From Optimal Tax Theory to Applied Tax Policy Lessons from the Netherlands for Norway*

Bas Jacobs
Erasmus University Rotterdam, Tinbergen Institute and CESifo

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Abstract

This paper aims to provide a perspective on the ideal tax system using insights from optimal tax theory supplemented with empirical evidence. These insights are applied to actual policy questions regarding the progressiveness of the labor income tax, the design of the capital income tax, the taxation of housing and pensions, the corporate income tax, the role of indirect taxes and optimal environmental corrective taxes.

1 Introduction and summary

The economic crisis has deteriorated government finances in many countries. Therefore, policy makers seek ways to either cut spending or to increase tax revenues. This paper contains some ideas for fundamental tax reform that could make existing tax systems more efficient and thereby could be of help to raise more public revenue. Although the choice of topics is mainly inspired by actual policy discussions in the Netherlands, I believe that the insights are relevant for other countries, like Norway, too. The Netherlands and Norway share some very similar structural problems in their tax system as the latest OECD country reports suggest, see OECD (2010a, 2010b). For example, both countries have very progressive tax systems with quite high marginal tax rates for top-income earners, both countries have a very lenient tax treatment of owner-occupied housing and pensions, both countries redistribute a lot of resources through health care and housing support, and both countries aim to raise the (sometimes high) excise taxes on alcohol further in the future.

Moreover, it is probably the case that many policy discussions on taxation in the Netherlands have their counterparts in Norway. In the Netherlands there has been an

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ongoing debate on the desirability of the flat tax. Many political parties on the right are advocates of introducing a flat tax (e.g. Christian Democratic Party and Conservative Liberal Party), but also some prominent economists such as Lans Bovenberg and Coen Teulings. Similarly, policy makers are concerned about the adverse effects of the poverty trap on labor supply incentives at the lower end of the income scale. Sometimes marginal tax rates can be higher than 100 percent. The former leader of the Labor Party and Minister of Finance, Wouter Bos, once famously argued that the real top tax rate can be found at the bottom of the skill distribution and not at the top. Hence, in his view left-wing politicians should fight the poverty trap. Like in the Mirrlees Review (2010), the taxation of capital income also receives ample attention in the public debate in the Netherlands. For example, should there be an exemption of the normal return to capital as Bovenberg and Stevens (2010) argue? Some economists advocate no taxation of capital income at all, whereas (mainly) law scholars vehemently defend a comprehensive income tax, where capital incomes are taxed at the same rate as labor incomes. The Dutch government also spends massive amounts on tax facilities for housing (mortgage rent is deductible) and pension savings. The total budgetary cost amounts to approximately 5 percent of gdp in lost tax revenue (Jacobs, 2008). As a result, there is a continuous and heated policy debate on whether these facilities make economic sense and whether they are equitable as the incidence of these tax-facilities falls disproportionally upon the wealthy. The Dutch government is trying to avoid overleveraging of corporations through various thin-capitalization rules. However, in the Netherlands a fundamental debate on the desirability of interest deductibility of interest payments on the corporate level is missing. Also, the Dutch government has recently lowered tax rates on gifts and inheritances, albeit without much public discussion. Among economists, however, this reform was met with some scepticism. Some political parties, such as the Labor Party and the Green Left Party aim to 'green' the tax system by shifting the tax burden from labor to consumption of polluting goods. However, one may the question whether further greening of the tax system is desirable given the already high excises on energy and fuels.

Most of these policy discussions originate in fundamental questions in the theory of optimal taxation. Therefore, this paper aims to provide a perspective on the ideal tax system using insights from optimal tax theory. In particular, the government chooses its tax instruments so as to maximize social welfare (defined in a broad sense), while taking into account all relevant tax-induced behavioral responses. The ideal tax system is therefore based on welfare-economic principles. These insights are applied to actual policy questions regarding the progressiveness of the labor income tax, the design of the capital income tax, the corporate tax, the role of indirect taxes and the inheritance tax. Some insights are not new, others are. Nevertheless, I believe that these discussions also play in many countries, like Norway.

This paper attempts to be both broad in range of topics and go in some depth at the same time. In order to do so, the main focus will be exclusively on the economic and distributional aspects of taxation. Indeed, not much attention will be paid to practical

matters of implementation and legal issues. However, this does not imply that these are not important for actual tax design. The range of topics covered in this paper is very broad and I am sure I have not done justice to all the theoretical and empirical research that has been done in various fields.

The setup of this paper is as follows. Section 2 summarizes the main assumptions underlying optimal tax theory. Section 3 discusses the optimal non-linear income tax. Section 4 argues that a flat tax is generally undesirable. Section 5 presents arguments that taxation of capital income is optimal and discusses how taxation of capital income should be organized. It will be argued in Sections 6 and 7 that pensions and housing should be treated as ordinary assets. Section 8 sheds some light on some problems in the corporate income tax. Section 9 discusses inheritance taxation and suggests that current inheritance taxes might be too low. Section 10 analyzes indirect taxes and argues that many indirect instruments are superfluous. Section 11 investigates environmental and energy taxes and argues that they might easily become too high. Section 12 analyzes corrective taxes on alcohol and tobacco. Section 13 concludes this paper with a summary of policy recommendations.

2 Assumptions optimal-tax analysis

This section will thoroughly summarize the most important assumptions that are commonly used in the theory of optimal income taxation (see for example, Diamond and Mirrlees, 1971a,b; Atkinson and Stiglitz, 1976; Mirrlees, 1976). In actual policy debates, these assumptions are not often made explicit. However, the outcomes of the analysis are the logical consequence of the assumptions that are made. Difference of opinion could exist with respect to the empirical validity of some assumptions. A number of assumptions or parameters will be discussed directly in what follows. In any case, criticizing the policy conclusions sketched above ultimately boils down to criticizing the underlying assumptions and the empirical estimates for crucial parameters.

The objective of the government is assumed to be the maximization of social welfare. Welfare is defined in a 'broad' sense, that is, including the value of, for example, leisure time, and environmental quality. Social welfare is a weighted sum of the utilities of all individuals in society. Utility of each individual is determined by a bundle of scarce commodities that each individual consumes: consumption goods, leisure, environmental quality, and so on. In addition individuals have individualistic and consistent preferences. Individuals exhibit rational behavior, i.e. they maximize their utility subject to their budget constraints. The main source of inequality is that individuals differ in their earning ability, or their 'skill level'.

Firms have only a limited role in the analysis. Firms produce outputs using labor, capital, intermediate goods and other inputs. Firm's profits accrue to the households that own the firms. Hence, the firm's profits do not enter the social welfare criterion directly,

only indirectly insofar as firm's profits raise household utility. Firms are assumed to behave competitively. If not, we explicitly discuss the role of pure profits, i.e., above normal returns on equity for the shareholders. In addition, we make the small-open economy assumption assume that factor prices are determined on world markets. Hence, there are no general equilibrium effects on the wage structure or interest rates as a result of tax policy. Diamond and Mirrlees (1971a,b) demonstrated that optimal tax rules are the same in partial and general equilibrium under some relatively mild assumptions (100 percent tax on pure profits, perfect substitution labor types).

The government chooses its tax instruments to maximize social welfare, while taking into account all relevant behavioral responses of individuals and firms. Indeed, the analysis assumes that the government is an 'enlightened dictator' that is not subject to any political constraints. This is an abstraction from real-world policy making. However, it is useful to have an idea about what the second-best tax system would be in the absence of political distortions. This sheds light on potentially welfare-improving policies and thereby helps policy makers and politicians to make better decisions.

The government can express its preference for a more equal welfare distribution by attaching a higher marginal weight to individuals with a lower level of utility. Hence, redistribution of welfare from individuals with a high to a low utility is welfare enhancing, since the individual with a high level of utility has a lower marginal social utility than the individual with a low level of utility. Politicians often consider income or wealth as the ultimate statistic of an individual's well-being, irrespective of the circumstances that this individual lives in. However, in welfare analysis the government does not aim for income or wealth equality per se. This is only desirable as long as this contributes to welfare equality.

Naturally, social welfare increases if the government corrects market failure, internalizes externalities and provides public goods. In this paper, the focus is on the taxation side and not on the expenditure side of the public budget. Therefore, we will only touch upon these issues when considered relevant. The main focus is on the distribution of welfare.

The welfare-economic approach insists that tax bases should be taxed (or not) only if doing so raises social welfare. Whether some tax bases should be taxed is never determined by ideas about fairness or social justice that are unrelated to individual welfare. This makes the welfare economic approach somewhat difficult to understand to non-economists. Legal scholars, for example, often have strong (politically and/or subjectively motivated) views on which taxes should be used and how they should be used. However, various ability-to-pay concepts (equal absolute or proportional sacrifice, Schanz-Haig-Simons comprehensive income, consumption/expenditure), references to subjective feelings of 'fairness' or norms originating from philosophical or legal traditions have no role to play in welfare analysis. By maximizing social welfare the government necessarily respects individual preferences. As long as the government attaches a larger weight to the individuals with a lower welfare, maximization of social welfare will produce a more equal welfare distribution. If additional constraints are imposed on the tax system based on some other notion of justice – a notion that is not already present in individual utility – these constraints will necessary

lead to lower social welfare. Indeed, in some circumstances, the welfare of *all* individuals could be reduced by imposing norms of fairness on the tax system. Generally, every superimposition of ad hoc ideas of fairness is superfluous from a welfare economic point of view and contradicts the Pareto principle (Kaplow and Shavell, 2002).

Nevertheless, it is perfectly feasible that individuals' utility functions do display notions of fairness other than the welfare equality implied by diminishing marginal social utility. Behavioral economics provides many examples: (time-)inconsistent preferences, hyperbolic discounting, prospect theory, interdependent utility, and so on. Notions of fairness, equal treatment, status motives, merit motives and paternalism could well be reasons why the standard welfare-economic approach cannot be applicable. However, when deviating from the standard welfare-economic paradigm, it is no longer clear which welfare criterion should be used. There are individualistic welfare criteria that allow for inconsistencies in individual preferences and still respect the Pareto criterion in some modified form (Bernheim and Rangel, 2009). Nevertheless, every non-individualistic welfare criterion breaks the link between individual preferences and the objective of the government. Hence, every non-individualistic welfare criterion contradicts the Pareto-criterion (Kaplow and Shavell, 2001).

In addition, there is a danger that Pandora's box is opened by explicitly breaking the link between individual preferences and social objectives. In particular, it always possible to construct a social objective that can characterize every particular policy proposal as the optimum policy. Thus, every political party or politician can state a social objective that perfectly fits its policy proposals. To avoid such arbitrariness in the characterization of optimal tax policies, this paper adopts the standard welfare-economic approach. Nevertheless, we do discuss deviations from this approach in some specific cases. In these cases, the deviation from the traditional approach will be made explicit, and also how this affects the policy conclusions. Nevertheless, it is clear that non-welfarist social objectives are no longer 'neutral' in the sense that the government overrules individual preferences. These impacts should be weighed by politicians in their decision making.

One can safely assume that governments value horizontal equity in the design of tax policy. That is, they do not wish to discriminate between individuals that are identical in relevant characteristics. However, also principles of horizontal equity are not neutral as these unavoidably require a judgment regarding the characteristics that can and cannot be used in public policy. For example, race, religion, age and gender are not generally accepted as characteristics by which government policy can discriminate. Others, such as family composition, having children, and illness are accepted as criteria for discrimination in policy. A welfare-based approach is blind towards these characteristics. According to the 'tagging principle' (Akerlof, 1978) all characteristics that correlate with utility should be included in the design of public policy.

In this paper, we abstract from the question whether and how differences in household composition should affect tax policy. Individuals have different preferences to cohabit, to work, and to have children. A strict adherence to principles of horizontal equity implies

that the government does not wish to discriminate between singles or couples, households with two income earners or a single income earner, or households with or without children as long as these households are identical in relevant characteristics such as earnings or wealth (per person). However, in actual policy practice we see that all states base their tax-benefit system on such characteristics. Jacobs (2010b) discusses the welfare-economic implications of dropping the horizontal-equity principle and the optimal design of the tax-benefit system.

In order to avoid inconsistencies or trade-offs between welfare maximization and horizontal equity, we assume that individuals have identical preferences and are identical in all other characteristics than income, consumption or wealth. We do not claim any realism in making this assumption. However, this assumption ensures that the government does not base its policy on differences in preferences, but on objective characteristics of households. In addition, the assumption ensures that optimal policy is not dependent either on other characteristics than income, consumption or wealth. Hence, this assumption rules out government policy that redistributes resources from individuals that do like to work to individuals that do not like to work, but have identical earning abilities. Similarly, the policy does discriminate between individuals that have a stronger preference to save than other individuals, even if they have the same life-time earnings. Nevertheless, we do in some important cases discuss the implications of heterogeneous preferences or other sources of heterogeneity than in earnings ability.

Asymmetric information between the government and the private sector is the most important economic distortion in this analysis. Earnings ability of individuals is private information and cannot be verified by the government (Mirrlees, 1971). Earnings ability can vary stochastically over time or can be influenced by investments in human capital (education, training). Therefore, the government has no access to *individualized* lump-sum taxes. Indeed, the government can base its tax instruments only on verifiable behaviors of individuals, such as their labor earnings, capital incomes or consumption expenditures. As a result, individuals with a higher earnings ability have incentives to mimic individuals with a lower earnings ability so as to benefit from redistribution geared towards the lower-ability individuals. High-ability individuals get weaker incentives for working, saving, entrepreneurship and education. Therefore, redistribution of welfare results in the well-known trade-off between equity and efficiency as taxation drives a wedge between the social rewards of an economic activity and the private rewards of that activity.

If the government would not be interested in redistribution of welfare, then it would only levy a non-individualized lump-sum tax so as to finance all its public expenditures. This is a tax independent from labor or capital income earned, independent from consumption choices and independent from individual characteristics. Since such a 'Thatcherian' poll tax is independent from economic activity, it does not drive a wedge between social and private rewards to economically relevant activities and would therefore be non-distortionary. Hence, in the absence of any desire to redistribute welfare, the government would refrain from taxing labor and capital income, consumption, inheritances and corporate profits. Of

course, in this case, Pigouvian taxes would still be necessary to internalize externalities or to correct market failure.

Generally, we will start from the assumption that – in the absence of government intervention – markets are efficient. However, labor, capital and goods markets can all fail and be subject to various kinds of frictions. For example, labor markets fail to achieve full employment due to search-frictions, insider-outsider problems, unions or efficiency-wage considerations. Capital markets can fail as individuals can generally not borrow against future labor income or pension wealth (which is a form of deferred labor income). Earnings are not accepted as collateral. Moreover, information asymmetries between borrowers and lenders result in frictions. Moreover, not all risk labor and capital markets can be insured due to adverse selection issues and contract incompleteness. For example, unemployment, health or disability risks cannot be insured privately (or only at very high costs), but the government can to a substantial extent (at lower costs) (Sinn, 1995). The analysis below will take into account market failures insofar relevant.

An objective welfare criterion is necessary to quantify the welfare effects of policies. Indeed, utility comparisons are necessary to compute the welfare effects of tax policy. Whenever appropriate we will discuss which welfare criterion is applied, e.g., utilitarian, Rawlsian, etc. However, when one views utility as entirely subjective, no welfare calculation or estimate of efficiency costs is feasible. In that case, one can only hope to draw qualitative conclusions, but even that may not be feasible. The 'orthodox' point of view that welfare is subjective and interpersonal utility comparisons are not possible is entirely destructive for optimal tax theory, and will therefore not be pursued in this paper.

In the remainder we will assume that costs of administration and compliance are identical for all tax instruments and are approximately negligible. Therefore, some tax instruments are not more attractive than others from an administrative point of view. Of course, costs of administration and compliance are neither identical nor negligible across instruments. Nevertheless, these costs are only a fraction of the economic costs of taxation. For example, in the Netherlands, *average* costs of administration and compliance are only 6 cents per euro revenue (Allers, 1994). At the margin, these costs are probably lower, since the cost of the tax authorities is largely a fixed cost that has to be incurred irrespective of the level of taxation. These costs are only a fraction of the welfare cost of the marginal euro in tax revenue. For the Netherlands, the dead weight loss is approximately 50 cent per marginal euro raised through the labor income tax (Jacobs, 2008). Similar dead weight losses can be calculated for most other developed countries, see also Jacobs (2008). Higher estimates are often found for capital income taxes. Therefore, this paper focuses on the economic costs of taxation.

