, unlike in type one, its internal rate of return does not matter so that we can conclude with the following proposition.

Proposition 2.2 *Under a system of immediate taxation of company pension contributions, where company pensions are externally funded, and for plausible values of t_s , i.e. $t_s = [0, 1)$, pension promises are profitable if and only if $\bar{r} > r$.*

⁶Such inefficient investments would probably not be in line with the goal of maximizing *PVD*. Nevertheless, this hazard is likely to exist because of the agency relationship between managers and owners of the firm.

Type 3 Under a pension plan of type three of figure 1, the employee pays taxes on C immediately as under the two types before. However, the firm does not fund the pension. The present value of dividends is now written as

$$PVD = (X - L)(1 - t_s) + \frac{1}{1 + r_s} [X - C(1 + \hat{r})](1 - t_s). \quad (9)$$

After substitution for L the derivative of PVD with respect to C is

$$\frac{dPVD}{dC} = \frac{1 - t_s}{1 + r_s} (r_s - \bar{r}) - \frac{1 - t_s}{1 + r_w} (r - \bar{r}). \quad (10)$$

The conclusion to be drawn from equation (10) can be summarized in the following proposition.

Proposition 2.3 *Under a system of immediate taxation of company pension contributions, where company pensions are unfunded, for $0 < r_s \leq r_w < r$ and $\bar{r} \geq 0$ pension promises are never profitable.*

To prove this one has to note that, first, equation (10) is strictly increasing in r_s and, secondly, if r_s and r_w are equal $\frac{dPVD}{dP}$ is always negative because $r_s < r$. This implies that for values of r_s less than r_w , i.e. if, in line with our assumptions, $t_w < t_s$, $dPVD/dP$ is negative as well. Therefore, unfunded pensions will never be offered if taxation is not deferred.

With all types of immediate taxation treated, it is necessary to establish the employee's wage-pension trade-off in case of deferred taxation of company pensions before types four to six from figure 1 can be approached. Analogous to equation (3), the employee is now indifferent between receiving a pure cash wage and receiving a wage-plus-pension package if

$$W = L + C \frac{1 + \bar{r}}{1 + r_w}. \quad (11)$$

It should be noted that the preferential character of the tax treatment is expressed by still discounting at rate r_w , since all other investment opportunities would still be subject to immediate taxation.

Type 4 Now we can turn to type four, which is the combination of deferred taxation and internal funding.⁷ The expression for the present value of dividends is the same as in type one. Solving equation (11) for L and substituting we obtain the expression for PVD in the presence of type four pensions as

$$PVD = \left(X - W - C \frac{r_w - \bar{r}}{1 + r_w} \right) (1 - t_s) + \frac{1}{1 + r_s} [X(1 - t_s) + C(1 - t_s)(\hat{r} - \bar{r})], \quad (12)$$

which is subsequently differentiated with respect to C :

$$\frac{dPVD}{dC} = \frac{1 - t_s}{1 + r_s} (\hat{r} - \bar{r}) + \frac{1 - t_s}{1 + r_w} (r_w - \bar{r}). \quad (13)$$

From this equation we can develop the following proposition:

Proposition 2.4 *Under a system of deferred taxation of company pensions, where company pensions are internally funded, company pensions will be profitable*

- i) if $\hat{r} \geq r \left[1 - t_s + \frac{1 + \bar{r}}{1 + r_w} (t_s - t_w) \right]$, and
- ii) profitability is increasing in \hat{r} and decreasing in \bar{r} .

This result predicts that this kind of company pensions will always be profitable if the firm's internal rate of return is not too far below the market rate and tax rates are within plausible ranges, i.e. $t_w, t_s \in [0, 1)$. It is a direct consequence of transforming equation (13) according to

$$\frac{dPVD}{dC} > 0. \quad (14)$$

For small differences between t_s and t_w , the bound from part (i) ensures that the internal rate of return must be at least as big as the shareholders' after tax rate of return. But therefore inefficiencies in the allocation of resources to investment must be expected if the combination of deferred taxation and book reserve funding of company pensions is permitted.

⁷This type represents the form of book reserve funded company pensions that is currently practiced in Germany for instance.

The underlying reason why company pensions of type four tend to be profitable is that capital gains, i.e. returns to the pension contribution, are effectively not taxed up to a rate of return of \bar{r} . As can be seen from equation (12), the firm pays taxes on the returns to the funds in the book reserves. However, up to a rate of \bar{r} these taxes are credited to it again because the interest component of the pension payment, which was not contained in the book reserves yet, counts as tax deductible expenditure.

