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From Optimal Tax Theory to Applied Tax Policy

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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, in-work tax credits, the design of the capital-income tax, the taxation of housing and pensions, the role of indirect taxes, optimal environmental taxes, and corrective taxes on alcohol and tobacco.

Keywords: labor-income taxation, participation taxation, capital-income taxation, indirect taxation, corrective taxation

JEL classification: H 25, H 32, K 34

1. Introduction

The economic crisis has deteriorated government finances in many countries. Therefore, policymakers seek ways to either cut spending or 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 many policy discussions in the Netherlands, the insights are relevant for other countries as well.

There is an ongoing debate on the desirability of the flat tax, as the discussion between Mankiw et al. (2009) and Diamond and Saez (2011) demonstrates. In many countries, there are public discussions about whether the marginal tax rates for top-income earners should be raised, for example in the Netherlands, the U.S., and France. Virtually everywhere policymakers are concerned about the adverse effects of the poverty trap on labor-supply in-

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centives at the lower end of the income scale. Many countries have therefore adopted in-work tax credits, such as an earned income tax credit (EITC), to promote labor-force participation (OECD, 2011a). Since the publication of the Mirrlees Review (2011), the optimal tax treatment of capital income has received renewed attention; should there be a tax exemption for the normal return on saving? Some economists advocate no taxation of capital income at all (Mankiw et al., 2009), and others argue in favor of some taxation of capital income (Diamond and Saez, 2011), whereas (mainly) law scholars defend a comprehensive income tax where capital and labor incomes are taxed at equal rates. Many governments have generous tax incentives for housing, such as the Netherlands, the U.S., Norway, Sweden, Denmark, and Belgium (OECD, 2011b; Andrews et al., 2011). Mortgage rent is deductible in half of the OECD countries, whereas imputed rent is lightly taxed or not taxed at all (OECD, 2011b). Similarly, in virtually all OECD countries pensioners pay lower or even no social security contributions (OECD, 2011c). Moreover, in almost all Western countries pension contributions and accrual of (private) pension wealth are tax exempt, whereas pension benefits are taxed (Yoo and De Seres, 2005). In recent years, many governments have been *greening* the tax system by shifting the tax burden from labor to consumption of polluting goods. However, is a further greening of the tax system still desirable given the current level of energy taxes and fuel excises?

Most of these policy discussions originate from 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, 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, and the role of indirect and corrective taxes.

This paper attempts both to be broad in range of topics and to go into some depth at the same time. In order to do so, the main focus will be on the efficiency and distributional aspects of taxation. Moreover, for the sake of brevity there will be no discussions on the taxation of bequests and corporations.¹ Furthermore, 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. In order to remain focused it turned out to be

1 Jacobs (2011) contains some short discussion of these issues. The reader is referred to Boadway, Chamberlain, and Emmerson (2010) for an excellent review of the taxation of bequests. Similarly, Auerbach, Devereux, and Simpson (2010) and Griffith, Hines, and Sørensen (2010) provide in-depth reviews of corporate-income taxation.

impossible to do justice to all 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 nonlinear 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 some aspects of the taxation of capital income. It will be argued in Sections 6 and 7 that pensions and housing should receive the same tax treatment as ordinary assets. Section 8 analyzes indirect taxes and argues that many indirect instruments are superfluous. Section 9 investigates environmental and energy taxes. Section 10 analyzes corrective taxes on alcohol and tobacco. Section 11 concludes this paper with a summary of policy recommendations.

2. Assumptions of 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 of crucial parameters.

The objective of the government is assumed to be the maximization of social welfare. Welfare is defined in a broad sense, 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*.²

2 Firms often have only a limited role in the analysis. Diamond and Mirrlees (1971a,b) demonstrated that optimal-tax rules are the same in partial and general equilibrium if there is a 100-percent tax on pure profits and if there is perfect substitution between labor types. Although these assumptions may not seem realistic, there is relatively little empirical or quantitative evidence on their importance for optimal-tax rules.

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. The government has a preference for a more equal income distribution if the social marginal utility of income is declining in income. This can be due to either declining private marginal utility of income or the government attaching a larger welfare weight to individuals with a lower utility. Hence, redistribution of income from rich individuals (with a low social marginal utility of income) to poor individuals (with a high social marginal utility of income) is welfare enhancing.³ Generally, we will start from the assumption that – in the absence of government intervention – markets are efficient. 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 those issues when considered relevant.

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 welfare, i.e., the (concave) sum of utilities. This renders the welfare-economic approach sometimes difficult to understand for noneconomists. 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 or 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 necessarily 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).

- 3 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 it contributes to larger social welfare.

Nevertheless, it is perfectly possible 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 instead. 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 nonindividualistic welfare criterion breaks the link between individual preferences and the objective of the government. Hence, every nonindividualistic welfare criterion contradicts the Pareto criterion (Kaplow and Shavell, 2002). We discuss deviations from the welfarist approach in some specific cases. Nevertheless, it is clear that nonwelfarist social objectives are no longer neutral, in the sense that the government overrules individual preferences. These effects should be weighed by politicians in their decision-making.