This contribution starts from the assumption that the residence principle can be enforced in the taxation of saving. However, this is becoming a problematic assumption in recent years. Tax arbitrage and tax planning become easier in more open and international capital markets. Therefore, one needs to take this international context into account, especially when setting the tax rates on capital incomes. Similarly, the taxation of commodities

is becoming more and more subject to international arbitrage and fraud, which complicate tax compliance. This needs to be taken into account when designing commodity taxes.

3 Taxation of labor income

How should the income tax be optimized? Mirrlees' (1971) Nobel-prize winning analysis has shown that it is always optimal to levy a non-linear income tax on labor earnings, irrespective of social preferences for redistribution. Indeed, the marginal tax rate on earnings is never flat. The critical function of the marginal tax rate at any given point in the income distribution is to redistribute resources from incomes above that point to incomes below that point in the income distribution. Marginal income taxation (including the impact on marginal tax rates due to income-dependent transfers, tax credits and subsidies) also causes efficiency losses on the labor supply of those individuals that are confronted with higher marginal tax rates. At the optimal tax system, marginal taxes are set such that the marginal distributional benefits and the marginal efficiency costs of taxation are equalized.

Social preferences determine the distributional benefits of higher marginal tax rates. Without making explicit statements about the welfare criterion, economists cannot tell how much income should be redistributed, and, thus, how high marginal taxes should be. However, model simulations by, amongst others Tuomala (1984), Saez (2001), Jacquet et al. (2010) and Zoutman et al. (2011a) demonstrate that the qualitative *shape* of optimal tax schedules is generally not affected much as long as social welfare functions are employed that feature social welfare weights that are declining with income. Figures 1 and 2 plot the optimal non-linear tax schedules derived by Zoutman et al. (2011a) for Rawlsian and utilitarian social preferences. Indeed, a stronger preference for redistribution implies higher marginal tax rates over the entire income distribution, and generally more so at the lower end of the income scale.

The most advanced simulations in the literature employ the empirical earnings distribution to distill the non-observed ability distribution in the population, supplemented with estimates of Pareto-tails for the top-income earners (Saez 2001; Jacquet et al. 2010; and Zoutman et al., 2011a). Earlier papers in the literature assumed less realistic synthetic skill distributions (Mirrlees, 1971; Tuomala, 1984). From the recent literature follows that marginal tax rates typically follow a U-shape, irrespective of the social preference for redistribution (Diamond, 1998; Saez 2001). The intuition for this shape is as follows. The distributional benefits of a higher marginal tax rate decline continuously as the income level increases. The reason is that, at higher incomes, there will be fewer and fewer individuals paying the higher tax. As revenues are lower, less income can be redistributed. The costs of a marginal tax rate follow the size of the tax base at each point in the income distribution. The distortions of marginal income taxation increase if the number of individuals and/or their earnings increase. Hence, until the modal income level distortions associated with higher marginal income taxes increase as the income level increases, since the taxed

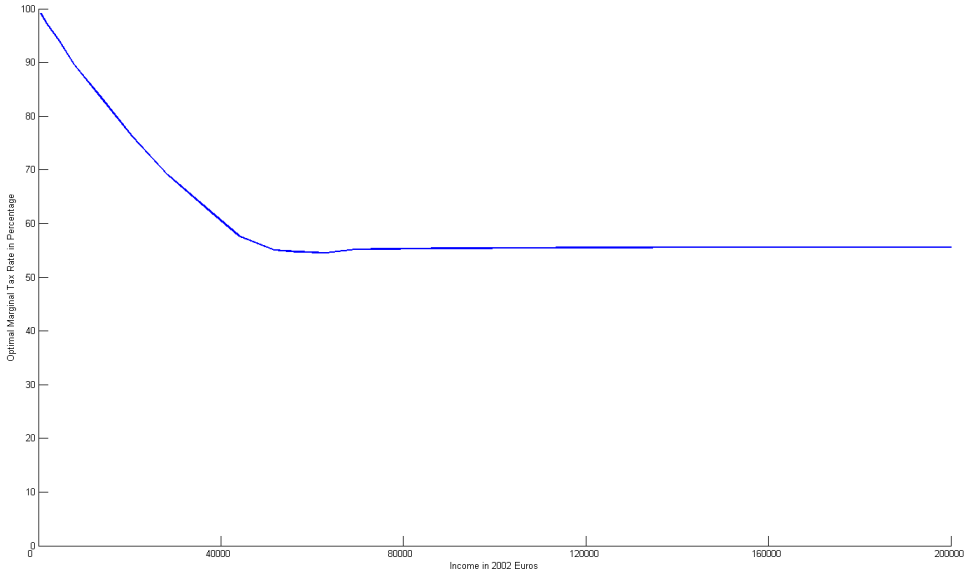

Figure 1: An example of optimal taxes under Rawlsian social preferences

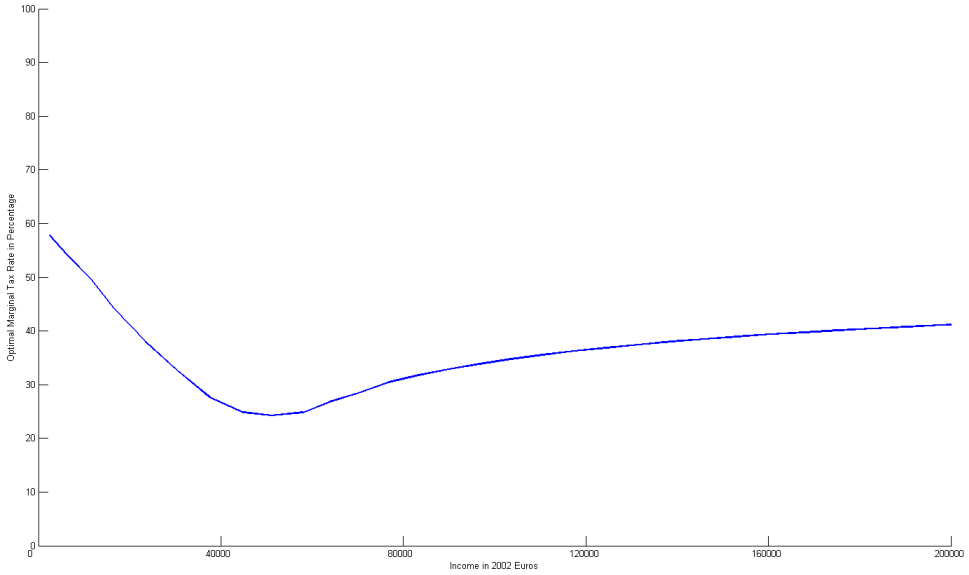

Figure 2: An example of optimal taxes under utilitarian social preferences

bases are increasing as both earnings and densities of individuals with higher earnings are larger. Since distributional benefits decrease and efficiency costs decrease, marginal tax rates should decline until the modal income level.

After the modal income level, marginal tax rates could be increasing again, since tax bases might shrink. Indeed, the density of individuals with a higher income is smaller if the income level is higher. This reduces the tax base. However, their earnings increase, which increases the tax base. The net effect on the tax base is unclear. In addition, the marginal tax rate after modal income is also determined by the social desire to redistribute towards the middle-class incomes. Again, the only function of marginal taxes is to redistribute from incomes above to incomes below the level where the marginal tax is levied. If the government cares about the middle-class income groups marginal tax rates could be increasing after modal incomes. Indeed, Boadway and Jacquet (2008) demonstrate that if the government has Rawlsian maximin preferences, marginal tax rates could be continuously declining with income as long as the skill distribution has a declining hazard rate. Hence, the optimal non-linear structure of income taxes is critically determined by the shape of the skill distribution, but also by the desire to redistribute incomes. For most empirical income distributions, the distributional benefits of higher marginal taxes above modal income appear to be declining at a slower rate than the efficiency costs, hence marginal taxes are increasing (Diamond, 1998; Saez, 2001; Zoutman et. al. 2011a).

The U-shape of optimal marginal tax rates is typically independent from the social preference for redistribution. Stronger redistributive tastes result in higher marginal tax burdens. The increase in marginal taxation is nevertheless typically larger at the lower end of the income distribution. This seemingly paradoxical result often confuses policy makers and politicians, but makes perfect economic sense. In particular, the function of marginal tax rates is to redistribute income from high-income earners to low-income earners. If the social desire for redistribution increases, marginal tax burdens should increase for the low-income groups so as to raise the *average* tax burden on the high-income groups. Confusion arises because average and marginal tax burdens are often interchanged, but these are very different concepts. Similarly, and just as confusingly for policy makers and politicians, when the social desire to redistribute incomes diminishes, the marginal tax rates at the *bottom* end of the income scale should decline. Then, the average tax burden for middle and higher income groups falls.

Rising marginal tax rates after modal incomes make sense only if the middle-income groups have a substantial weight in social welfare. It is again paradoxical that especially the left-wing parties often want to increase the marginal tax burden after modal incomes, whereas the right-wing parties want the opposite. From a social welfare point of view, the left-wing parties thus pursue less 'Rawlsian' type of tax policies than the right-wing parties (Zoutman et al., 2011b).

The optimality of sharply declining marginal tax rates from low to middle-income groups are an important argument against universal welfare programs that are observed in Scandinavian-type welfare states. As universality implies that also middle and high-income

groups benefit from redistribution, the labor market is distorted much more severely, since marginal tax rates are on average much higher so as to finance universal programs.

The optimal marginal top rate in the income tax can be computed analytically. Empirically, the top tail of the earnings distribution is described best by the Pareto distribution (Atkinson et al., 2011). In that case, Saez (2001) demonstrates that the welfare-maximizing top rate in the highest tax bracket equals $\tau = (1-g)\left[1-g+\alpha\varepsilon-\eta\right]^{-1}$ where $g < 1$ is the social marginal welfare weight for top-income earners, ε is the compensated elasticity of taxable income, η is the income elasticity, and α is the Pareto parameter of the earnings distribution. g measures the social value in euro's of transferring a marginal euro to an income earner in the top-tax bracket. Rawlsian social preferences imply that the government wants to 'soak the rich', i.e., $g = 0$. In that case, the tax rate is optimally set at the top of the Laffer curve. More generally, one expects the social valuation of income for the very high income earners to go to zero in the limit if the the marginal social value of income is declining.

The revenue-maximizing top rate in the Netherlands is therefore equal to $\tau = \frac{1}{1+3.35*.35-.1}$ = 48 percent, given that the Pareto parameter is estimated at $\alpha = 3.35$, and if we assume realistic estimates for the earnings supply elasticities: $\varepsilon = 0.35$ and $\eta = 0.1$ (see Zoutman et al., 2011a). These elasticities amount to an uncompensated elasticity of taxable income of 0.25. The current top rate in the Netherlands is 52 percent. The effective marginal top rate, including an effective VAT-rate of 16.1 percent, is therefore given by $\tau_{NL} = 1 - \frac{1-.52}{1+.161} = 59$ percent. The current top rate is therefore quite 'over the top' of the Laffer curve.

Dagsvik and Vatne (1999) present a comparable estimate of the Pareto-parameter for Norway of $\alpha = 3.48$, which is very similar to the estimate obtained by Zoutman et al. (2011a) for the Netherlands. However, they also report much lower estimates using different estimation methods. The current marginal tax rate in Norway equals about 54.3 percent in the highest tax bracket. The VAT-rate varies from 25 percent in the highest bracket to 14 percent for foodstuffs and a low 8 percent rate for some minor items, which will be ignored here. If the expenditure shares on low VAT-rate commodities are comparable in the Netherlands and Norway, the effective marginal VAT-rate is 21.6 percent in Norway. Hence, the effective marginal top rate equals $\tau_{NO} = 1 - \frac{1-0.543}{1+.216} = 62.4$ percent. This is also above the top of the Laffer curve using the same elasticities of taxable income as for the Netherlands. Hence, these simple calculations seem to suggest that the highest tax rate is over the top (of the Laffer curve) in Norway using realistic estimates for the elasticity of taxable income. It is not likely that tax payers respond very differently, given that Norway and the Netherlands are comparable. Hence, the estimation of the Pareto-parameter is crucial. Atkinson et al. (2011) report a much lower (and in my view rather implausible) estimate of the Pareto parameter for Norway equal to $\alpha = 1.48$, which is even lower than in the US. Nevertheless, this number could suggest that Norway has perhaps a fatter tail of the earnings distribution than the Netherlands, which justifies a somewhat higher top rate.

The analysis of Mankiw et al. (2009) suggests that a flat income tax could be rougly

optimal. However, this conclusion is based on the empirically unwarranted assumption that top tail of the income distribution is log-normally distributed. These authors argue that the differences between the log-normal and Pareto distribution are negligible. However, the tails of empirical earnings distributions are too thin when approximated by a log-normal distribution, especially at the very high-income levels. See also Atkinson et al. (2011).

It does not make economic sense to introduce a separate top bracket among very high-income earners as some politicians and economists in the Netherlands have suggested. For example, the Labor Party, the Socialist Party and the Green Left party proposed a top bracket of 55 or 60 percent at incomes above the salary of the prime minister, see also, Bovenberg and Stevens (2010) and De Kam and Caminada (2010). Again, the only function of the marginal tax rate is to redistribute income from very high income earners to not-as-high-income income earners. As the social value of such redistribution should be regarded as negligible, since social valuations of income among very high income earners should be small and very similar, it does not make economic sense to promote an increase in the marginal tax rate at very high income levels. It only distorts behavior and it yields negligible distributional benefits (Mirrlees, 1971; Saez, 2001; Zoutman et al. 2011a). Hence, a separate top bracket for very high income levels cannot be defended on welfarist grounds.

Only non-welfarist motives could justify a separate top bracket or a very high effective marginal tax rate for the top-income earners. The optimal marginal tax rates are derived under the assumption that individual preferences are individualistic. However, behavioral economics has given a number of reasons why optimal marginal taxes could either be lower or higher. If consumption is a status good, causes rivalry or induces keeping up with the Joneses' effects, then individuals tend to supply too much labor – in the absence of taxation – and this causes status or rat races (Akerlof, 1976; Layard, 1980; Kanbur et al. 2006). Marginal taxes then help to internalize these negative externalities, so that the economic cost of taxation is lowered. However, also leisure can be a status good (Alesina et al., 2005) or high leisure consumption could erode work ethic (Lindbeck and Nyberg, 2006). In that case labor taxation is even more distortionary. The net effect of these behavioral economic aspects is unclear and should be weighed by politicians.

Marginal tax rates higher than 100 percent are never optimal (Mirrlees, 1971). In many countries it is still the case that examples can be found where marginal tax burdens are larger than 100 percent due to the accumulation of means-tested income support, income-dependent subsidies, tax credits and marginal tax rates. Marginal taxes larger than 100 percent should be avoided. However, a substantial poverty trap with marginal tax burdens in the order of 60-70 percent is unavoidable, see also Saez (2001), Jacquet et al. (2010), Zoutman et al. (2011a). Indeed, high marginal tax burdens at the lower end of the income scale ensure that income support for the poor is phased out and that the middle and higher income groups start contributing to redistribution. Only by having a high marginal tax burden at the low-income groups, the average tax burden for these groups can be lowered. Or, in other words, it is not possible to reduce the poverty trap without reducing poverty alleviation.

Besides the intensive labor supply response, individuals also respond on the extensive labor supply margin, see Blundell et al. (2011). The average, not the marginal, tax rate determines the participation decision. Indeed, the larger is the average level of taxation, the more participation will be discouraged. Zoutman et al. (2011a) show that including the extensive margin in the optimal non-linear tax framework does not change its qualitative shape. However, marginal tax rates are lower. Figures 3 and depict the optimal tax schedule under both labor supply responses and for comparison also the optimal tax schedule under only intensive labor supply responses for Rawlsian and utilitarian governments. As can be seen, the optimal tax rate generally decreases. The effect at the bottom is quite large and the effect at the top is negligible. Since the participation margin has the strongest impact at the lower end of the income scale, marginal tax rates should be especially lowered at the bottom end of the income distribution.

An important question is whether participation should be taxed or subsidized on a net basis. Diamond (1980), Saez (2002a), and Jacquet et al. (2011) have demonstrated that EITC-type of programs can only be defended if the government has sufficiently 'right-wing' social preferences. In particular, the welfare weight attached to the working poor should be lower than that of the non-employed. A Rawlsian government would never want to use participation subsidies, since these subsidies imply a redistribution from the non-working to the working population. Jacquet et al. (2010) and Zoutman et al. (2011a) demonstrate for the US and Netherlands that participation is subsidized only on a net basis using utilitarian social objectives. Indeed, participation should be taxed on a net basis for Rawlsian social preferences.