Type 5 Next, the combination of deferred taxation and external funding will be discussed.⁸ In this case, if the employee is to receive a pension of P before income taxes in period two, the firm has to make a contribution of C to an external fund in period one. This contribution grows at the rate \bar{r} promised by the fund and the employee is paying taxes when receiving the pension.

Substituting for L , differentiating with respect to C yields

$$\frac{dPVD}{dC} = \frac{1 - t_s}{1 + r_w}(\bar{r} - r_w), \quad (15)$$

what leads to the next proposition:

Proposition 2.5 *Under a system of deferred taxation of company pension contributions, where the pensions are externally funded, pension promises are profitable if and only if $\bar{r} > r_w$.*

The proposition holds for the same reason as stated for type 2. But the range where an agreement between company and employee is achieved is extended now because the employee's pension payments are not subject to the distortionary effect of immediate taxation anymore.

Type 6 Lastly, the case of deferred taxation combined with no funding will be considered. It corresponds to type six in figure 1. By substituting for L in the general expression for PVD with unfunded company pensions (eq. (9)) we obtain

$$PVD = \left(X - W + \frac{1 + \bar{r}}{1 + r_w} \right) (1 - t_s) + \frac{1}{1 + r_s} [X - C(1 + \bar{r})](1 - t_s). \quad (16)$$

⁸In general the current 401(k) legislation in the US corresponds to this type of company pensions for instance although one difference is the assumption of certainty within our framework.

type	description	$\frac{dPVD}{dC}$ -formula
1	immediate taxation, internal funding	$\frac{dPVD}{dC} = \frac{1-t_s}{1+r_s}(\hat{r} - \bar{r}) - \frac{1-t_s}{1+r_w}(r - \bar{r})$
2	immediate taxation, external funding	$\frac{dPVD}{dC} = \frac{1-t_s}{1+r_w}(\bar{r} - r)$
3	immediate taxation, no funding	$\frac{dPVD}{dC} = \frac{1-t_s}{1+r_s}(r_s - \bar{r}) - \frac{1-t_s}{1+r_w}(r - \bar{r})$
4	deferred taxation, internal funding	$\frac{dPVD}{dC} = \frac{1-t_s}{1+r_s}(\hat{r} - \bar{r}) + \frac{1-t_s}{1+r_w}(r_w - \bar{r})$
5	deferred taxation, external funding	$\frac{dPVD}{dC} = \frac{1-t_s}{1+r_w}(\bar{r} - r_w)$
6	deferred taxation, no funding	$\frac{dPVD}{dC} = \frac{(1-t_s)(1+\bar{r})}{(1+r_s)(1+r_w)}(r_s - r_w)$

Table 1: Synopsis of $\frac{dPVD}{dC}$ -formulas

Differentiating with respect to P and unifying denominators yields

$$\frac{dPVD}{dC} = \frac{(1-t_s)(1+\bar{r})}{(1+r_s)(1+r_w)}(r_s - r_w). \quad (17)$$

This result leads to our last proposition:

Proposition 2.6 *Under a system of deferred taxation of company pensions, where company pensions are unfunded, company pensions will be profitable if and only if $t_w > t_s$.*

This implies that, as long as the distribution of incomes is skewed and income taxation is progressive, only employees with high income tax rates will be eligible for a non-funded company pension whose taxation is deferred. If, unlike in this model, profits are at least partly retained, the above condition needs to be adapted to reflect the average taxation of profits that is then valid. The consequence is that in jurisdictions with corporate income tax rates significantly lower than personal income tax rates on high incomes, employees with lower incomes might be eligible for type six company pensions too.

With this last result established, we can turn to the next section where the above findings will be further discussed. Before, however, it might be helpful to sum up the results of this section, which is done in table 1.

2.3 Discussion of Results

One important criterion to distinguish company pensions of the six types is whether they present a source of finance to the firm. Only two forms of externally funded pensions, types two and five, do not. The other four types of company pensions, by contrast, automatically strengthen the firm's liquidity to varying degrees. The reason is, first of all, that in so far as the firm saves on current wage payments by promising future pensions to its employees, its outflow of liquidity is reduced – unless the reduction in wage payments is canceled out by contributions to external pension funds.⁹ This effect is further enhanced if pensions are funded through book reserves as in cases one and four. Then the wage payments saved do not increase taxable profits, which means that tax payments in period one are as low as they would be in the no-pension case with higher wage payments.

The consequence of this finance effect of company pension types one, three, four and six is that in case taxation is favorable, i.e. $\frac{dPVD}{dC} > 0$, the firm obtains finance at less than the market rate of interest, which harms allocative efficiency because resources can be used for investments that yield less than the market rate of return. This problem has been mentioned before for type one company pensions, and, in fact, for book reserve funded pensions, the relevance of this issue can be demonstrated best: in Germany, for example, where reserve funded pensions of type four are widespread, the legally specified \bar{r} has long been 6% p.a. even though interest rates on bank credit or bonds were more than double at times.

When the six types of pensions were treated in detail in the last section, it was noted that while type three will, under plausible assumptions, never be chosen by firms, type four pensions are always profitable under the same circumstances. The profitability of types one and six, by contrast, was found to depend on \bar{r} and relative tax rates of employees and shareholders, respectively. It seems as if non-neutral taxation is an unalterable fact of life as far as types three and four are concerned.

⁹In fact, even externally funded pensions increase the firm's liquidity if their tax treatment is favorable, however, the amounts are relatively small and this liquidity is at the same time profit, whereas the finance effect aimed at above is to be seen in analogy to loan-financing.

Naust (1990) comes up with the same result. The reason is that types three and four violate what Naust calls the *principle of correspondence*. According to this principle, the firm's investment decision is left undistorted by company pensions with a finance effect only if either immediate taxation of the implicit pension contribution is coupled with the formation of book-reserves or deferred taxation is coupled with no funding of the pension obligation by the firm.

Company pension types three and four, in the classification of figure 1, are thus undesirable from a tax-systematic point of view. Type four should, therefore, not be permitted unless favorable tax treatment of company pensions is a specific political aim, which will be discussed in section 4. Type three would never be chosen by firms, anyway, for lack of profitability. Of the types of company pensions with a finance effect, only type one and type six remain to be considered. Further, the two cases of external funding, types two and five, deserve attention. For these four types it might be helpful to take another look at what determines their profitability.

As summarized in table 1, for types one and two profitability depends on the relation between \bar{r} and r . For type six, by contrast, relative tax rates are crucial, while profitability of type five depends on both interest and tax rates.

For company pensions of type one the tax legislator can ensure neutral treatment by aligning the legal discount rate for the purpose of reserve formation to the market rate of interest. If \bar{r} is equal to r , the effect of company pensions on PVD is strictly positive only if the firm's internal rate of return is higher than the market rate of return. This is perfectly desirable from the point of view of allocative efficiency. One option to approximate would be for \bar{r} to track the rate of interest on long-term government bonds plus a certain margin to reflect the higher default risk of private debtors relative to governments. Further, the size of premia on mandatory insurance for pension liabilities could be geared to each individual firm's risk of default so each firm's cost of finance through pensions would depend on its creditworthiness, approximately as in the capital market.¹⁰

For the two types of externally funded company pensions, no state regulation of \bar{r} is required. Just as any rate of return offered by a financial institution, \bar{r} will be

¹⁰Mandatory insurance of pension liabilities is already common, however, assessing individual companies' default risks to determine premia is less widespread. Failure to do so is one of the major criticisms of the US Pension Benefit Guaranty Corporation (PBGC).

determined by market forces.¹¹ Thus, both types, in fact, do not require any regulation at all. But one should keep in mind that for type five it is more likely that high-income earners participate in the plan.

This property makes type five similar to type six. The latter will only be offered where $t_w > t_s$. However, as long as redistribution through the tax system is maintained and income is not equally distributed, shareholders will tend to be taxed at higher rates than employees, so type six pensions will be unprofitable for all employees but those with top-level incomes. But altering this fact would require abandoning progression for both types, what would have other major distributional consequences.

3 Effects of real-world complications

In this section, two of the restrictive assumptions made so far will be dropped in order to see how the results obtained in the previous analysis have to be adapted in more realistic settings. First the consequences of dropping the assumption of perfect capital markets with a uniform interest rate will be explored. Subsection 3.1 regards the modeling of the employee's indifference between a pure wage contract and a contract that includes a pension. In subsection 3.2 the finance effect of internally funded and unfunded pensions is investigated. Secondly, in subsection 3.3 the employee's tax rate will be allowed to vary over the life cycle.