Still, it seems feasible to reform the tax system such that it becomes more efficient in redistributing income. De Mooij (2008) using the MIMIC model of CPB Netherlands Bureau for Economic Policy Analysis demonstrates that it is feasible in the Netherlands to introduce EITC's that do not harm employment, but do redistribute more income towards the working poor at the same time. His simulations demonstrate that a non-linear rate structure is superior to redistribute income, compared to a linear one. Also, Zoutman et al. (2011a) demonstrate for the Netherlands that the current tax system probably features too low marginal tax rates for the lowest income groups as the optimal rates are always found to be above the actual rates at the lower end of the income scale. Hence, too little income is redistributed towards the poor. Blundell and Shephard (2011) find exactly the same for the UK. Zoutman et al. (2011b) demonstrate that political parties especially cater to the middle-income groups. Hence, political-economy considerations explain why welfare weights given to the lowest-income groups are lower than that of the middle-income groups.

From a non-welfarist perspective, redistribution towards the working poor rather than the non-employed could also be desirable (Kanbur et al., 2006). If having work per se has social value, a too high tax burden at the lower end of the income distribution may well cause too high levels of non-participation. However, the price of supporting the working poor is less redistribution towards the non-working poor.

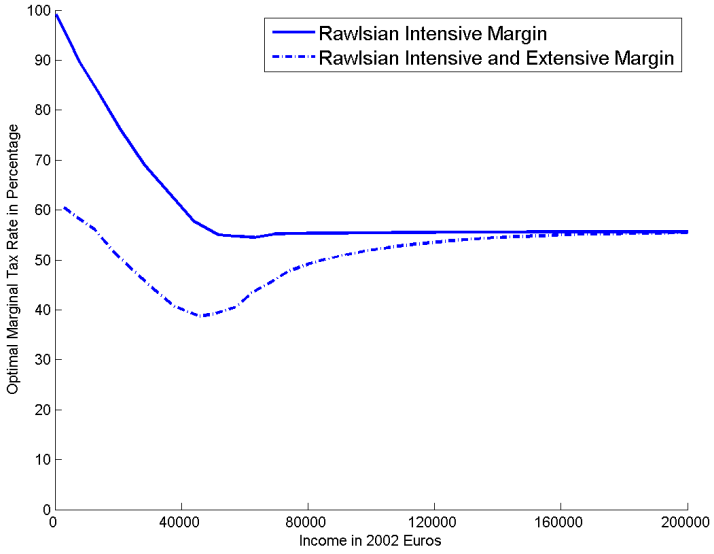

Figure 3: An example of optimal taxes with intensive and extensive labor supply responses under Rawlsian social preferences

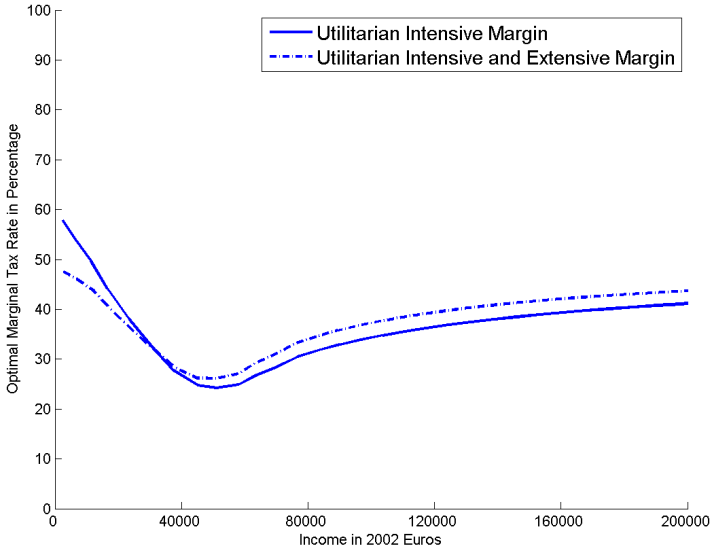

Figure 4: An example of optimal taxes with intensive and extensive labor supply responses under utilitarian social preferences

In the Netherlands and Norway tax authorities do not allow for negative income taxes. This erodes the redistributive powers of the tax system considerably, as general tax deductions and credits cannot be targeted to individuals or households with very low or zero taxable incomes. Consequently, alternative ways to reach low-income individuals are devised. Examples include subsidies (e.g. rent assistance, health care), public provision of private goods, or other transfers in kind. However, such measures typically distort the consumption patterns of households. In addition, many tax payers may need to apply for these additional income-support schemes. As a general principle – exceptions are discussed later – it is better to directly target income support to the poor by making a negative income tax available, rather than transferring resources to the poor indirectly. The latter causes inefficiencies in consumption patters, which can be avoided by direct transfers. Moreover, providing direct income support through the income tax system instead of using indirect schemes can bring substantial cost savings in administration and tax compliance.

In many European countries collective labor agreements negotiated by unions and minimum wage legislation effectively impose a wage floor in labor markets, which results in involuntary unemployment. Minimum wages are generally not a very efficient redistributive device (Gerritsen and Jacobs, 2011). In general it's better to provide 'income support' rather than 'price support'. The low-skilled workers themselves pay for a higher minimum wage with higher unemployment. In addition, high wage floors promote work in the informal economy or black market. Minimum *net* income levels can be sustained using wage subsidies or an EITC, while at the same time reducing the minimum gross wage for employers. Such a reform does not cost much public revenue as the government saves on unemployment and welfare benefits, and discourages black market employment. Indeed, Lee and Saez (2010) demonstrate that a minimum wage is never socially desirable as long as low-skilled labor is taxed at positive rates.

The optimal shape of the tax structure has been derived under the assumption that there was no market failure in labor or capital markets. However, labor markets are distorted by unions, search-frictions, efficiency wages, and insider-outsider considerations. Higher marginal taxes generally increase employment for given average taxes and labor supply. See Bovenberg and van der Ploeg (1994), Sørensen (1999), Pissarides (1998), Bovenberg (2006), and Van der Ploeg (2006). Unions and insiders in labor markets are punished when seeking higher wages in response to higher marginal tax rates as the government taxes away wage increases at higher rates. This force moderates wage demands, labor demand expands and unemployment falls. In labor markets characterized by search frictions, marginal tax rates can boost employment. Since workers and firms Nash-bargain over the surplus of firm-worker matches, workers capture less of the surplus when marginal tax rates increase. Firms need to pay a higher gross wage to provide a given net wage to the worker. And, conversely, workers need to accept a lower net wage to maintain a given level of profits for the firm. Hence, the negotiated wage falls, labor demand expands, labor market tightness increases, and equilibrium unemployment falls. In market environments characterized by efficiency wages, firms find it harder to recruit, retain or motivate work-

ers by increasing wages when governments tax away these wage increases at higher rates. Therefore, firms pay lower wages, labor demand expands and equilibrium unemployment falls.

However, typically higher marginal tax rates are generally associated as well with higher average tax rates. Higher average tax rates exacerbate labor market distortions, depending on the response of the net replacement rate to higher taxes. See Bovenberg and van der Ploeg (1994), Sørensen (1999), Pissarides (1998), Bovenberg (2006) and Van der Ploeg (2006). A higher average income tax increases net replacement rates (net benefit divided by the net wage rate) if benefits are untaxed. Black labor market income is always untaxed. In response to higher average taxes, unions and insiders will demand higher wages as the position of their working members worsens in comparison with the non-working members, so that unemployment rates go up. With search frictions, higher average tax rates on wage income increase wage demands of workers, which pushes up wage costs for firms, labor market tightness falls and unemployment increases. Firms paying efficiency wages see that it becomes more difficult to recruit, retain or motivate workers because net replacement rates increase. As a result, labor costs rise and equilibrium unemployment increases. However, when benefits are indexed to net wages, replacement rates remain fixed and unions, workers or firms do not change wage setting behavior (a lot) and there are much smaller (or even zero) effects of higher average tax rates on unemployment.

Whether labor market distortions should increase or decrease optimal marginal tax rates is a priori unclear. This depends on the particulars of the labor market in question. In the Netherlands, however, empirical estimates suggest that the negative effects of higher marginal taxes outweigh the positive effects (Jacobs, 2008).

Apart from redistribution, progressive income tax systems also help to insure labor market risks (Eaton and Rosen, 1980a). Simulations presented in Eaton and Rosen (1980b) demonstrate that optimal marginal tax rates substantially increase when there is non-insurable income risks, in the order of 10 percent higher marginal taxes. However, in the calculations discussed above, marginal tax rates are based on observed samples of individuals. In the data it is impossible to distinguish individuals that have a low income due to low ability or due to bad luck. Hence, the insurance gains are already captured in the calculations above.

In addition, redistributive tax systems may be helpful to relax credit constraints by redistributing resources from non-constrained to constrained individuals, see also Jacobs and Yang (2010). Hence, the labor income tax helps to correct failures in capital markets. Jacobs (2002) and Hubbard and Judd (1986) demonstrate that optimal marginal tax rates could be substantially higher by correcting capital market failures. However, from a practical point of view it is probably more useful to address these liquidity constraints directly by providing borrowing facilities than making the tax system more progressive.

4 Flat income tax not desirable

Hall and Rabushka (1983) were the first to propose a flat tax. Recently, Mankiw et al. (2009) also argued in favor of a flat tax. Like in many countries, in the Netherlands many politicians and some economists propose to introduce a flat tax rate on labor earnings that replaces the progressive rate structure (in the Netherlands from 38% to 52%), while maintaining a general tax credit. Some wish to introduce a 'super rate' (i.e. for those earning more than the prime minister) on top of an otherwise flat tax system. See for example Bovenberg and Stevens (2010) or De Kam and Caminada (2010). Often, it is argued that the effective marginal tax burden – after taking into account income-dependent tax credits, tax deductions, subsidies, etc. – is virtually flat (see for example Gielen et al. 2009). Hence, introducing a flat tax and removing all the tax deductions, tax credits, tax subsidies, and so on, leaves the effective marginal tax burden (and therefore the amount of income redistribution) unaffected.

Of course, it is a very good idea to clean out the tax system thoroughly by removing all kinds of clutter and rubbish in all kinds of tax arrangements and using the proceeds to lower marginal tax rates. If the income effects are neutralized by appropriate adjustments of the tax rates or general tax credits, such an operation yields a genuine welfare gain – provided of course that many exceptions and tax provisions have no direct economic value. This is where I agree with Hall and Rabushka (1983) and many others. However, a flat tax rate can never be seen as the ultimate goal of a reform to simplify the tax system. Indeed, the structure of tax rates are the ultimate consequence of redistributional objectives, see previous section.

Many flat-tax proposals that we have seen in the Netherlands, such as those presented by the Christian Democratic Party and the Conservative Liberal Party are attempts to make the tax system less progressive, rather than simpler. Indeed, most plans leave the biggest tax deductions (for housing and pensions) in place and/or raise the value added tax to finance lower rates in the income tax.

In addition, there is confusion about what a flat tax really is. Most proposals consider a flat rate income tax, while leaving tax deductions, income-dependent tax credits and subsidies, and so on, in tact. Then, there is no real flat tax, since effective marginal tax rates are still (highly) non-linear and all the supposed advantages of a flat tax emphasized by its proponents will not materialize.

The most important argument put forward in favor of a flat tax is that a non-linear tax system creates opportunities for arbitrage and income shifting between tax payers, over time and across tax bases. This argument is correct in principle. In particular, households would like to shift income towards the person with income in the lowest tax bracket. Hence, increasing marginal tax rates provide incentives to households to smooth labor supply among partners within a household so that a distortion in the allocation of time between partners within the household results (see for example Bovenberg and Teulings, 2006). Given that men earn on average more than women, this argument seems

to be quite strange. The distortion created by a non-linear tax system would imply that men would be doing inefficiently large amounts of household production, whereas women would do inefficiently little household production. I am not aware of any empirical evidence supporting this claim. However, it is conceivable that some correction in the time-allocation between men and women could be socially desirable, since the incidence of household tasks is still typically very skewed towards women. Moreover, even if there are distortions in the time allocation within households, this still could be second-best efficient, since women typically have much higher labor supply elasticities than men (Blundell and MaCurdy, 1999; Meghir and Phillips, 2010; Blundell et al. 2011). The Ramsey principle then insists on taxing women at a lower rate than men. However, as long as gender-dependent taxation is impossible, and men earn more on average than women, it is second-best desirable to have some distortion in the time-allocation of households through increasing marginal tax rates so as to smooth labor-supply distortions over men and women.

A non-linear income tax creates possibilities to shift income over time. Individuals typically have a lower taxable income during retirement than during working age. Hence, a non-linear tax schedule would provide incentives to save for retirement if the government allows individuals to deduct their retirement savings from the income tax, as is the case in the Netherlands and in Norway. The question is, however, how important these distortions are, since the level of tax-favored pension saving is mainly determined by the institutional setting. Similarly, self-employed with risky incomes have incentives to realize profits in bad times when earnings are low, and defer profit realization when earnings are high. In principle, this type of tax shifting provides income insurance, which is valuable to the self-employed (see Eaton and Rosen, 1980a, 1980b). Whether the erosion of the tax base is larger than the insurance gain is not clear. In any case, I am not aware of empirical evidence suggesting that these types of tax arbitrage are very important in practice, but this could be ignorance on my side.

Finally, a non-linear labor income tax gives incentives to transform labor into capital income if the latter is taxed at a lower rate, especially for the self-employed. This mechanism is empirically well-established (see for example De Mooij and Nicodeme, 2008). However, this form of arbitrage is inevitable if one wishes to tax capital incomes at a lower rate than labor incomes. This paper will argue below that this is indeed optimal. Introducing a comprehensive income tax where capital incomes are taxed at the same rate as labor incomes eliminates any arbitrage between tax bases of labor and capital income, but cannot be defended on welfare economic grounds. There will always remain incentives to shift income to tax bases where taxes are lower. One can only try to reduce the possibilities for arbitrage by reducing the number of tax bases, for example, by introducing one, integrated regime for taxing capital income that treats all sources of capital income symmetrically – see below. In addition, tax authorities should try securing the division between labor income and capital income by attributing a fictitious return on capital invested in closely-held companies or small enterprises. This is already common practice in Norway (Cnossen, 1999). Avoiding arbitrage between capital and labor incomes requires

that top labor-tax rates should not deviate too much from effective tax rates on capital incomes of firm owners, not that the rest of the labor tax rates should be flat.

A number of fallacious arguments are often put forward by proponents of a flat income tax rate. Many would pose that a flat tax is more efficient than a non-linear income tax, for example, the Christian Democratic Party and the Conservative Liberal Party in the Netherlands. Even Hall and Rabushka (1983) claim that a flat tax generates more employment. However, the discussion of the optimal non-linear income tax suggested that this is a flatly incorrect argument. In contrast to a non-linear income tax, a (real) flat income tax does not employ information on individual or household income. Hence, the government uses an informationally inferior device to redistribute incomes. In order to achieve the *same* amount of income redistribution the marginal tax rates under a flat tax need to be much higher than the (income-weighted) marginal tax rates under a non-linear tax system. Intuitively, all individuals benefit from redistribution towards the poor via the general tax credit. Hence, by using a flat tax system, the government cannot target income support effectively towards the poor and a lot of the support will leak away to the middle- and higher-income groups. Saez (2001) and Zoutman et al. (2011a) demonstrate that optimal marginal taxes under a flat tax can easily be 10 percentage points higher than the average of optimal marginal tax rates under a non-linear income tax. Hence, the trade-off between equity and efficiency worsens as the government uses less information. This logic is the same as the logic underlying the non-optimality of universal income support systems. With universality, the government does not employ information on individual earnings capacity. Jacobs et al. (2009) demonstrate that introducing a flat tax in the Netherlands always reduces aggregate employment as long as the lower-income groups are compensated for the higher marginal tax rates with larger general tax credits. Hence, irrespective of the redistributional aims of the government, a non-linear tax will cause fewer distortions in the labor market than a linear tax system. Hence, pleas for a flat tax should be discarded on the basis of fundamental economic logic.

Moreover, if the government introduces a flat tax, then it becomes socially desirable to use indirect instruments in order to partially remedy the inefficient redistribution via the labor income tax (Diamond, 1975; Atkinson and Stiglitz, 1976; Mirlees, 1976). For example, the government then wishes to introduce taxes on commodities that are consumed disproportionally by the rich and subsidies on commodities that are disproportionally consumed by the poor. Think of rent assistance and health subsidies. By taxing labor income non-linearly – and provided that separability is a reasonable assumption to make on individual utility functions – it is not necessary to use indirect instruments for redistributional reasons. Indeed, indirect instruments are unable to achieve more redistribution than can be achieved with the non-linear income tax if the non-linear income tax is optimized, but indirect instruments do cause additional distortions in consumption behavior, which are avoided by only taxing earnings. Similarly, a flat income tax severely constrains the possibilities to implement optimal corrective taxes, for example, on goods that cause environmental damage. Again, assuming separability in individual preferences between labor

and other commodities, environmental taxes are only determined by Pigouvian considerations when the government can optimize income redistribution via a non-linear income tax. However, when the government has only access to flat taxes, and environmental taxes fall disproportionally on the poor, the optimal corrective tax is set below the Pigouvian level (Jacobs and De Mooij, 2011).

Many proponents claim that a flat tax makes the tax system simpler as every tax payer would know its marginal tax rate. Again, this is a fallacy. Even under a fully non-linear income tax (with a potentially infinite number of tax brackets) tax payers can use a tabular provided by the tax authorities that gives marginal tax rates, average tax rates and total tax payments at each level of taxable income. Once taxable income is known, it's a piece of cake to figure out the marginal and average tax rate. The complexity of the tax system is not caused by the rate structure, but by the complications in determining taxable income. This is where I think Hall and Rabuschka (1983) oversell their case. Taxable income is difficult to determine due to deductions, tax credits, income-dependent subsidies or income support, exceptions to tax rules, loopholes in the tax law, and the correct application of tax laws. A flat tax rate does not change anything about the complexity of the tax code if nothing is changed in the determination of taxable income. Simplifying the determination of taxable income is a good idea, but that is a good idea irrespective of the rate structure.

Sometimes it is also suggested that the flat tax can be implemented as a payroll tax at the firm level. Consequently, firms do not need to keep track of individual characteristics on which the current pay-roll tax is based. As a result, the administrative burden on firms can be reduced. In addition, the flat payroll tax may serve as a final withholding income tax for households. Filing a tax return at the household level would then become superfluous. Hence, the government can make substantial savings on administrative and tax collection costs. However, the withholding tax can never function as a final tax if not all income-dependent tax credits, exemptions, deductions, and so on, are abolished. Indeed, no cost savings can be made if all households need to file a tax return after all. Basically, introducing a flat rather than a non-linear pay-roll tax only shifts the administrative burden from firms to households, but does not reduce it. Moreover, Kleven et al. (2010) demonstrate that firms have an important role as third-party reporters to the government so as to reduce tax avoidance and tax evasion. Reducing or eliminating this role of firms will therefore be costly because tax avoidance and evasion will increase.

Finally, some proponents of a flat tax claim that there will be less political fiddling with taxes to serve special interests (Hall and Rabuschka, 1983; Bovenberg and Teulings, 2006). Again, this argument is very weak. Tax rates can not easily be used for political manipulation. Tax rate changes are too costly and too transparent to voters. Moreover, the politicians have the ultimate say over tax rates. In practice, politicians serve special interests with exceptions to tax laws, new tax credits or deductions, tax privileges for certain groups of voters, and so on. Introducing a flat tax rate will not change this practice.

5 Taxation of capital income

Should capital income be taxed, and if so, how? The optimal tax literature provides two anchor points arguing that capital incomes should not be taxed at all. These arguments provide the normative basis for proposals to exempt (the normal return to) savings from taxation, see Mankiw et al. (2009), Bovenberg and Stevens (2010), and the Mirrlees Review (2010).

The first point of reference is Chamley (1986) and Judd (1985). In these analyses households form dynasties of altruistic generations that are perfectly linked with each other through bequests. Labor, capital and insurance markets are perfect and frictionless. A positive tax on capital income can then be seen as an exponentially increasing marginal tax rate on consumption further away in the future. Since distortions increase 'quadratically' in the level of marginal taxation, such a policy clearly violates Ramsey principles. In order to avoid an infinite marginal tax burden on consumption in the far future, capital incomes should therefore be taxed only in the 'beginning of times' and never in the long run.

The second point of reference is the well-known theorem of Atkinson and Stiglitz (1976). If preferences of households are weakly separable between leisure and consumption, then it is not optimal to tax capital income if the government can levy a non-linear income tax. Intuitively, weak separability implies that consumption profiles chosen by households are not dependent on labor supply behavior. Hence, taxing capital income cannot help to reduce the distortions created by labor income tax, but do distort saving behavior. Consequently, it is better not to tax capital incomes. This result is independent from the issue whether households have a finite or infinite horizon.

Nevertheless, both these corner stones in public finance are very stylized and too stylized to permit the conclusion that capital income should not be taxed at all. Households do not have an infinite time horizon as in Chamley (1986) and Judd (1985). In addition, one can question the separability of preferences needed to apply the Atkinson-Stiglitz theorem. Further, individuals do not only save in the form of financial capital, but also in the form of housing, human capital and firm ownership. Finally, financial markets may not work perfectly, since individuals might be liquidity constrained or find it impossible to insure risks in their labor income. The rest of this section argues that capital incomes should be taxed for both efficiency and equity reasons. Although capital income taxes imply intertemporal distortions in saving decisions, they can help to reduce the distortions created by the labor income tax. In particular, capital income taxes boost labor supply, increase the retirement age, help to contain tax-arbitrage, promote investments in human capital, and tax away rents. In addition, capital income taxes can be helpful in complementing the labor income tax to redistribute resources and insure labor income risk. Finally, capital income taxes are generally desirable when capital and insurance markets fail.

Generally, consumption rises and labor supply falls with age. Labor supply falls if individuals work fewer hours or stop participating, for example, due to (early) retirement. This pattern suggests that consumption at higher ages becomes relatively more comple-

mentary to leisure than consumption at young ages. One should be careful to conclude that the observed pattern of consumption and leisure is a necessary condition for complementarity between consumption and leisure in the utility function. This is only the case if the marginal willingness to save increases with leisure time demanded. In that case, the Atkinson and Stiglitz (1976) results imply that savings should optimally be taxed. A positive capital tax reduces labor supply of the younger and boosts labor supply of the older workers through intertemporal substitution in leisure. If the increase in labor supply of the 'old' more than compensates the reduction in labor supply of the 'young', total labor supply over the life cycle increases, and a positive capital tax is optimal. By taxing capital income, the government implicitly taxes leisure, which helps to offset the distortion of labor income taxation on labor supply. Hence, capital taxes can be useful for efficiency reasons. In common macro-economic models this is the case as Erosa and Gervais (2002) and Conesa et al. (2009) have demonstrated. Indeed, these authors find substantial optimal taxes on capital incomes. Pirttilä and Suoniemi (2010) use Finnish consumption data and demonstrate that (average) labor supply significantly falls when individuals have larger capital incomes.

Households do not only save in the form of financial capital. For many households, savings are made in the form of paying down mortgage debt on owner-occupied housing. Pirttilä and Suoniemi (2010) demonstrate also that higher expenditures on housing also reduce labor supply.

No direct estimates of the effects of capital income taxes on retirement are available. However, we do know that retirement decisions respond strongly to financial incentives (Gruber and Wise, 1999, 2002). Since capital income taxes erode accumulated pension wealth, they stimulate later retirement (Jacobs, 2009). As long as retirement choices are distorted due to explicit or implicit taxes on continued work, it is therefore optimal to have positive capital income taxes to counter these distortions in retirement.

By taxing labor income at non-linear rates, the government potentially reduces the return to investments in human capital (education and training). The most important costs of such investments are the forgone labor earnings, which are taxed. Besides forgone earnings individuals have to invest resources for books, tuition, and other materials. The government could make human capital investment decisions efficient by making all costs of the investment effectively deductible against the rate at which future earnings are taxed. Bovenberg and Jacobs (2005, 2011) demonstrate that this is also an optimal policy under some separability conditions in the gross earnings function. However, not all costs of education can be verified by the government. Therefore, not all costs can be made tax deductible or can be subsidized. Think of the costs of effort and working hard as a student, parental investments in children, and training of employees. A large part of human capital investments are informal (Carneiro and Heckman, 2003). The costs of on-the-job training and working careers are for the larger part non-verifiable costs of effort. All these costs cannot be subsidized either. A high skill-premium moreover suggests that returns to human capital may compensate for substantial immaterial costs of effort (Jacobs and Bovenberg,

2010). Judd (1999) demonstrates that when there are non-deductible costs of investment in human capital, a consumption tax (i.e. a zero capital tax) is no longer neutral with respect to investments in human capital as long as these costs cannot be deducted against the rate at which future returns are taxed. Jacobs and Bovenberg (2010) derive that it is then optimal to tax capital income to reduce the distortions of the labor income tax on human capital investment. By taxing capital income the government provides an implicit subsidy on human capital investments as individuals substitute financial for human savings. Jacobs and Bovenberg (2010) make a back-of-the-envelope calculation using a stylized life-cycle model and derive that the optimal tax rate on capital income is close to the optimal tax rate on labor income. This holds true even if a substantial fraction of investments in human capital is verifiable and can be subsidized directly. Hence, capital incomes should be taxed if the tax on labor income distorts investment in human capital.

Capital income should be taxed as well to avoid arbitrage between labor and capital tax bases. The self-employed get stronger incentives to start a closely-held firm and being paid out in the form of capital income if taxing labor income with progressive tax rates reduces the return to being self-employed. Indeed, if capital incomes would not be taxed, there would be very strong incentives to transform labor earnings into capital incomes. Taxing capital incomes is therefore necessary to avoid tax-arbitrage between labor and capital income tax bases and to maintain the integrity of the income-tax system (Christiansen and Tuomala, 2007; Reis, 2009). De Mooij and Nicodème (2008) demonstrate that these arbitrage-effects can be important empirically. This argument does not imply, however, that capital income should be taxed at the same rate as labor income.

From optimal tax theory it is well-known that it is optimal to tax pure rents at the highest possible rates. Pure rents are not the compensation for economic efforts and are therefore an ideal tax base as there are no distortions involved in taxing rents. Hence, the government can lower distortionary taxes elsewhere. Using the Chamley-Judd setting, Correia (1996) demonstrates that optimal capital taxes are positive when a part of capital consists of rent income arising from a fixed factor. Therefore, it is socially desirable to tax immobile capital, such as houses. The value of the house mainly reflects the scarcity of the land on which the house has been built (Van Ewijk et. al., 2007a, 2007b). The same is true for dividend incomes and capital gains on shares from firms that benefit from location-specific advantages, infrastructure, brand name, monopoly power, or increasing returns to scale (De Mooij, 2005). For the same reason it is also optimal to tax non-intentional bequests, see later. Capital incomes consist at least for some part of rent income, for which no economic sacrifice has been made. Hence, it is efficient to tax capital income to capture some of the rent.

Capital income taxes can also be efficient when capital markets fail. Many households face binding liquidity constraints (Attanasio and Weber, 2010). Capital markets may fail to provide loans due to asymmetric information between financiers and borrowers which results in moral hazard and adverse selection. Moreover, labor earnings cannot be used as collateral in financial contracts, since modern states have abolished slavery. Ideally, bor-

rowing constraints should be alleviated by providing borrowing facilities. However, as long as that is not the case, capital income taxes help to correct this market failure (Aiyagari, 1995). Intuitively, borrowing constraints result in inefficiently high levels of saving and, thereby, overaccumulation of capital. Formulated differently, with binding borrowing constrains the relative price of future consumption in terms of current consumption is lower than the marginal rate of transformation between future and current consumption. Taxing capital incomes reduces the incentives to save of those who are not borrowing constrained and avoids overaccumulation of capital. By redistributing the proceeds of the capital income tax the credit constraints for those who cannot borrow are alleviated. Capital income taxes thus help to complete the missing market for borrowing by transferring resources from those who can to those who cannot borrow (see also Jacobs and Yang, 2010). Aiyagari (1994) simulates optimal capital income taxes and finds that the optimal capital income tax is around 45 percent in the simulation using the most realistic wage elasticity of labor supply (with a value of one this is still unrealistically high). Hubbard and Judd (1986) also find that capital income should be taxed in the presence of liquidity constraints using a realistically calibrated model for the US.

Similarly, capital income taxes are also desirable when individuals cannot insure the risks in their labor earnings. This is true even if the government directly insures income risks through the labor income tax and social insurance arrangements (Diamond and Mirrlees, 1978, 1986; Nishiyama and Smetters, 1995; Golosov et al., 2003; Jacobs and Schindler, 201). Due to moral hazard problems in social insurance, it is never optimal to perfectly insure individuals against all labor income risk. The government trades off the gains from social insurance against the disincentives to supply labor. By taxing capital income, however, the government can indirectly boost labor supply by changing the labor supply profile over the life cycle. In particular, by taxing capital income labor supply at later ages increases, whereas labor supply at earlier ages decreases. This works through both intertemporal substitution in leisure (future leisure becomes relatively more expensive) and intertemporal wealth effects (lower saving boosts future labor supply). If labor supply increases on average, capital income taxes are useful to counter the labor-tax distortions. This is very similar to the complementarity argument discussed above. Indeed, empirical evidence suggests that labor supply falls when capital incomes increase (Pirttilä and Suoniemi, 2010). In addition, wealth is a state variable that absorbs the earnings risk during earlier phases of the life cycle. Hence, capital taxes may complement the labor income tax to insure labor income risks. This is relevant when the government can only optimize an age-independent income tax. Under age-dependent labor income taxation, social insurance only takes place via the income tax (Jacobs and Schindler, 2011).

Banks and Diamond (2010) refer to many empirical studies showing that earnings risk over the life cycle is very substantial. Nishiyama and Smetters (1995) simulate a detailed applied stochastic general equilibrium model of the US. They find that introducing earnings risk radically changes optimal tax policy. In particular, in the absence of earnings risk they find that replacing a comprehensive income tax (equal rates on capital and labor incomes)

with a pure expenditure tax delivers a huge life-time welfare gain of $154.000 for each household. However, when labor market risk is not insurable, the same tax reform *lowers* expected life-time welfare with $86.000 per household. Consequently, by ignoring non-insurable labor market risks one can substantially bias policy conclusions.

Capital income might be taxed as well for redistributive reasons. However, the arguments to tax capital incomes for redistributional reasons are much more subtle than popular policy discussions often suggest. Indeed, one needs to ask the question whether the capital income tax could supplement the labor income tax if doing so can redistribute more income than is already possible with the labor income tax alone.

Capital incomes could be labor income in disguise. Some individuals generate substantial higher returns to savings, stock market investments, entrepreneurial efforts, and other investments. Capital incomes earned are then at least to some extent also a return to labor supply, work effort, human capital, or investment ability (Cnossen and Bovenberg, 1999; Banks and Diamond, 2010). Taxing capital income is then desirable to redistribute resources from individuals with a high earning ability to individuals with a low earning ability. Gordon and Kopczuk (2010) demonstrate that both capital incomes and owner-occupied housing are strongly increasing in the wage per hour worked. They conclude that capital incomes and houses should therefore be taxed for redistributive reasons so as to complement the non-linear income tax with redistribution. It is unclear, however, whether high capital incomes are the result of higher earning ability or differences in preferences to save or to own a house. Individuals with higher ability might be more patient or have a stronger preference to own a house. Although taxing capital income would then violate horizontal-equity principles, it does make sense from a welfare-economic point of view to tax capital incomes (see below when heterogeneous preferences are discussed).

Empirical research demonstrates that inequality increases rapidly over the life cycle (Attanasio and Weber, 2010), especially because wealth becomes more unequally distributed as individuals age. Taxing capital incomes may then be desirable to reduce inequality and to improve the redistributive powers of the tax system. However, this argument is valid only if the government is constrained in employing a fully non-linear labor income tax, such as a flat tax, and if the government does not directly tax (non-intended) bequests. In that case, capital income taxes reduce inequality over the life-cycle and reduce differences in initial wealth holdings. With a non-linear labor income tax, the government cannot redistribute more income by also levying a capital income tax, but it does distort saving behavior. Hence, a tax on savings is not beneficial to reduce inequality. Still required is a tax on bequests so as to reduce initial wealth differences, see below.

If individuals with a higher earning ability also have a stronger preference to save, then it is optimal to tax savings for redistributive reasons (see also Mirrlees, 1976; Saez, 2002b). Intuitively, saving patterns then provide information on who has a higher earnings ability. Consequently, taxing savings helps to redistribute income at the lowest efficiency costs. Note that rising inequality over the life-cycle, as discussed in the previous point, might be explained by differences in preferences to allocate consumption over the life-

cycle. Banks and Diamond (2010) discuss many studies presenting evidence that earnings ability and the willingness to save are strongly correlated. Hence, taxing savings is welfare optimal. Note, however, that this argument violates horizontal-equity principles, since the government bases its tax policy not only on objective measures such as earnings differences, but implicitly also on preference heterogeneity. Whether this is socially desirable or not is something that politicians need to decide.