3.1 Imperfect capital markets – the employee's side

In the previous discussion capital markets have been assumed to be perfect in so far as a single uniform market rate of interest was supposed to exist. Realistically, however, interest rates on debt are higher than those on credit due to transaction costs. As a consequence, the condition for indifference of the employee between contracts with and without a pension is no longer independent of his time preferences, as will be shown in this subsection.

In subsection 2.1 the justification for describing the employee's preferences for one contract or another in terms of the present values of the resulting payments was that

¹¹In fact, they should drive it towards r anyway, since otherwise either no firm would make contributions to the fund or the fund would go bankrupt.

within the bounds of the present value of his income, the employee could achieve any intertemporal distribution of consumption by borrowing or lending in the capital market at the uniform market rate of interest. In this situation, the employee's time preferences regarding his consumption did not enter his preferences over labor contracts.

The crucial assumption in this argument was the existence of a uniform market rate of interest. As soon as it is dropped and interest rates on debt and on credit are allowed to diverge, time preferences do matter for the valuation of contracts. To see this, consider equations (3) and (11), the conditions on the trade-off between cash wage and pension under immediate and deferred taxation, again and interpret r as r^{cr} , the credit interest rate. Given this trade-off, the employee's consumption possibilities sets under the two contract types are no longer identical. In fact, under the realistic assumption that the debt interest rate r^d is higher than the credit rate, which will usually hold, the employee's set of feasible consumptions will be smaller under the pension contract. In order to finance period one consumption in excess of his net cash wage, he has to borrow at the high debt interest rate. So his maximum possible period one consumption is strictly less than $W(1 - t_w)$, his maximum period one consumption under a pure wage contract.

The consequences of this reduction of consumption possibilities for the employee's relative valuation of the two contracts depend on his time preferences. Employees whose optimal period one consumption, given a pure wage contract, is weakly less than their period one cash wage under a pension contract as specified above, will still be indifferent between the two contract types. For these low discounters can achieve the same consumption vector in both cases. Employees with a strong preference for period one consumption, by contrast, whose optimal consumption vector under a pure wage contract involves period one consumption in excess of the period one cash wage of the pension contract, can no longer afford this consumption vector. Thus, assuming well behaved preferences, they will prefer the wage-only contract.

Put differently, the trade-off between pension and wage would have to be more favorable in order to guarantee this employee the same utility level under both contracts. This means equations (3) and (11) would have to turn into

$$W(1 - t_w) = L(1 - t_w) - Ct_w + \frac{C(1 + \bar{r})(1 - t_w) + Ct_w}{1 + r_w^i} \quad (18)$$

for the case of immediate taxation and

$$W = L + C \frac{1 + \bar{r}}{1 + r_w^i} \quad (19)$$

for the case of deferred taxation, where $r_w^i = r^i(1 - t_w)$ stands for the after tax discount rate required by an individual employee in order to be indifferent between the two contracts. r^i is an increasing function of the employee's time preference with r^{cr} and r^d as its lower and upper bounds. For as was shown, a low discounter only demands r^{cr} , the rate of return that he would receive on his saved period one income in the capital market. An extremely high discounter, on the other hand, wants to consume his entire lifetime income in period one, which means that $W(1 - t_w)$ must be part of his consumption possibilities set under the pension contract. This is achieved if the pension is discounted at $r_w^i = r^d$. An individual whose time preferences are in between those two extremes will demand an intermediate r^i in order to be able to borrow at the high debt interest rate as much as he requires to achieve the same utility level as under a pure wage contract.

The implications of the modified pension–wage trade–offs (18) and (19) on the expressions for $\frac{dPVD}{dP}$ for each of the six pension types are rather obvious. In all six cases profitability of company pensions tends to be lower, the more myopic the employee is since the rate of return that he demands on his foregone period one income increases in his relative preference for period one consumption.¹² This is an important result because it has consequences for policies towards company pensions. It seems reasonable to assume that an employee's willingness to give up period one income in favor of a pension increases in his overall budget because his marginal utility of period one consumption decreases. This issue will be discussed in more detail in section 4 in light of current concerns about securing old age incomes.