In contrast to the Mirrlees Review (2010), I come to the conclusion that some taxation of the normal return to capital is clearly desirable, in accordance with Banks and Diamond's (2010) contribution to the Mirrlees Review (2010). A dual income tax, as is present in Norway, appears to be most desirable from a welfare-economic point of view, see also Cnossen and Bovenberg (1999) and Cnossen (1999, 2010). From a welfare-economic point of view, one should not expect that two tax bases should be taxed at the same rate except in knife-edge cases. One such knife-edge case is relevant for the taxation of capital incomes. When assets can be perfectly substituted in household portfolios, it is impossible to levy different rates on different types of capital income. Clearly, there are also practical limits to differentiate tax rates on different tax bases depending on how easily taxes can be avoided via tax planning. Therefore, most forms of capital income, such as interest income, dividends, capital gains, imputed returns on housing, and accrual of pension wealth, should be taxed symmetrically under one uniform tax regime for capital incomes. However, additional measures could be taken for housing wealth and bequests to tax rents and initial wealth, see below. If capital incomes are taxed, then the costs of generating these capital incomes should be deductible. This should, for example, imply that costs of mortgages are deductible, but also the interest payments on consumption or study loans.

How high should the optimal tax rate on capital income be? This question is easily posed, but a definitive answer cannot be given. Like in the labor income tax, this also depends on political preference for redistribution. In any case, the optimal tax rates on capital and labor income should move up and down together. A major role played by the capital income is to reduce the distortions associated with the labor income tax. Based on the studies in the optimal tax literature, the optimal capital tax should in my view be somewhere in between 20-50 percent. However, this is an estimate surrounded with large uncertainty. Only more research can provide more definitive answers. Moreover, most studies assumed that the residence principle can be perfectly enforced in taxing capital incomes. This is clearly unrealistic. Nowadays, households can more easily move their assets across borders than ever using foreign investment funds and saving accounts, but also by using various kinds of tax planning facilitated by the internet. Hence, tax rates on capital income can presumably not be set higher than 35 percent.

If the government taxes all sources of wealth, then levying a wealth tax is redundant. Sometimes it is argued that wealth should be taxed for non-welfarist reasons, because wealth yields power, status and security (see for example Cnossen and Bovenberg, 1999). In my view, these are rather ad hoc motives that cannot be defended easily from a welfare-economics point of view (see also Boadway et al., 2010).

The Netherlands abolished the capital income tax on the personal level in the large tax reform of 2001. By then, interest incomes and dividends were taxed, capital gains remained untaxed. There also was a wealth tax with a low rate above a large exemption, which was also abolished. In the current system, all assets (apart from housing and pension wealth) are subject to a wealth tax of 1.2 percent, above a low threshold of about 20.000 euro per person. This wealth tax is based on the fiction that all assets earn a nominal (risk-free) return of 4 percent, and the tax rate on this nominal return equals 30 percent. Euphemistically, tax authorities call this wealth tax a 'presumptive capital income tax'. The tax reform did nothing to change the taxation of pensions and housing and both remained heavily subsidized. Realized capital income earned by large shareholders in closely-held companies is taxed separately at a rate of 25 percent before and after the reform. This tax reform did not make any economic sense to me.

The wealth tax does not tax anything above the normal risk-free return, such as the risk-premium, compensation for investment ability, returns for entrepreneurship, informational advantages, above-normal returns due to pure profits, and so on. In doing so, the Netherlands has moved in exactly the opposite direction as the recommendations of the Mirrlees Review (2010): tax the normal return on capital, exempt the above-normal return to capital. Clearly, this results in efficiency losses, since taxing above-normal returns is largely non-distortionary. Moreover, it is easily seen that exempting the above normal return is highly inequitable. The average tax for someone making a return of only 2 percent on a savings deposit is 60 percent, whereas for someone investing in the stock market and earning a return of 10 percent, the effective tax rate is only 12 percent. Hence, average tax rates on capital incomes have become steeply regressive. Similarly, the current capital tax system provides less social insurance, since the government does not share in the risk-premium on risky investments.

The introduction of the wealth tax was politically defended by referring to the so-called 'robustness' of its tax revenues. Not only the State Secretary of Finance who introduced it, Willem Vermeend, but also his successor Wouter Bos, who later became the Minister of Finance, used this argument over and over again. However, the argument has no welfare economic foundation. Basically, robust revenue is the mirror image of less social insurance. The government does not share anymore in good and bad luck of asset holders; they have to pay the wealth tax irrespective of whether they make a positive or a negative return on their assets. From a macro-economic point of view, this tax policy is pro-cyclical; in good times the government taxes less, and in bad times it taxes more. Robust tax revenues can be nice for the Minister of Finance, but this comes at a large expense for the tax payers.

The wealth tax in the Netherlands should be replaced by a true capital income tax, which taxes real capital incomes, not wealth holdings (Cnossen and Bovenberg, 1999). Capital losses can be off-set for a number of years against realized capital gains. To avoid lock-in effects, realized capital gains should be taxed at death or migration. Delaying the realization of profits should be avoided by charging interest on delayed capital realizations. Lock-in effects can be overcome completely by taxing accrual of wealth. However, this can

only be done for assets which are traded in markets and have a clear valuation, such as stocks.

The optimal tax literature does not provide any evidence that capital incomes should be taxed in the same way as labor incomes, as many legal scholars appear to favor. Indeed, the Schanz-Haig-Simons ability to pay concept is completely at odds with optimal tax principles. A pure consumption/expenditure tax cannot be defended either from welfare economic principles. Indeed, a pure consumption/expenditure tax is only optimal under the following, very strict conditions:

- Individuals act as if they have an infinite time horizon, or they form a dynasty of perfectly altruistically generations that are linked through an unbroken chain of bequests;
- The marginal willingness to save should be independent on labor supply or earnings ability (weakly separable and identical preferences), and the government should be able to levy a perfectly non-linear income tax on labor earnings;
- All costs of all conceivable investments whose returns are taxed under the labor income tax should be made tax deductible at the rate of the labor income tax. Hence, investments in education, training, entrepreneurship, etc need to be verifiable and deductible;
- All capital incomes can be perfectly separated from labor incomes, especially at the firm level (small enterprises and closely-held firms with a large owner-shareholder);
- Capital markets should work frictionless, hence individuals should be able to borrow against all possible assets (including human capital, housing and pension wealth);
- Insurance markets are perfect and complete. Hence, 100 percent insurance of all possible labor and capital income risks is feasible;
- Capital incomes should not contain any pure rents due to monopoly profits, location rents, fixed factors (land), and so on;
- Returns on all sources of capital incomes should be identical for all individuals and cannot be the reward for earning ability, entrepreneurship, human capital or investment talent;
- There should be no correlation at all between earnings ability and the willingness to save (ordinary saving, housing or pensions).

Clearly, these conditions are not met in reality. It still is a mystery to me why the Mirrlees Review (2010) recommended to exempt the normal return to saving, thereby overriding the recommendation of Diamond and Banks (2010) in the same Mirrlees Review to have some taxation of the normal return on saving.

6 Taxation of pensions

In both the Netherlands and in Norway, premiums for occupational pensions are tax deductible, accrual of pension wealth remains untaxed and pension benefits are taxed. In the Netherlands, participation in occupational pensions are obligatory and enforced through the collective labor agreements. Also in Norway pension savings are mainly institutionally determined. The tax treatment of pension savings implies that a large tax-subsidy on pension saving is provided. This subsidy consists of two parts. First, the tax rates at which pension contributions are deducted is typically larger than the tax rate at which pension benefits are taxed. In addition, in the Netherlands the elderly do not pay contributions for the state pension, hence their tax rate is about 18 percent lower in the first two tax brackets. Hence, actual earnings are taxed at a higher rate compared to deferred earnings. Second, ordinary savings are subject to the capital income tax, whereas accrual of pension wealth remains untaxed. The net budgetary cost for the Dutch government is approximately 2 percent of gdp (Studiecommissie Belastingstelsel, 2010). The distributional impact of these tax subsidies is typically regressive, since high-income earners save more for their pensions (De Kam, 2007). One may expect that also in Norway the budgetary cost is substantial, whereas the incidence is skewed to the high-income earners.

Behavioral economics provides sufficient evidence that individuals are short-sighted and have difficulties with pension planning. In the Netherlands, individuals are therefore obliged to save for their old age. However, from a welfare-economic point of view it is totally unclear why the government should, in addition, subsidize the accrual of pension wealth through extremely generous tax facilities. If it is so desired that individuals accumulate more pension wealth, then the government could easily raise the minimum level of required pension savings, without a huge budgetary cost.

In addition, if capital income should optimally be taxed at a positive rate, see previous section, then it is not clear why capital income generated in pension funds should remain tax exempt. Moreover, to avoid arbitrage, both intertemporally and between different assets, increases in pension wealth should receive the same tax treatment as ordinary savings. Doing so would restore symmetry in the tax treatment of pensions and other types of capital income. While taxing the investment returns in pension funds, one can maintain the exemption for pension savings, but it would then be desirable to levy the same tax rate on pension benefits as the tax rate at which pension contributions have been deducted. Hence, it is generally not desirable to have lower marginal tax rates for the elderly.

In both the Netherlands and Norway the government provides additional tax facilities for saving (NL: life-course saving scheme, employee saving scheme; NO: allowance for individual pension saving). These should preferably abolished to avoid arbitrage with taxation of taxed forms of saving.

Removing the tax favored status of pension savings yields a lot of tax revenue, which can be use to cut tax rates on labor income. Indeed, if the marginal dead weight loss of a euro of tax revenue is 50 cents, a reduction in tax rates on labor income of 2 percent of

gdp yields a welfare gain of about 1 percent of gdp in the labor market. Of course, there can also be increased distortions in saving decisions, but these appear to be relatively limited. The reason is that the bulk of pension savings are determined institutionally. Voluntary pension savings will certainly be affected, but this applies mainly to savings by self-employed individuals and employees with a pension gap, whose accumulated pension entitlements fall below 70 percent of average life-time earnings. Savings for pensions above 70 percent of average life-time earnings do not have a tax-favored status: the tax treatment is identical to that of ordinary savings.

7 Taxation of housing

The Netherlands and Norway have a very similar, and extremely lenient tax treatment of owner-occupied housing. Interest costs of mortgages are deductible from the income tax in both countries. Taxation of imputed rent is abolished in Norway in 2005, whereas is has steadily declined in the Netherlands. Currently, imputed rent amounts to a tiny 0.55% of the property value. Both in the Netherlands and in Norway housing is subject to a property tax (at the local level), although property values on which the tax is based do not reflect true market prices. There is neither a wealth tax nor a capital gains tax on housing in both the Netherlands and in Norway. In the Netherlands, the budgetary cost of this favorable tax treatment is enormous and currently approaches about 3 percent of gdp in 2011. I am not aware of any estimates for Norway.

Why would the government subsidize owner occupied housing to such a large extent? Very often it is claimed that house-ownership generates positive externalities as house owners take more care of their house and their neighborhood. Indeed, a robust correlation between home-ownership and quality of the neighborhood is found in the literature. However, correlation does not imply causation. Most studies do not control for selection biases and endogeneity issues, hence they should be interpreted with caution (Van Ewijk et al, 2007a, 2007b). Indeed, home owners have typically a higher income and are better educated than renters. Arguably, most of these home owners would take better care of their environment and house as well when they still rented a house.

In addition, subsidies on owner-occupied housing are typically very regressive, since home-ownership correlates heavily with income. Expenditures on housing are tightly associated with individual earnings ability (Gordon and Kopczuk, 2010). Static income measures give a very biased view on the real regressive incidence of housing subsidies due to life-cycle effects and general equilibrium effects in housing markets. Life-cycle effects severely distort the static incidence of housing subsidies, since younger households have low earnings and high mortgages. As a result, they typically benefit most from housing subsidies in terms of their income. Older households have generally higher earnings and lower mortgage debt, so they seem to benefit less. Calculating the life-time benefits of housing subsidies in terms of life-time incomes would remove this bias. Moreover, housing

supply is typically not very elastic. In the Netherlands housing supply is almost completely inelastic (Vermeulen and Rouwendaal, 2007). This is confirmed in a recent OECD study by Caldera Sanchez and Johansson (2011). The latter study reports a housing supply elasticity of about 0.5 for Norway. Hence, the main part of the housing subsidies will simply be capitalized in higher housing prices. Indeed, the incidence of a subsidy (or a tax) always falls on the least elastic side of the market. This implies that mainly home sellers benefit from housing subsidies, i.e. the older generations, and not the home buyers, i.e. the younger generations. This also biases the static incidence measures.

Whatever the reason is that the government would like to promote home-ownership through tax-subsidies on housing, this policy will hardly be effective when the elasticity of housing supply is very low. Indeed, such a policy promotes mainly high housing prices, not more widespread home-ownership.

Given that interest costs are deductible, and imputed rent is very low (or zero), households receive strong tax incentives to finance their houses as much as possible with debt so as to benefit from this tax shield. The global financial crisis has demonstrated that tax incentives to increase leverage can be extremely risky. By raising leverage of households, tax incentives to promote debt financing strengthen 'boom-and-bust' cycles in the economy. In particular, when the economy performs well, a higher leverage allows households to buy more expensive houses, which raises both housing prices and strengthens the economic boom. However, during recessions, a high leverage tends to strengthen the economic downturn by depressing housing markets. In addition, tax incentives for debt financing raise the exposure of the banking sector to risks in the housing market, thereby contributing to the 'boom-and-bust' cycle. In the Netherlands, mortgage debt hovers around a scary level of 100 percent of gdp, which is much more than the US and below Iceland. In Norway, mortgage debt as a fraction of gdp is much lower: slightly above 50 percent (IMF, 2008).

Low housing-supply elasticities also imply that the main welfare losses of stimulating home-ownership cannot be found in the housing market (overconsumption of housing), but in the labor market. The tax burden on labor income needs to increase substantially to finance the subsidies on owner-occupied housing. In the Netherlands, this amounts to almost 3 percent of gdp or about 20 cents for every euro spent on real estate (Van Ewijk et al., 2007a, 2007b). Marginal taxes on labor income can decline across the board with more than 5 percentage points if the tax-subsidies on owner-occupied housing would be abolished.

Therefore, from an economic perspective, the tax treatment of owner-occupied housing, both in the Netherlands and Norway, makes absolutely no sense. Housing assets should be treated symmetrically with other assets. Hence, both costs and returns on housing should be taxed under the capital income tax. Mortgage rent can be deducted against the capital income tax rate, whereas imputed rent should be taxed. Imputed rent should be based on a presumptive rate of return on housing investments. This rate of return does not only consist of the risk-free interest rate, but also consists of a risk/liquidity premium, corrections for depreciation, costs of insurance and maintenance and transaction costs (Poterba, 1984).

In the Netherlands the nominal return on housing is about 5.7 percent, see Ewijk et al. (2007b). Hence, a imputed rent on housing of about 4-6 percent of the property value seems reasonable.

Since property is an illiquid asset, the government may introduce a borrowing facility for home owners that have fully paid down their mortgage loan, have no labor earnings, but still do have to pay the tax on imputed rent. If capital markets do not provide consumption loans using the house as collateral, home owners need to sell their property so as to pay the tax on imputed rent. This can be avoided by giving tax payers the possibility to defer these tax payments for a number of years until the house is sold, the tax payer dies or migrates. At that moment, the government can collect the tax claim, including interest.

In addition, capital gains made on selling owner-occupied houses should be taxed as well. Capital gains (G) are equal to the selling price at date t (P_t) minus the acquisition price at date 0 (P_0), corrected for the (compounded) normal annual return of 4-6 percent (r): $G = P_t - (1+r)^t P_0$. Capital losses can be offset against realized capital gains for a number of years. When imputed returns on owner occupied housing are raised to the same rate as the interest rate to mortgage debt, debt and equity invested in owner occupied housing are taxed symmetrically. Hence, the incentives for excessive leverage vanish.

Housing prices reflect scarcity rents of the land on which houses are constructed and the attractiveness of the location of the house. This is especially true when housing supply is not very elastic. According to optimal tax principles, these rents should be taxed, preferably at high rates. It is plainly baffling for an economist to see that both the Netherlands and Norway subsidize home-owners rather tax them. Indeed, it may even be desirable to tax housing wealth at a higher rate than other assets. One could do so by increasing imputed rent. Probably better is to raise local property taxes, since housing prices also reflect the value of public good provision at the local level. Hence, property taxes can serve as an indirect benefit tax for local public goods.

Some may argue that owner-occupied housing should be seen as a consumption good, not as an asset. In that case, home owners cannot deduct mortgage rent from their income tax, and they do not need to pay tax over imputed rent either. This not a desirable policy option, since home ownership is (besides pension wealth) one of the most important parts of wealth holdings of households. By not treating housing as an asset, individuals will get very strong incentives to accumulate wealth through untaxed real-estate investments. Capital gains on houses remain out of reach of the tax authorities. And the government does not tax a tax base consisting mainly of rents, thereby shifting the tax burden to other, much more distortionary tax bases.