3.2 Imperfect capital markets – the firm's side

It was mentioned in the last section that the divergence of interest rates on debt and on credit can also have consequences for the cost of finance for firms that offer internally funded or unfunded company pensions. As has been pointed out before, these types of company pensions are a source of finance for the firm since, in effect, by foregoing part of his period one wage, the employee makes a loan to the firm, which

¹²Remember, though, that $r^{cr} \leq r^i \leq r^d$. So profitability is constant over the extreme ranges of myopia and farsightedness.

the latter repays including interest in the form of the pension. Types three and four are not discussed here, however, because they do not conform to the tax–systematic principle of correspondence anyway, as was shown above. In the last section, it was seen that the employee is willing to make such a loan if he earns a pre–tax rate of return of at least r^i on it. The firm, on the other hand, should be prepared to pay a rate of r^d because this is its cost of finance in the capital market. Since $r^d \geq r^i$, for some of its employees, a rent will arise that can be shared thus lowering the firm’s cost of finance and raising the employee’s rate of return. A closer look at type one company pensions will illustrate this point.

In the case of type one company pensions, the size of the rent depends on the value of the legally specified \bar{r} and on the employee’s r^i . In order to explain this, it is helpful to state the new version of equation (6) that takes multiple market rates of interest into account:¹³

$$\frac{dPVD}{dC} = \frac{1 - t_s}{1 + r_s^{cr}} (\hat{r} - \bar{r}) - \frac{1 - t_s}{1 + r_w^i} (r^i - \bar{r}). \quad (20)$$

An intuitive solution to the problem of specifying \bar{r} is to set it equal to r^d . Then the first term of equation (20) drops out if the firm’s investments yield exactly the rate of return that they would have to yield if externally financed. $\frac{dPVD}{dC}$ will then be positive if the employee demands a rate of return r^i that is less than r^d . Otherwise it will be zero. For values of \bar{r} lower than the interest rate on debt $\frac{dPVD}{dC}$ is always strictly positive provided the firm earns r^d on its investments. The reason is that the expression decreases in \bar{r} as long as $r_s^{cr} < r_w^i$, which is likely the case.¹⁴

Setting \bar{r} equal to r^d thus seems to be the efficient solution because then $\frac{dPVD}{dC}$ is zero if

$$\hat{r} = r^i = r^d, \quad (21)$$

that is to say, neutrality with respect to external financing is preserved. The fact that $\frac{dPVD}{dC}$ is positive for values of r^i lower than r^d does not have to be regarded as a violation of neutrality, even though it makes investments that yield less than

¹³In the denominator of the first term r_s^{cr} is used because the shareholders can reasonably be assumed to be savers for the purpose of determining their discount rate.

¹⁴The derivative of $\frac{dPVD}{dC}$ with respect to \bar{r} is $(1 - t_s)(\frac{1}{1+r_w^i} - \frac{1}{1+r_s^{cr}})$, which is negative when $r_s^{cr} < r_w^i$. This is most likely so because $r^{cr} \leq r^i$ and by assumption $t_s > t_w$ for most employees.

r^d feasible. The reason is that such investments do not necessarily harm allocative efficiency. The fact that the interest rate on debt is higher than that on credit is a manifestation of imperfect capital markets with positive transaction costs. Thus, if with the help of company pensions, the cost of finance approaches r^i and thus ultimately r^{cr} for low discounters, efficiency may actually be enhanced. The gain from the spread between r^d and r^i that remains after deducting the cost of administration of the pension plan, which has been neglected all along, could be regarded as a rent to efficient financial intermediation.

In principle, the same efficiency considerations apply to type six company pensions. Again, the firm's cost of external finance would be r^d before taxes, while the employee demands r^i . To the extent that the former is bigger after taxes than the latter, there is a rent. This case will not be discussed any further here because it cannot be grasped in the context of the chosen model setup. For in the specification of equation (16), the amount saved on wages in period one would simply be distributed to the shareholders. Thus, there would not be any finance effect.

3.3 Progressive income taxation

The purpose of this section is to demonstrate the potent effects of progressive income taxation on the results of the model. In a way, progression has been assumed all along by positing that the tax rate of the shareholder is higher than that of the employee. However, variation of tax rates among individuals is only one of the consequences of progressive income taxation. Another important aspect that has been neglected so far is that individuals are likely to have varying tax rates over their life-cycle because retirement income tends to be lower than income during work time.

Explicit modeling of progressive taxation using marginal tax rates would lead to very complicated expressions that do not yield any tractable results. Therefore, we will simply assume that the employee faces different but constant tax rates during his working life (period one) and during retirement (period two), which are going to be called t_{w1} and t_{w2} with $t_{w1} > t_{w2}$. This assumption is possible because, given the usual sizes of company pensions, L , in a pension contract, is not likely to be so much smaller than W , in a wage-only contract, as to reduce the employee's period one tax rate significantly. Taxable retirement income, by contrast, tends to be markedly less than income during a person's working life.