In the Netherlands, equalizing tax treatment of owner-occupied housing to that of ordinary savings, would allow the government to reduce labor income tax rates across the board with more than 5 percentage points, almost 3 percent of gdp (Van Ewijk et al., 2007b). In a largely inelastic housing market, there are few welfare losses involved in the housing market. However, the welfare gain in the labor market would approach 1.5 percent of gdp if the marginal dead weight loss is 50 cents per euro (Jacobs, 2008).

Although welfare losses in the housing market are not substantial, income effects are very complex. Indeed, due to the rather inelastic supply of houses, removal of the subsidies on the demand for houses will inevitably result in house-price declines. If housing supply would be completely inelastic, and housing subsidies would be completely capitalized in housing prices, a price decline of 20 percent is possible in the Netherlands. This is roughly the value of the housing subsidy as a fraction of the value of the stock of houses (Van Ewijk et al., 2007a).

These general equilibrium effects are the most important political obstacle towards a more sensible tax treatment of housing. Reforming the tax treatment of owner-occupied housing while compensating home-owners for price declines will erode the potential welfare gains. Indeed, when home owners would all be perfectly compensated for a price decline, then no revenue will be left to reduce income taxes. In that case, the policy reform is completely useless. Hence, if politicians are not willing to take pain, there will be no gain.

A policy change is more likely to be successful when tax rates are lowered for those groups hurt by the removal of the housing subsidy, i.e. the higher income groups. Lowering income taxes also helps to boost demand for housing to that the decline in housing prices is dampened. Given that housing markets are forward looking, a slow phase-in of policy measures need not be useful to avoid immediate housing-price declines. Since buying a house is a long-term investment, future policy changes directly translate in changes in current housing demand. A well-designed transition regime should preferably protect home-owners with low or negative equity invested in their house. Typically, these will be young households that have just bought a house with a large mortgage loan. Focusing compensation on these groups helps to limit resources spent on compensation. Moreover, a reform will then act as an indirect capital levy on those households that have experienced very large capital gains on their house, and that do not run into financing issues because they have down paid their mortgage loans.

Generic transition measures are not suitable when removing housing subsidies. For example, introducing a general exemption of the capital income tax for housing (up to some maximum) is not desirable, since not only the households with low/negative equity will benefit, but every household. Since the welfare gain of the reform is primarily driven by the revenue it generates, transition measures that soak up large parts of the revenue yield much lower welfare gains. Similarly, a gradual increase in imputed rent moves the tax system into the right direction, but is a also generic and therefore unsuited measure to address transition issues.

As a final remark, in the Netherlands, there is a stamp duty of 6 percent on the value of housing transactions. This is a very distortionary tax, since it reduces labor and housing mobility a lot (Van Ewijk et al., 2007a). There is no clear economic rationale for such transaction taxes, hence it would be desirable to abolish it (Van Ewijk et al. 2007a, 2007b).

8 Corporate income tax

The corporate income tax (CIT) is a very distortionary tax, for which the economic foundation is quite problematic. The Netherlands has a classical system, in which the CIT is a tax on the normal and above normal returns to equity invested in firms. Interest income, dividends and capital gains are liable to the presumptive capital income tax (i.e. the wealth tax). Norway, in contrast, exempts the normal return on equity from double taxation at the firm and the household level. However, a double impost is still laid on above-normal returns (Sørensen, 2009).

If capital is perfectly mobile internationally, then the CIT will be completely shifted to workers via lower wages. Intuitively, the Diamond and Mirrlees (1971a) production efficiency theorem insists that capital incomes should not be taxed on a source basis. Under full capital mobility the CIT does not generate any tax revenue; taxes paid for by the corporations are more than compensated by lower tax revenue from taxing labor income. Hence, de iure firms pay the CIT, de facto workers pay the tax. However, capital is not perfectly mobile, even in small open economies (Gordon and Bovenberg, 1996). This implies that not all of the CIT will be shifted towards workers.

The classical CIT distorts financing decisions, investment decisions, location choices and provokes international profit shifting, see De Mooij (2005), Griffith et al. (2010) and Auerbach et al. (2010). All these distortions are important empirically, see the references mentioned in these studies. To avoid these distortions, it would be better not to levy capital taxes at source, but rather tax capital income at a residence basis, that is, tax the shareholder directly.

However, enforcing the residence principle in taxation is becoming more and more problematic. The government faces difficulties in verifying how much dividends are paid out to shareholders and how much wage income they receive if they are working in their own firm. Without a positive CIT too many individuals will start a firm so as to avoid labor income taxes. See De Mooij and Nicodème (2008) who demonstrate the quantitative importance of these effects. In addition, it becomes more and more difficult for governments to trace down in which countries individual tax payers have allocated their assets and how much they earn on these assets. Therefore, the CIT is necessary as a withholding tax so as to tax capital incomes at the personal level. The CIT thus helps to maintain the integrity of the income tax.

Although the classical CIT taxes the normal return to equity, it also taxes above normal returns resulting from market power, location advantages, increasing returns to scale, brand names, and so on. From an economic perspective it is useful to tax these rents at the corporate level if this is difficult at the personal level. Moreover, the CIT could shift part of the tax burden towards foreign shareholders. However, it is not so clear whether this argument has a lot of bite if capital is mobile internationally; foreign investors then simply demand higher gross returns to maintain the same net return on their investment. Moreover, countries may have signed tax treaties exempting the taxation of foreign holders

of debt or equity. This is the case in the Nordic countries (Sørensen, 2009).

The classical CIT can be improved in a number of ways. First, the distortion on the financing decisions of firms needs to be eliminated through an Allowance for Corporate Equity (ACE), a Comprehensive Business Income Tax (CBIT), or a combination of both where costs of equity and debt are both partially deductible for the CIT (De Mooij and Devereux, 2009; De Mooij, 2011). In a pure ACE system, the costs of debt and equity are both deductible, where the costs of equity are based on some imputed risk-free rate of return. Under a CBIT neither debt nor equity are deductible. Both the ACE and CBIT systems eliminate the incentives for excessive leverage. The ACE removes all investment distortions as well. However, introducing an ACE requires a higher CIT-rate, since the allowance reduces the corporate tax base. Hence, the marginal tax rate on the normal return becomes zero at the expense of a higher tax rate on above-normal returns. The latter will strengthen the incentives for profit shifting and moving firms towards countries with lower taxes on above-normal returns. The CBIT, on the contrary, raises the effect tax rate on the normal return on invested assets and thereby discourages investment. However, since the CIT-base is broadened it also allows for a lower tax rate. Hence, the tax rate on above-normal returns is lowered at the expense of a higher tax on the normal return on invested assets. The latter will attract foreign firms and profits.

Both distortions in location and profit allocation, as well as investment distortions are important empirically, see De Mooij (2005), Griffith et al. (2010) and Auerbach et al. (2010). It therefore appears optimal to introduce a combined ACE/CBIT where the costs of equity and debt are both *partially* deductible for the CIT. For example, both costs of debt and equity could be made deductible for 50 percent of the total cost. The optimal fraction of costs of debt/equity that should be made deductible depends on the trade-off between investment distortions on the one hand (CBIT) and the profit-shifting and location distortions (ACE) on the other hand.[1]

The Netherlands should implement a Norwegian-type dual income tax system. Arbitrage possibilities should be avoided as much as possible by introducing one, uniform regime for the taxation of capital incomes (Cnossen, 1999, 2010; Cnossen and Bovenberg, 1999). Like in Norway, double taxation of corporate income should be avoided trough imputation credits at the personal level, see also Sørensen (2009). In that case, the CIT will function as a withholding tax for the personal capital income tax. In Norway, the normal return to equity is taxed at the same rate as the return to debt (at the household level), hence there will be no incentives for excessive leverage for domestic investors. The separation of capital and labor incomes is the Achilles heel of a dual income tax. A pragmatic solution, adopted by the Nordic countries, is to split capital and labor incomes by attributing a presumptive

[1] As a practical matter, one should be careful in implementing such a tax reform. For example, by gradually reducing the deductibility of interest costs and phasing in the deductibility of equity costs. Immediate introduction of an (partial) ACE gives a free lunch to existing shareholders who receive a (partial) exemption of taxes on their invested equity. In addition, additional measures should be taken to avoid that old shares are transformed into new shares so as to benefit from the new CIT-regime.

return on assets invested in small firms or by the large, active shareholder in a closely-held company (see also Sørensen, 2009).

From an international perspective, governments should aim to coordinate both tax rates and tax bases in the CIT. The biggest economic distortions of the CIT are the financing and investment distortions. These distortions can be removed by international coordinating tax rates and tax bases and introduce an ACE-system, for example, in the whole of the EU. Profit shifting has become moot if corporate tax rates are uniform over countries. Location choices are then only determined by the relevant economic trade-offs, not by specifics of tax systems.

Unilateral reductions in CIT-rates have been common practice in the Netherlands during the last decade. Indeed, corporate income taxes dropped from 35 percent in 2011 to 25 percent at present. This a 'beggar thy neighbor' policy, which provokes tax competition, and stimulates the 'race to the bottom'. As a by-product of tax competition, countries make their CIT-systems more and more distortionary. From an European perspective, it is clearly not efficient to tax above-normal returns to equity at lower rates, and tax the normal return to equity at higher rates, which is very distortionary for investment.

9 Taxation of bequests and gifts

In the Netherlands, taxable bequests and gifts are about 1.8 percent of gdp in 2006. Revenue collected from the bequest tax is about 0.35 percent of gdp (CBS, 2008). The average tax rate on bequests is about 20 percent. However, these numbers are biased, since there are large exemptions for the bequest tax (see Van Gilst et al., 2008). According to De Beer (2007) the tax base for the bequest tax could be twice as high without the exemptions, so that the effective average rate reduces to about 10 percent. In Norway, there is also a tax on bequests and gifts, which raises only a slight amount of revenue: about 0.1 percent of gdp (Norwegian Ministry of Finance, 2011).

In the Netherlands bequests consist of property (48 percent), saving deposits (33 percent) and other assets (19 percent) (CBS, 2008). The distribution of bequests is extremely skewed. The 30-percent wealthiest households bequeath 90 percent of all inheritances, see CBS (2008). Recently, the Dutch government changed the laws for taxation of bequests and gifts. Basically the tax rates are lowered and some exemptions are increased. Some of the revenue losses were off-set by closing some loopholes in the tax system used for tax avoidance. One may doubt the usefulness of this reform.

Bequests are just an ordinary form of saving, as long as bequests are completely intentional decisions by those leaving a bequest. Hence, the underlying assets should be treated in the same way as ordinary assets, and all capital earned on the underlying assets from bequest should be taxed under the capital income tax regime: capital gains on houses, interest on saving deposits, dividends and capital gains on shares. Receiving a bequest as such does not need to be subject to taxation. Indeed, a bequest tax is comparable to

a wealth tax, which is unnecessary if all capital incomes are taxed. However, as long as the Netherlands does not tax real capital incomes (including capital gains) and subsidizes housing and pensions, the inheritance and gift tax should correct for this lack of taxation of real capital incomes.

However, not all bequests are intentionally made. Unintentional bequests arise when individuals have accumulated precautionary savings or because they were unable to annuitize their wealth. In that case, an inheritance tax has very attractive properties – even if all underlying assets are correctly taxed. Non-intentional bequests can be taxed away without distortions, hence this is optimal from a revenue-raising perspective. In addition, taxing away initial wealth differences helps to reduce inequality, since wealth typically escapes the progressive labor income tax. In addition, non-welfarist motives could justify an inheritance tax, just as a wealth tax: correction of differences in status, power, security, etc. However, these arguments appear to be rather ad hoc, especially if capital income is also taxed directly (Boadway et al., 2010).

In general, it is desirable to introduce exemptions for the inheritance tax so as to redistribute resources form individuals with a high to individuals with a low inheritance. Intuitively, initial wealth differences are a second source of inequality, besides the differences in earning ability. Typically, both are positively correlated. A positive inheritance tax should therefore be levied, since the progressive income tax cannot tax away initial wealth differences.

Ultimately, the tax rate on bequests is determined by the share of unintentional bequests. This is an empirical question, not an ideological one. How large the non-intentional part of bequests is, cannot be easily established on the basis of objective data. See for example Blumkin and Sadka (2003), Kopzcuk (2009), and the many studies to which they refer. In the Netherlands, some studies evaluate the subjective motives of individuals using a panel study conducted by the Dutch Central Bank. Using these data Haffner (2005) finds that a majority of 58 percent of all interviewed individuals in 2003 does not have plans to leave their children a bequest. Only one-fifth of respondents explicitly intends to leave a bequest to their children. Asking the same question Alessie and Kapteyn (2001) using the CentER panel study find that 60 of the interviewed individuals has no intention to leave a bequest, whereas only 16 percent does.

Suppose that we make the very conservative estimate that 20 percent of inheritances is non-intentional. Then, the average tax rate on inheritances should be about 20 percent if all non-intentional inheritances are taxed away at a 100 percent rate. This average tax burden implies a rough doubling of the tax burden on inheritances in the Netherlands. The rate of inheritance taxation depends on the share of non-intended bequests, the size of the exemptions, and the desired redistribution through the inheritance tax. Depending on political preferences, exemptions can be introduced, as well as non-linear tax rates. Revenues from a higher inheritance tax could be recycled in the form of lower distortionary tax rates elsewhere.

Given that Norway collects so little revenue from both the wealth and the inheritance

tax (approximately 0.7 percent of gdp) it seems perfectly possible to raise the level of inheritance taxation.

10 Indirect taxation

If the government can use direct instruments for income distribution, i.e. income taxes, tax credits and transfers, should it use indirect instruments as well? In optimal tax theory, a lot of attention has been paid to the division of direct-indirect taxes. The main insight is that indirect instruments should be used mainly for efficiency reasons. In particular, taxing or subsidizing commodities is useful it doing so raises labor supply. Intuitively, the government then alleviates the distortions of the income tax on labor supply. Hence, goods that are complementary to leisure should be taxed, for example, alcohol, travel, and tourism. Goods complementary to work should be subsidized (or taxed less), such as work-related cost of travel, child care facilities, or education. However, this comes at the cost of distorting commodity demands, since households demand relative more goods on which lower taxes are levied (Atkinson and Stiglitz, 1976; Mirrlees, 1976). These welfare losses in goods markets need to be traded off against the welfare gains in labor markets.

Indirect taxes and subsidies are useful only if the marginal willingness to pay for certain commodities varies with labor effort when the government can levy a flexible non-linear income tax. Indeed, when the willingness to pay for commodities does not vary with labor effort, preferences of households are weakly separable between consumption and leisure, and the famous Atkinson-Stiglitz (1976) theorem applies. In that case, indirect instruments are redundant.

Empirical research does not provide particularly strong evidence in favor of weakly separable preferences, see also Crawford et. al (2010) and Pirttilä and Suoniemi (2010). Crawford et al. (2010) find that for the UK food, energy, tobacco and public transport are complementary to leisure, whereas restaurant dinners, alcohol (!), and fuels are complementary to work. Pirttilä and Suoniemi (2010) show that in Finland capital income and expenditures on housing are complementary to leisure, whereas child care facilities are complementary to labor. Most expenditure categories in both studies, however, show no significant association with labor supply. Given the tremendous importance of the Atkinson-Stiglitz theorem in the optimal tax literature it is rather surprising and disappointing that not more direct evidence is available on its empirical validity.

Indirect instruments are not often justified by efficiency reasons, as in the previous point. Mostly, politicians argue in favor of indirect instruments for equity reasons. For example, in the Netherlands, large amounts of resources are redistributed through income-dependent tax credits for rent and health care. Also in Norway there is a large income-dependent program of subsidies for housing costs. The question is whether indirect instruments are useful as a distributional device if the government can also redistribute income through the income tax. The equity argument in favor of indirect taxation only appears

to be valid if i) the government uses an informationally inefficient income tax (such as the flat tax) for income redistribution or if ii) individuals differ not only in their income but also in their preferences for certain goods.

Under a fully non-linear income tax, using indirect instruments for redistribution does not generate distributional gains – over and above the gains that can be achieved with the income tax – but do distort commodity demand. Intuitively, an optimal non-linear income tax extracts all hidden information on earning ability. Since, all heterogeneity is in earnings ability, it is not useful to levy taxes on other tax bases if these tax bases provide no direct signal as to who has a low or a high ability. Hence, the trade-off between equity and efficiency cannot be improved and indirect taxes should not be used for redistribution.

Nevertheless, strict conditions are needed to find no role for indirect instruments under optimal *linear* income taxation (Sandmo, 1974; Atkinson and Stiglitz, 1976; Deaton, 1979). In particular, the marginal willingness to pay for commodities should not vary with labor effort, just as with non-linear instruments. Indeed, if this is the case then all commodities are equally complementary to leisure and uniform commodity taxes are optimal. Moreover, preferences of households need to be such that commodity demands feature linear Engel curves (in jargon: the utility function should be weakly separable between labor and commodities *and* it should be homothetic in all commodities). In that case, expenditures on all commodities are linear in labor earnings. Hence, taxes on commodities have the same distributional impact as taxes on earnings. Consequently, indirect taxes and income taxes can achieve the same redistribution, but indirect taxes, in addition, distort commodity demands. These can be avoided by not using indirect instruments for redistribution. Empirically, there seems to be no evidence supporting linear Engel curves, see Crawford et al. (2010) and Pirttilä and Suoniemi (2010). Hence, an important disadvantage of a flat tax is that it becomes optimal to employ all kinds of indirect instruments for redistribution. This can be avoided by using non-linear income taxes, see also the discussion on the flat tax.

However, if individuals do not only differ in their earning ability, but also in terms of their willingness to pay for certain commodities, then taxing these commodities helps to redistribute resources. Intuitively, when the preference to consume certain commodities correlates with earnings ability, commodity demands provide useful information on who has a high or a low ability and, therefore, should be used for redistribution (Mirrlees, 1976; Saez, 2002b). For example, Gordon and Kopczuk (2010) present empirical evidence that home-ownership strongly correlates with earnings ability. Note again that redistribution based on varying preferences for certain commodities generally violates principles of horizontal equity.

Empirical research does not point to strong complementarities of commodity demands with labor for many goods. Some obvious exceptions are discussed above. As a general rule, I think it would be best to have no commodity tax differentiation and that in particular, well-reasoned cases, one can deviate from this rule. From a practical point of view, implementation of differentiation in indirect instruments, notably the value added

tax (VAT), is a complex task, especially when goods cross nation borders (Cnossen, 2009). Crawford et al. (2010) argue that the potential welfare gains of VAT-rate differentiation are limited in scope and that these need to be traded off against the administrative and compliance costs. They suggest that VAT-rate differentiation yields too little welfare gains to compensate these costs and is therefore not desirable.

There is no clear evidence supporting low VAT-rates on necessities and high VAT-rates on luxuries. In the Netherlands there is a high VAT-rate of 19 percent and a low VAT-rate of 6 percent for necessities, mainly food stuffs. In Norway, there is a general VAT-rate of 25 percent and a lower VAT rate of 14 percent for foodstuffs. These categories of goods are generally too 'broad' to have substantial distributional benefits. In the Netherlands, for example, expenditure share on food – the main expenditure item subject to the low VAT-rate – is virtually flat over the income distribution (linear Engel-curve!). This implies that the distributional objectives can be perfectly achieved with the income tax, and no distinction between luxuries and necessities need to be made. Crawford et al. (2010) also show for the UK that a flattening of VAT-rates with the appropriate adjustments in the non-linear income tax hardly has distributional consequences. In Norway, there is also a very low VAT-rate of 8 percent for transportation, hotels, cinema's and television licenses.

In the Netherlands, and other countries, many goods are exempted from value added taxes or are taxed at a zero rate, for example in education, agriculture, real estate, postal services, gambling, child care and the financial sector. In Norway this applies to financial services, health care, social services, education, newspapers, books and periodicals. These exemptions do not have a clear welfare-economic rationale. Exemptions distort production decisions (violation of the Diamond and Mirrlees (1971) production efficiency theorem), create unlevel playing fields, obstruct fair competition and distort the terms of trade. Hence, these exemptions should be abolished, see also Crawford et al. (2008) and Cnossen (2008, 2010).

Value added taxes are not the only indirect instruments. Indeed, most countries also provide indirect subsidies on, for example, housing costs and health care. In the Netherlands, households receive income-dependent tax credits for rent and health care insurance. In Norway, households receive income-dependent subsidies for housing expenditures for both rental housing and owner-occupied housing. In addition, health-care costs are mainly covered by general tax revenues. The public share in total health care costs is 84.1 percent in Norway and 82.1 percent in the Netherlands (OECD, 2010c).

From an economic point of view, these policies only make sense if there is a clear relation of health and housing consumption with labor market behavior. This is not the case. For example, Pirttilä and Suoniemi (2010) show that expenditures on housing are complementary to leisure. If anything, this suggests that housing should be taxed rather than subsidized. One could also make the argument that expenditures on health are some form of human capital investments. Hence, there would be a case to subsidize health expenditures, since healthier individuals work more, retire later and are less dependent on social benefits for illness or disability. On the other hand, one could also suspect that an

ability bias in health is present. High-ability and therefore high-income groups benefit more from the same health expenditure in terms of improved labor market prospects (Jacobs and Bovenberg, 2010). Hence, it is not clear that health should be subsidized or publicly provided.

Highly subsidized housing or health care promotes overconsumption of housing and health care. Therefore, it should come as no surprise that Norway has the highest health expenditures per capita of all OECD-countries, whereas the Netherlands follows closely (OECD, 2010c). Therefore, many income support programs directed towards the poor may be integrated in the income tax system. In principle, the same income redistribution can be organized while avoiding overconsumption of particular commodities.

Although there are no clear welfare-economic motives why goods such as health care and housing are subsidized, there might well be non-welfarist reasons for doing so. For example, in Sens' (1985) capability approach, the social welfare function is not seen as the proper objective for the government. Indeed, the government should be concerned with the distribution of capabilities. Subsidizing health care and housing can be seen as capability enriching, hence can be defended on that ground. Similarly, from behavioral economics we know that individuals may be subject to all kinds of self-control issues. Hence, it may be desirable to provide subsidies in kind rather than cash transfers (Kanbur et al., 2006; Currie and Gahvari, 2008).

Another issue often discussed in the policy arena is whether there should be a lower tax rate on goods in labor intensive sectors (e.g. a lower VAT-rate or a lower payroll tax rate). Applying the principles of optimal taxation, this is only beneficial if consumption of goods produced in labor intensive sectors is more complementary to work than other goods. Alternatively, such a low rate can discourage black market activities by promoting employment in the formal sectors (Sørensen, 1997). It is a priori unclear whether the broad category of labor intensive sectors produce goods that are indeed complementary to work. This would apply for example to cleaners, restaurants, and child-care services, which are goods that are close substitutes for household production. However, other goods produced in labor intensive sectors may be more complementary to leisure, such as maintenance for gardens and housing, bars and shops. Insofar as one wishes to lower the marginal tax burden at the lower end of the earnings distribution so as to boost low-skilled employment, it is probably better to do this directly through generic reductions in the income tax rate, for example with an EITC. Taxing labor intensive sectors at a lower rate induces production inefficiencies as too much labor will be allocated towards these sectors and consumption patterns will be distorted. In addition, one may wish to directly subsidize substitutes for household production, rather than giving general tax relief for labor intensive services.

In the Netherlands, subsidies for child-care facilities have overshot the optimum. The average subsidy is about 80 percent of the total cost and causes over consumption of these facilities. Moreover, in recent years public expenditures on child-care facilities have exploded: 700 mln euro (0.14% gdp) in 2005 to 3 bln euro (0.5% gdp) in 2010. One of the major drivers for this cost explosion is that informal child care provided by neighbors,

grandparents, and other family members are now subsidized by the government. In the Netherlands, participation rates of women have approached those in Nordic countries, but Dutch women typically work part-time and make much fewer hours. However, the massive increases in public budget for child-care had a negligible effect on the labor force participation of women (Jongen, 2010). Although there is a clear case to be made to subsidize child-care facilities (or publicly provide them), current Dutch practice needs to be reformed. In particular, the government should stop subsidizing informal care. In addition, child-care facilities could be made conditional on labor force participation and preferably also on the number of hours worked. In the current system, this is not the case, hence it is no surprise that labor force participation or hours worked increased; the level of support is independent from labor supply choices. Naturally, it is difficult for governments to condition tax policy on measures of labor supply (if it really could, the trade-off between equity and efficiency would vanish). Nevertheless, it seems efficient to target child-care support much more towards working individuals. Alternatively, the government could phase out child-care support and it can provide tax credits to working families with children. Such a reform boosts labor force participation and hours worked of women (CPB, 2007).

11 Environmental and energy taxes

Apart from income redistribution, the government also needs to correct externalities. Ever since Pigou economists have been forceful advocates to use tax instruments in order to internalize externalities. Naturally, taxes can be a useful device to do this, although also other instruments could be used that achieve the same goals, such as regulation, subsidies, auctions, and so on.

The deterioration of the environment caused by global warming is a treat to the survival of the planet. Stern (2007) therefore speaks of the 'the greatest and widest-ranging market failure ever seen'. Tax instruments can usefully be employed to internalize externalities associated with CO2-emissions, which cause global warming. This implies that the government is right to levy taxes on energy (gas and electricity), fuels (petrol and gasoline), etc.

Environmental taxes should be introduced mainly for environmental reasons. The optimal Pigouvian tax exactly internalizes the external damage of polluting consumption in market prices. The optimal Pigouvian tax is independent from the demand elasticity (as sometimes suggested) and only depends on the size of the marginal external damage (Jacobs and De Mooij, 2011). A lower consumption of a polluting good generally induces substitution towards non-polluting alternatives. Therefore, positive externalities in the development of alternative and sustainable energy sources can also be interpreted as negative externalities in the use of ordinary energy. Calculating the externalities is, however, a daunting task, see also Fullerton et al. (2010).

Many politicians and fellow economists claim that environmental taxes should be employed to raise revenue or to lower taxes on labor so as to shift the tax burden towards polluting consumption goods ('greening of the tax system'). This claim is generally incorrect, since it refers to the most efficient ways to raise tax revenue. From a non-environmental point of view, indirect taxes on particular commodities should not be used to raise revenue as long as the demand for these commodities does not relate to labor market behavior. Indeed, one can immediately invoke the Atkinson-Stiglitz theorem to argue that environmental taxes are not the most efficient way to raise revenue or to redistribute income. Intuitively, environmental taxes distort labor supply just as much as an equal-revenue labor tax would do. In addition, environmental taxes also distort the composition of consumption. These distortions are desirable from an environmental point of view, but not from a non-environmental point of view. Indeed, environmental taxes reduce the real wage more than an equal-revenue income tax would do and thereby exacerbate the tax distortions on labor supply. From a non-environmental point of view it is therefore not optimal to raise revenue through environmental taxes if the government can also levy direct taxes (Sandmo, 1975; Bovenberg and De Mooij, 1994). 'Greening of the tax system' cannot be a correct policy goal.

Similarly, the chief economist of the Dutch Ministry of Infrastructure and Environment proposes to maximize tax revenue from environmental and pollution taxes (Ter Haar, 2010). This cannot be a goal of environmental taxes and is clearly conflicting with optimal tax principles. The level of environmental taxes is primarily determined by the size of the environmental damage, and is only in knife-edge cases equal to the revenue-maximizing tax rate. Indeed, the optimal environmental tax could both be below and above the revenue-maximizing rate.

If for environmental reasons (not revenue reasons) a positive environmental tax is levied, labor market distortions generally increase. Indirect taxes reduce the relative price of leisure in terms of consumption goods. However, this should not lead to the conclusion from Sandmo (1975) and Bovenberg and De Mooij (1994) that optimal environmental taxes are set below the Pigouvian rate. Jacobs and De Mooij (2011) demonstrate that larger distortions in the labor market are compensated by distributional benefits of labor taxes, which are ignored by Sandmo (1975) and Bovenberg and De Mooij (1994). Under suitable separability assumptions, the optimal environmental tax in second-best is still identical to the first-best Pigouvian tax.

When designing environmental taxes, the government needs to take into account the second-best interactions of consumption of polluting goods and environmental quality with labor supply (Jacobs and De Mooij, 2011). If consumption of polluting goods boosts (reduces) labor supply, environmental taxes exacerbate (alleviate) the distortions of the income tax on labor supply and should therefore be set at a lower (higher) rate. Similarly, if a better environmental quality boosts (reduces) labor supply, environmental taxes should be set lower (higher). Not much is known, however, about the complementarity of polluting goods and environmental quality with respect to leisure compared to non-polluting goods.

Fossil fuels appear to be complementary to labor supply in the UK, see Crawford et al. (2010). Hence, excises on fuels could be set below the Pigouvian level. Crawford et al. (2010) also demonstrate that in the UK energy use is more complementary to leisure. Hence, from a revenue-raising perspective, energy needs to be taxed at a higher rate than the Pigouvian level. Nevertheless, it is hard to generalize these findings to other countries. Based on the principle of insufficient reason it therefore seems best to set environmental taxes at the Pigouvian rate.

As long as the government can employ a non-linear income tax, environmental tax policy is exclusively determined by efficiency considerations (externalities and interactions with labor supply). Hence, the design of environmental policy can disregard distributional issues. Distributional consequences of environmental taxes can be addressed by appropriate adjustments in the non-linear income tax. However, if the government is constrained in using a non-linear tax, for example because there is a flat tax, then the distributional effects of environmental determine also environmental policy. In particular, environmental taxes should be set lower when environmental policies have adverse consequences for the income distribution (Jacobs and Van der Ploeg, 2011).

The main determinant of environmental taxes should be the marginal external damage. Tol (2008) presents a meta-analysis of studies estimating the social cost of carbon. On average these studies present an estimate of $24-35 per ton CO2-emissions. Stern estimates that the social cost of carbon can be as high as $85 per ton CO2-emissions. These estimates are on the very high end and belong to the highest in the literature. Nordhaus (2007) criticizes Stern's estimates because the calculations cannot be reproduced, insufficient weight is given to counter arguments, and discount rates are set at too low values.

Whatever the outcome of this scientific debate, the current Dutch excises on households are already way above Stern's high value for the social cost of carbon (gas: 89 euro/ton CO2, electricity: 192 euro/ton CO2, see Ter Haar, 2010). For small enterprises and services the excises are around the Stern's social cost of carbon (gas: 78 euro/ton CO2, electricity: 70 euro/ton CO2, see Ter Haar, 2010). Given the very high value of the social cost of carbon, there appears to be no good reason to raise energy taxes any further at this moment in time.

Similarly, Dutch excises on fuels – except those for kerosine and LPG – are far above $85 per ton of CO2-emissions. Diesel: 130 euro, 'red' diesel (fuel for agriculture and shipping): 80 euro, petrol: 250 euro, LPG: 40 euro, biodiesel: 160 euro, ethanol: 460 euro, and kerosine: 0 euro. It would be good if the government would equalize the excises per ton CO2 over all fuels. Low excises on LPG, 'red' diesel and kerosine can increase to levels comparable to those on petrol and diesel. It appears that the excises on these latter fuels have also overshot their optimum values. Hence, the environmental gain could even be smaller than the loss in non-environmental welfare. As a final remark, it may well be that the use of biofuels generates more rather than less CO2-emissions (see Searchinger et al. 2008) due to large damage done to ecosystems as a result of, for example, deforestation. Biofuels should therefore be subject to high excises. Green house farmers, airline companies and

shipping companies are exempt from energy taxes or receive substantial reductions on their energy tax bills. These exceptions should be abolished. International coordination may be necessary to achieve this, since countries use these tax instruments for tax competition.

In Norway, excises on energy and fuels are much more in line with typical estimates for the social cost of carbon, and generally below the value of the social cost of carbon suggested by Stern (2007). Gas: 28 euro/ton CO2, electricity: 24 euro/ton CO2[2], petrol: 49 euro/ton CO2, diesel: 28 euro/ton CO2, LPG: 28 euro/ton CO2, kerosine: 35 euro/ton CO2 (Norwegian Ministry of Finance, 2011).[3]

The social cost of carbon is not constant, but will rise over time as the rising stock of CO2 in the atmosphere gradually warms up the earth and creates more environmental damage over time. In addition, more energy-saving technologies and alternative energy sources will be developed. Positive externalities of alternatives for fossil energy sources may therefore rise over time as well. Although energy taxes are currently too high, they still need to display a rising pattern over time (see for example Nordhaus, 2007; Sinn, 2008; Van der Ploeg and Withagen, 2011).