The two pension–wage trade–off equations for immediate and deferred taxation of the pension have to be adapted as follows. The equation for immediate taxation turns into

$$W(1 - t_{w1}) = L(1 - t_{w1}) - Ct_{w1} + \frac{C(1 - t_{w2})(1 + \bar{r}) + Ct_{w2}}{1 + r(1 - t_{w2})}, \quad (22)$$

which can be solved for L to yield

$$L = W - C + \frac{C}{(1 + r(1 - t_{w2}))} \frac{1 - t_{w2}}{1 - t_{w1}} (r - \bar{r}). \quad (23)$$

For deferred taxation, the expressions are somewhat simpler. Indifference of the employee requires that

$$W(1 - t_{w1}) = L(1 - t_{w1}) + C(1 - t_{w2}) \frac{1 + \bar{r}}{1 + r(1 - t_{w2})}, \quad (24)$$

which after solving for L yields

$$L = W - \frac{C(1 + \bar{r})}{1 + r(1 - t_{w2})} \frac{1 - t_{w2}}{1 - t_{w1}}. \quad (25)$$

Comparing equations (23) and (25) to the results derived by equations (3) and (11) respectively makes apparent that, provided \bar{r} equals the market rate of interest r , the value of L changes only in the case of deferred taxation. More specifically, the required L to make the employee indifferent with regard to the company pension is reduced because $\frac{1 - t_{w2}}{1 - t_{w1}}$ is greater than one. The reason for this reduction in L is that relative to the employee's alternative of private retirement saving, which is subject to immediate taxation according to the assumptions of this model, deferred taxation of company pensions constitutes a tax privilege. Deferred taxation implies that the entire pension is taxed at the lower rate t_{w2} . In the alternative case of immediate taxation, by contrast, only the interest component of the company pension, or of the private pension for that matter, is taxed at the low rate.

This result is significant because it shows that in the presence of a progressive tax system immediate and deferred taxation are not equivalent in their effects on profitability. While the employee profits from the lower taxation of retirement income, no matter from what kind of pension this income stems, only profitability of types four through six is affected. In these cases deferred taxation creates a rent.

How does progressive taxation interact with the phenomena discussed in the previous two subsections? Obviously, the rent from deferred taxation adds onto the rent that may arise from finance effects through company pensions. It also helps to counter the negative effect on profitability of company pensions of myopic employees in imperfect capital markets. However, this latter statement needs to be qualified: As mentioned in the discussion of myopia, it seems likely that those employees with the lowest incomes are likely to have the highest discount rates. Thus, these employees require the highest differential between t_{w1} and t_{w2} to compensate for their myopia. However, the lower an employee's income during period one, the lower this differential is likely to be because he will be taxed at rather low rates in both periods. This is an indicator that deferred taxation of company pensions constitutes a stronger incentive in favor of company pensions for earners of high incomes than for earners of low incomes.

4 Allocative consequences of tax–motivated company pensions

At the beginning of this article, neutral tax rules were defined as tax rules that – in the absence of labor economic considerations or supernormal internal rates of return – leave the company indifferent with regard to company pensions. One has to remark, though, that by assuming immediate taxation as the usual tax treatment in the economy, we have actually been in a second–best world all along. For immediate taxation always implies a bias towards consumption due to the taxation of capital gains. Given this one distortion, it is no longer possible to state that adding another distortion via preferential tax treatment of company pensions leads to less efficient results in general. But at least in a tax systematic way we can argue that it makes little sense to prefer just one particular form of old–age income provision, a statement that will be supported by the following line of arguments.

First of all, there is one distortion inherent in all kinds of tax privileges: Holding government expenditures constant, they always imply a loss of tax revenue that has to be compensated for by higher taxes elsewhere, usually leading to further reduced allocative efficiency since all taxes tend to be raised in a distorting manner. Secondly, in all cases of unfunded and internally funded company pensions the firm's investment decision can be distorted, as has been discussed extensively in previous

sections.¹⁵ On the other hand, there could be substantially higher induced savings in the long run, as pointed out by Hubbard and Skinner (1996) and in this way an enhancement of efficiency. But one has to mention that the effectiveness of tax-induced saving incentives in general is at least controversial, comparing the results of Poterba, Venti and Wise (1996) with those of Engen, Gale and Scholz (1996).

Beyond these doubtful long-term gains, there are potentially three advantages of company pensions over private pensions. However, as will be seen, none of them provides a justification for tax privileges since they all make company pensions profitable by themselves. One such advantage is that administrative and informational costs may be lower if a firm organizes a plan for its workforce, rather than if every employee organizes his retirement saving individually. A second is that a firm that insures a whole group of employees with an external fund may be offered better contracts. The idea here is that the technology of insurance firms is such that its average cost decreases in the number of plan participants because the variance of participants' average age of death around the expected age of death decreases in the number of participants, as pointed out by Walliser (2000) for instance. Thus, the fund may want to attract large groups of participants that increase its pool significantly at once and therefore offer group reductions. A third argument in favor of company pensions that is often cited despite its flaws is that company pensions strengthen firms' capacity for internal financing and thus provide easy access to capital. There are two objections against this argument. First, easy access to capital would be very undesirable if it meant that there is weak supervision of the firm's use of its assets to meet future pension liabilities. In fact, the need for financial supervision and insurance is especially strong for the types of company pensions in question here. The employee does not make his pension investment in a diversified portfolio, as in external funds, but rather his investment risk is undiversified and, on top of that, highly correlated with his employment risk. Secondly, company pensions of the four types that provide capital to the firm are only viable for very large firms, which will most likely have easier access to capital than small firms anyway. The reason is that a high number of covered employees is required to make the average duration of pension payments until death predictable because the variance in the average duration of pension payments decreases as the number of covered employees increases.

¹⁵Note though, that the case discussed in section 3.2 is different. Here the rent arising from the spread between debt and credit interest rates was economically justified.

In summary, no reasons have been found to grant tax preferences to company pensions alone. This means that in the absence of deferred taxation of private retirement saving, taxation of company pensions should not be deferred either. As a consequence, only company pensions of types one and two would remain for employers to choose from, since type three is unprofitable, as pointed out in section 2.2. For type one company pensions, it would further be necessary to set \bar{r} equal to the market rate of interest on debt. Type two pensions would not require any tax regulations at all. The likely outcome would be that small enterprises choose these externally funded pensions if they want to offer company pensions for labor economic reasons. Large companies with a sufficient number of employees, by contrast, would prefer internally funded pensions because of the rent caused by the spread between credit and debt interest rates.¹⁶

The scenario just described was derived under the assumption that there is no particular reason for concern about the level of old age incomes, which clearly does not hold in many industrialized countries. Social security pensions will no longer be able to provide sufficient old age incomes and there is common concern that people are not farsighted enough to make sufficient provisions on their own. It therefore appears necessary to induce people to make supplementary provisions for their retirement. The question now is to what extent the above plea for neutral taxation of company pensions can be upheld in this situation.

It is necessary to make clear, that to be concerned about people's willingness to save enough for their old age, means to assume that they are myopic. Therefore, what has been proposed above as neutral taxation may in this situation entail negative values for $\frac{dPVD}{dC}$. For externally funded company pensions, this would clearly happen, since a fund would likely only offer a rate of return of r^{cr} while the required rate of return of a myopic employee is $r^i > r^{cr}$. For internally funded company pensions, $\frac{dPVD}{dC}$ depends on the degree of myopia. For the very myopic employees, who demand $r^i = r^d$, it would presumably turn negative as well, due to costs of administration and the like.¹⁷ In this situation, a positive bias in the tax rules would not necessarily create rents to be bargained over between employer and employee and thus not necessarily lead to cheap finance and distortions in the allocation of resources to investment.

¹⁶Note that this implies that employees in big firms are at an advantage in such a system because employers can offer them pensions under better terms.

¹⁷External funds obviously incur such costs too. But by offering r^{cr} they have deducted them already.

However, it must be expected that rents to be bargained over would arise for some employees after all. There are two reasons for this prediction: First, as mentioned in section 3.1, it is likely that people are not all equally myopic, but that the strength of the incentive necessary to make them save for their retirement is inversely related to their income. Second, in a system of progressive income taxation, tax incentives benefit primarily high income earners (compare the discussion of deferred taxation as an incentive in section 3.3). Both these facts entail that, while a given level of tax subsidies may only just induce earners of low incomes to trade wages for company pensions, employees with high incomes will take them as windfalls.