Both the Netherlands and Norway are small-open economies. This implies that neither country can do something about global warming on its own. The environment is a global public good, which is not, or only to a limited extent, provided, because also global public goods are non-rival and non-excludable. Consequently, given the absence of a global government, there will be huge coordination failures in securing the efficient level of CO2 emissions. Countries try to free ride on each others efforts to reduce global warming. CO2-emissions will be reduced only if all countries in world commit themselves to binding agreements on carbon taxes or tradable emission permits. As long as the Netherlands, Norway or the West-European countries are unilaterally trying to reduce energy demand, only the world price of energy falls so as to restore equilibrium on world-energy markets (Sinn, 2008). Reducing energy consumption will then not reduce CO2-emissions, but will only move them to other countries. Therefore, international coordination is vital to realize a global system of tradable emission permits or carbon taxes.

If the Netherlands and Norway really would like to contribute to reductions of CO2-emissions, they should not try reducing demand for energy through energy taxes, but rather leave their fossil fuels in situ (NL: gas; Norway: oil). Of course, this will directly diminish public revenue from gas or oil sales, but contributes directly to a lower supply of carbon to world-energy markets.

[2]This is an estimate, since no direct data were available. The Dutch energy excise for households consuming less than 10.000 kWh per year is 0.1114 euro/kWh. In Norway, the standard rate is 0.01437 euro/kWh. If we assume that Norway and the Netherlands produce the same CO2 emmissions per kWh electricity use, then the electricity excise equals 24 euro/ton CO2 in Norway.

[3]The figures for the motor fuels no not include the road-use tax.

12 Corrective taxes

There can be good reasons to levy or increase excises on meat, poultry, fish and other products from factory farming. Massive uses of antibiotics, pesticides, growth hormones, fertilizers, and so on, pollute the environment (air, soil, and drinking water), threaten public health, and harm animal well being. Moreover, factory farms are sources of bacterial and viral diseases among living stock and human beings, as break outs of various diseases in recent years have demonstrated. Excises help to bring social cost of meat, poultry, and fish in line with the private costs, and would level the playing field with organic farms.

In addition, the government can use the tax system to internalize externalities associated with unhealthy life styles. Gruber (2008) sees obesity as the largest threat for public health in the US. Hence, it could be worthwhile to levy excises on fast food, sugar, and saturated fats. Health benefits can be substantial if individuals reduce intake of unhealthy foods. Although such taxes are currently missing in the Netherlands, Norway does have a excises on sugar (0.85 euro per kilo), lemonades (0.35 euro per liter), syrups for lemonades (2.16 euro per liter), and chocolate and confectionery (2.26 euro per kilo) (Norwegian Ministry of Finance, 2011).

Excises on alcohol and tobacco help to discourage their consumption and align the private costs of the consumption with their social costs. In addition, behavioral economic arguments could justify some public paternalism in setting such excises, for example, if individuals have time-inconsistent preferences (Gruber, 2008). However, how big are the externalities of smoking and drinking?

Estimates of the externalities created by smoking are controversial, but only because they suggest that the externalities might actually be positive, rather than negative. For example, Crawford et al. (2010) refer to calculations made by Viscusi (1995) that demonstrate that smoking has a positive welfare effect in the US. Tollison and Wagner (1992) and Sloan et al. (2004) reach the same conclusion, despite the extremely high individual cost of smoking in terms of lower life-expectancy. Also Cnossen (2006) reviews a number of studies and reaches a similar conclusion. The main reason for the positive externality is the premature death caused by smoking. Hence, there are large public savings on public outlays on pensions and health care facilities. These savings outweigh the higher costs of health care, illnesses, fires and forgone tax revenues on labor earnings. As far as I know, such calculations have not been made for the Netherlands or Norway. The valuation of the damage done to individuals (children) in the vicinity of smokers ('passive smoking') is a complicated matter. The Dutch Health Council (2003) refers to accumulating scientific evidence corroborating the damage of passive smoking. Nevertheless, the social cost of smoking – if there is any – appears to be more than sufficiently compensated by high tobacco excises, see also Cnossen (2006a) and Crawford et al. (2010). In addition, governments all around the world not only use excises to steer behavior of smokers, but also use regulation by outlawing smoking in public places, bars, restaurants, and so on. Smoking bans act as implicit taxes on smoking. Hence, smokers do not only pay a cost in

terms of excises, but in terms of implicit taxes. Finally, smokers are overrepresented in the low-income groups, which makes tobacco excises typically regressive. For all these reasons there is not a clear economic rationale to increase excises on tobacco. Current excises on tobacco could therefore very well be far too high from a strictly welfarist perspective, both in the Netherlands and in Norway. Both the Netherlands and Norway have experienced a steady increase in tobacco excises over time, and governments in both countries intend to continue doing so. Hence, welfare losses imposed on smokers outweigh the gains to the non-smokers even more.

The social cost of alcohol is much less controversial. Cnossen (2007) summarizes numerous studies calculating the social cost of alcohol. External costs are caused by a relatively small group of heavy drinkers: traffic accidents, criminal behavior and (home) violence. In principle, the individual damage to personal health cannot be treated as a social cost, unless the government has paternalistic objectives. These costs vary from country to country. The unweighted country average over 7 EU-countries and 4 Anglo-Saxon countries is 20 euro per liter of pure alcohol consumption when only the direct tangible costs are calculated (health care, criminal justice system, traffic accidents). The unweighted country average is 35 euro per liter of pure alcohol consumption when (production) losses on account of absenteeism, unemployment and premature mortality are included as well. Note, however, that not all of these costs can be regarded as pure external costs, since they include a substantial fraction of private costs as well.

The external costs of alcohol use are much larger than the revenue from alcohol excises in the Netherlands. Current alcohol excises are only 1.1 euro per liter of pure alcohol in beer, and around 6 euro per liter of pure alcohol in wine and spirits (Dutch Ministry of Finance, 2011). In other words, Dutch alcohol excises are by far not set at the optimal, Pigouvian level. A higher excise on alcohol in the Netherlands can therefore be defended on efficiency reasons. However, the distributional consequences are skewed, since damage done by a relatively small group of heavy drinkers is paid for by a majority of moderate alcohol consumers. Ideally, the government would like to levy a non-linear tax on alcohol, which is increasing with alcohol consumption. Due to arbitrage problems such a policy is not feasible. In order to shift the costs more to the problem drinkers, specific regulation might also be useful. For example, though large fines and losses of driving licenses when caught drinking and driving, large fines with the ultimate loss of licenses when alcohol is sold to minors and drunks, severe penalties and high fines for alcohol-related violence and disturbing public safety.

However, the alcohol excises in Norway are – also by international standards – extremely high. In particular, excises for high-percentage alcohol are 79 euro per liter of pure alcohol, and for low-percentage alcohol 52 euro per liter of pure alcohol (Norwegian Ministry of Finance, 2011). These values are the highest in the EU and are generally way above the estimates for the social cost of drinking presented in Cnossen (2007). Norway might therefore consider to lower the duty excises on alcohol. This is contrary to the plan to raise the alcohol excise in real terms with 5 percent as announced in the budget for 2011

(Norwegian Ministry of Finance, 2011).

13 Conclusions

Based on my reading and work in the optimal tax literature, I come to a number of policy recommendations. These recommendations follow from an attempt to strictly adhere to a welfare-based optimal tax analysis. Naturally, these recommendations are as good as the analysis that underlies them. Certainly, one can have different views on important assumptions that are used to derive these conclusions, which also implies that one does not need to share the policy recommendations. However, I have tried to be very explicit which assumptions are used and I have not tried to sweep the unrealistic ones under the carpet. Although I tried to be rigorous and consistent, some conclusions also depend on some elements of judgment or 'educated guessing' if either theoretical analysis or empirical evidence is missing. Only more future research can bring us closer to make more informed recommendations.

13.1 Taxation of labor income

- Taxes on labor income should be non-linear. A flat tax is *never* optimal, irrespective of political preferences for redistribution.
- Effective marginal tax rates typically follow a U-shape with income. Optimal marginal tax rates at the bottom end of the earnings distribution are very high, in the order of 60-80 percent. Hence, the 'poverty trap' is part of the optimal tax system.
- Effective marginal tax rates should decline towards the modal-income group, and may increase thereafter to top rates of about 50 percent, which implies that current marginal tax rates in both Norway and the Netherlands are over the top of the Laffer-curve.
- Exact levels of tax rates depend on political preferences for redistribution. However, the more 'left-wing' political preferences are, the *smaller* is the increase of marginal tax rates after modal earnings. The stronger is the political weight given to the middle-income groups, the more tax rates should increase after modal earnings.
- Marginal tax rates larger than 100 percent are never optimal. Hence, simplifying and streamlining income-dependent arrangements should avoid marginal tax burdens larger than 100 percent.
- The Earned Income Tax Credit (EITC) is a useful device to reduce distortions on the extensive margin (i.e. participation), but it increases distortions on the intensive margin (i.e. hours worked/effort). An optimal EITC does not shift the marginal

tax burden too much to the densely populated middle-income groups to avoid large distortions on the intensive labor supply margin.

- Tax credits or subsidies for rent, health care costs and other commodities should preferably be replaced by refundable tax-credits or a negative income tax so as to avoid distortions in consumption demand of these commodities, while not sacrificing on the distributional tasks of the tax system. As long as there are no distributional changes, there are no reductions in labor market distortions either.

- Minimum wages are typically not an optimal redistributional device; it is better to support low-income households using wage subsidies or tax credits like the EITC.

13.2 Taxation of capital income

- The optimal tax system is a dual income tax system where labor and capital incomes are separately taxed. Neither a synthetic income tax, nor a pure consumption/expenditure tax can be defended on welfare-economic grounds.

- Capital income should be taxed for efficiency reasons, as taxing capital income reduces the distortions created by the non-linear labor income tax. In particular, capital income taxes can stimulate labor supply over the life-cycle, boost the retirement age, stimulate investments in human capital, avoid tax shifting between labor and capital income, tax rents, and help to correct failing capital and insurance markets.

- Capital income taxes are also useful as a redistributional device over and above the redistribution that can be organized with labor income taxes. Capital incomes correlate with earning ability. Capital incomes are labor incomes in disguise through tax shifting and entrepreneurial efforts. Capital incomes are the result of initial wealth differences. And, capital incomes contain above normal returns to investments (luck, informational advantages, monopoly profits, etc).

- Realized capital incomes should be taxed, including the possibility to off-set losses against realized capital incomes. All investment costs to realize capital incomes should preferably be made deductible. Examples include mortgage rent, interest on consumption and study loans, etc.

- Capital gains on liquid assets with a market valuation can be taxed on an accrual basis, which avoids lock-in effects. Capital gains on illiquid assets without a clear market valuation should be taxed on a realization basis. Lock-in effects (deferred realization of capital gains) should be avoided by taxing deferred capital gains including interest at realization, death or migration.

- All relevant capital incomes should be included in the capital income tax regime, such as interest on savings, asset returns, returns on pension savings and housing,

and returns on assets held in small firms or closely-held companies. Capital incomes should be taxed at a flat rate to avoid tax arbitrage between different sources of capital incomes.

- Equity holders in small businesses or closely held companies earn a fictitious return on their invested equity that is treated symmetrically as ordinary capital income at the household level. Remaining earnings are considered labor incomes.
- There is no need for a wealth tax as long as realized capital gains are taxed.

13.3 Housing taxation

- Owner-occupied housing should be seen as an asset, subject to the same tax treatment as all other assets. On the one hand, this implies that costs of acquiring the assets, most importantly mortgage rent, are deductible from the capital income tax. On the other hand, this also implies that imputed rent should be taxed. The imputed rent should be equal to the normal return on housing assets.
- The government may want raise the tax on housing through (local) property taxes so as to efficiently tax scarcity rents (location, land).
- Realized capital gains on houses should be taxed as ordinary capital gains. These capital gains equal the selling price minus the acquisition price corrected for the normal return on housing assets (approximately 4-6%).
- There should be no transaction taxes or stamp duties on housing sales. (More generally, transaction taxes should be avoided.)
- Given that debt and equity invested in housing are treated symmetrically, there is no incentive for excessive leverage in financing owner-occupied housing.

13.4 Taxation of pensions

- Pension savings can be made deductible for the labor income tax, as long as pension benefits are taxed under the labor income tax and accrual of pension wealth is taxed under the capital income tax.
- The government should abolish saving incentives through special tax-facilities for various types of (retirement) savings.

13.5 Corporate income taxation

- The tax treatment of debt and equity at the corporate level should be made symmetric, through an ACE, CBIT or a combination of both. A revenue-neutral reform

introduces an allowance for equity financed by reducing the deductibility of debt until both are taxed symmetrically.

- Returns on equity or debt should be taxed only once, preferably at the household level. Corporate taxes paid over debt (and/or equity) should be treated as withholding taxes for the capital income tax at the household level.

- Countries should strive to eliminate tax competition in the corporate income tax and aim to harmonize both tax rates and tax bases. Ultimately, an internationally coordinated ACE-system in the corporate income tax would eliminate financing and investment distortions, avoid location distortions and eliminate profit shifting.

13.6 Inheritance taxation

- Capital gains on the underlying assets in inheritances are taxed at the moment the assets are sold or bequeathed. Real estate is not liquid and capital gains on houses can only be taxed at the moment of realization, including interest. Interest bearing deposits and risky assets traded on the stock market are liquid and can be taxed.

- Assets in inheritances should probably be taxed at a higher rate than other assets so as to efficiently tax unintended bequests. How important these unintended bequests are is empirically controversial. If all bequests would be intentional, then bequests are just like any other type of saving, and the tax treatment with other saving should be symmetrical.

13.7 Indirect taxation and subsidies

- Uniform commodity taxes (VAT) are not desirable, both on theoretical and empirical grounds. Theoretically, goods that are complementary to leisure should be taxed, whereas goods complementary to work should be subsidized (or taxed at a lower rate than other goods). Empirical evidence shows that commodity demand patterns can only be systematically related to labor supply behavior in well-defined cases.

- Arbitrage, administrative and compliance costs associated with differentiated commodity taxes are substantial and it is not clear whether commodity tax differentiation brings substantial welfare gains, if at all. There are no good economic reasons to exempt many goods from value added taxes and they should be abolished as much as possible.

- Differentiated VAT-rates between luxury goods and necessary goods have no clear rationale either as long as the government can levy a non-linear income tax. The distinction in VAT-rates can be abolished while adjusting the income tax at the same time to neutralize the distributional effects.

- Similarly, it is generally more efficient to transfer income to low-income groups directly, rather than in kind, through, for example, subsidized rental housing or health care. The same income redistribution can be achieved using non-linear income taxes, while avoiding over consumption of rental housing or health care.

- A generic low tax rate on labor-intensive services is not desirable. It is generally better to lower taxes on low-income earners to promote employment of low-income earners. Specific instruments targeted at close substitutes for household production (e.g. child-care facilities) are better than generic instruments to discourage informal sector employment.

13.8 Environmental and energy taxes

- Environmental taxes should not be motivated to raise public revenue or to 'green' the tax system. Neither should revenue from environmental taxes be maximized. The primary goal of environmental taxes is to internalize the negative externalities associated with polluting consumption.

- The Dutch energy and fuel excises are already way above Stern's very high estimates for the social cost of carbon. Hence, they should not be increased. Norway's energy and fuel taxes are currently at levels suggested by most estimates for the social cost of carbon, and hence are optimal.

- Over time however, the social cost of carbon will rise, and energy and fuel taxes should increase as the earth warms up and the environment deteriorates further.

- Exemptions for energy and fuel excises in certain sectors should be abolished, in both Netherlands and Norway.

- Small countries like Norway and the Netherlands cannot solve the global climate crisis on their own. Only international agreements to which all countries subject themselves can solve the coordination failure in providing the global public good of avoiding a climate disaster. However, until no global agreements are reached, unilateral efforts by the Netherlands or Norway are useless to combat global warming.

13.9 Corrective taxes

- Excises on factory-farming products are needed to internalize adverse consequences of factory farming for human health, animal well being and the environment.

- It is efficient to increase alcohol excises further in the Netherlands as the social cost of drinking is not compensated by revenue from alcohol excises.

- Regulation is desirable to let the 'polluter' pay for the damage done, since the majority of alcohol consumers are moderate drinkers. Therefore, it is necessary to have large fines and withdrawal of driving licenses when caught drinking and driving. Shops, bars and restaurants should be fined or loose their license to sell alcohol when caught selling alcohol to minors and drunks. Large penalties and high fines should reduce alcohol-related violence and disturbing public safety.
- Alcohol excises in Norway are among to the highest in the world, and are way above estimates for the social cost of alcohol. From a welfare-economic perspective these excises should be lowered.
- Tobacco excises should not be increased as the external damage of smoking – if there is any – is more than compensated by current level of tobacco excises.
- Plans to increase tobacco excises further in both the Netherlands and Norway cannot be supported on welfare-economic grounds.

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