Therefore, for high income-earners, the same efficiency considerations regarding preferential tax treatment of company pensions apply here as in the absence of concern about old age income security: Rents are created that are paid for by distorting taxation elsewhere, and the capturing of part of these rents by the firm may inefficiently lower its cost of finance. Thus, tax preferences for company pensions, especially in the form of deferred taxation and the like, still do not appear desirable.

This does not mean, however, that company pensions have to be excluded in a political attempt to enhance old age income security. It would, for instance, be an option to introduce equal tax incentives for company pensions and private retirement saving, as it is the case with 401 (k) plans and IRAs in the US. Such a solution has three advantages over giving tax preferences to company pensions alone. First, the problem of rents that can be captured by the firm and used for inefficient investments is avoided. Taxation of company pensions is neutral again because the employee's relevant alternative of private saving is treated equally.¹⁸ Second, equal treatment of the two forms of retirement income provision opens a level playing field for competition among them. The most efficient form may then crystallize in an evolutionary process. The third advantage is that, while subsidies to company pensions only benefit those in employment, subsidies to retirement saving in general benefit the unemployed and non-working partners of employees too, at least if they come in the form of lump sum payments.

Even though, given the just named arguments, subsidization of private and company pensions alike seems preferable to granting tax privileges to company pensions alone, this option does not avoid the problem that, *ceteris paribus*, distorting tax-

¹⁸Speaking in terms of the model, the employee's pension-wage trade-off is the same if both types of retirement provision receive the same favorable treatment as if neither is subsidized.

ation elsewhere is necessary to raise the revenue from which the subsidies are paid. In fact, this problem is inherent in all kinds of subsidies.¹⁹ Its most obvious solution is to make a certain level of retirement saving in either company or private plans mandatory. The budgetary cost of this option would be (*prima facie*) zero,²⁰ but it may be deemed politically unacceptable because forced saving might remind people too much of disliked taxes and social security contributions, which for instance could be seen in the last trials for reforming social security in Germany. Another option would therefore be to stick with an incentive solution but to search for one that minimizes the amount of subsidies required. Given our presumption that myopia among employees is negatively related to income, such a solution would involve relating subsidies negatively to income as well. If this policy is deemed too redistributive, lump sum subsidies could be chosen. At any rate, tax incentives in the form of deferred taxation or partial tax exemption of retirement saving would be inappropriate because they benefit earners of high incomes disproportionately, as was explained in section 3.3.

All this may suffice regarding possible ways of overcoming current problems of securing old age incomes. It is not within the scope of this article to present ready solutions to this enormously complex topic. The purpose of this brief touch upon it was rather to show the consequences of different solutions for the pertinence of the hazards to efficiency discussed in relation to subsidizing company pensions.

5 Conclusions

The central part of this article has been an analysis of tax-based incentives of firms to provide company pensions. On the basis of this analysis, the efficiency consequences of company pensions could be derived. It was found that tax motivated company pensions harm efficiency in most cases. Contrary to pensions offered for labor economic reasons which might yield a true surplus in the firm by enhancing productivity, tax-motivated company pensions tend to reduce general economic efficiency because preferential taxation of pensions may distort the allocation of re-

¹⁹Hubbard and Skinner (1996) provide a summary of estimation results comparing the positive and negative dynamic effects of debt financed saving incentives to overcome the problem of immediate distortions from taxation.

²⁰Even though no income tax revenue is lost, there will be losses in revenue from consumption taxes in reality because higher saving rates imply lower consumption today. So only in a first approximation the budgetary cost is zero.

sources within the firm. Also, it requires *ceteris paribus* higher taxes elsewhere, which will nowadays usually be levied in a distorting manner.

Therefore under efficiency considerations, it was postulated that in terms of taxation, company pensions should not be privileged over private pensions. If due to concern about old age income security it is deemed necessary to induce people to make supplementary old age provisions, both company and private pensions should be granted the same kind of tax subsidies or be allowed as options within a framework of mandatory supplementary pensions. If the former option is chosen, subsidies should be inversely related to income, or at least paid as lump sums in order to avoid windfalls to the well-off.

With such neutral tax treatment, the quantitative importance of company pensions in retirement income provision would be endogenously determined by their performance in competition with private pensions. Company pensions would be at a disadvantage since people with unsteady employment or no employment would rather choose private pensions. On the other hand, they would have an edge over private pensions because of the labor economic gains from them and because of the reduction in the cost of finance stemming from the spread between the interest rates on debt and on credit.

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