Asymmetric information between the government and the private sector is the most important economic distortion in this analysis. Earning ability of individuals is private information and cannot be verified by the government (Mirrlees, 1971). Earning 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 earning ability have incentives to mimic individuals with a lower earning ability so as to benefit from redistribution geared towards the lower-ability individuals. In other words, high-ability individuals face weaker incentives for working, saving, entrepreneurship, and education. Consequently, redistribution 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.

One can safely assume that governments value horizontal equity in the design of tax policy.⁴ That is, governments do not wish to discriminate be-

4 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, between households with two income earners and those with a single income earner, or between

tween individuals that are identical in “relevant” characteristics. However, principles of horizontal equity are not neutral, as these unavoidably require a judgment regarding the characteristics that are “relevant.” 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 disability, 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 ability should be included in the design of public policy. In order to avoid inconsistencies or trade-offs between welfare maximization and horizontal equity, we initially 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 observable, objective characteristics of households. In addition, the assumption ensures that optimal policy is not dependent on other characteristics than income, consumption, or wealth. Nevertheless, we do in important cases discuss the implications of heterogeneous preferences or other sources of heterogeneity than earning ability.

In the remainder, we will generally assume that costs of administration and compliance are identical for all tax instruments and are negligible in approximation. 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. Jacobs (2009a) summarizes a large literature calculating the cost of taxation. Estimates of the excess burden of taxation are generally in the range of 20–70 percent of marginal public revenue, with some upward outliers of more than 100 percent. Estimates for capital-income taxes are typically larger. Therefore, this paper focuses on the excess burden of taxation.

However, when judging the desirability of various instruments, administrative and compliance costs need to be taken into account, especially in capital-income taxation and commodity taxation. This contribution starts

households with and without children, as long as these households are identical in relevant characteristics such as earnings or wealth (per person). However, this is not the case in actual policy practice. How optimal tax systems should differentiate between different household types has not been fully crystallized out and is the subject of ongoing research.

from the assumption that the residence principle can be enforced in the taxation of saving. That assumption has become problematic in recent years. Tax arbitrage and tax planning become easier in more open and international capital markets. Therefore, one needs to take this 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 diminish tax compliance. This needs to be taken into account when designing commodity taxes.

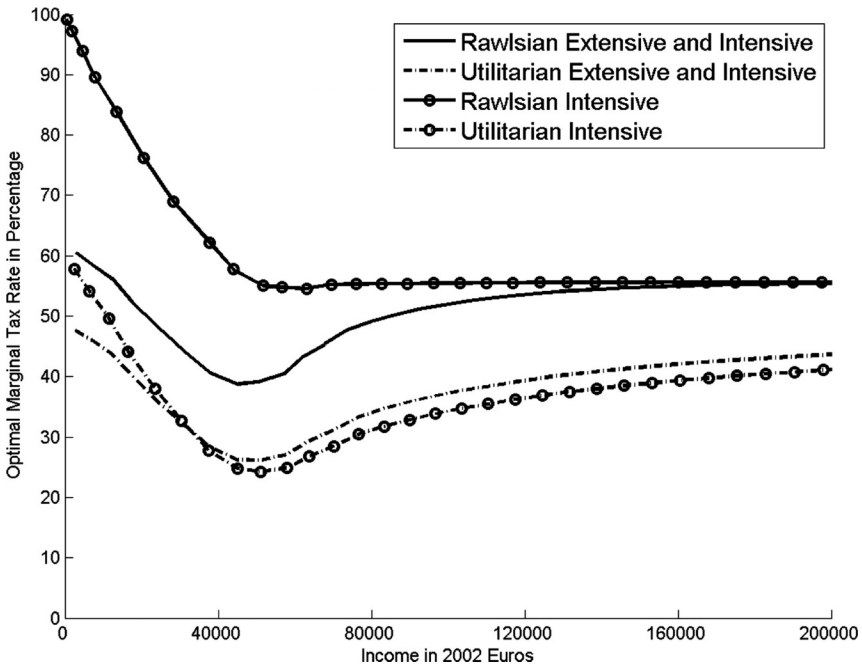
3. Taxation of Labor Income

How should the income tax be optimized? Mirrlees's (1971) Nobel Prize-winning analysis has shown that it is always optimal to levy a nonlinear 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 effect on marginal tax rates of income-dependent transfers, tax credits, and subsidies) causes efficiency losses in the labor supply of those individuals that are confronted with higher marginal tax rates. In 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 how high marginal taxes should be. However, model simulations by, amongst others, Tuomala (1984), Saez (2001), Jacquet et al. (2010), and Zoutman et al. (2011) demonstrate that marginal tax rates typically follow a U-shape, irrespective of the social preference for redistribution (Diamond, 1998; Saez 2001).⁵ Figure 1 plots the optimal nonlinear tax schedules derived by Zoutman et al. (2011) for Rawlsian and utilitarian social preferences and for the cases with an intensive labor-supply margin only and with both an intensive and an extensive labor-supply margin. Indeed, a stronger preference for redistribution implies higher marginal tax rates over the entire income distribution, and generally a bit more so at the lower end of the income scale.

5 The most advanced simulations in the literature employ the empirical earnings distribution to infer the nonobserved ability distribution in the population, supplemented with estimates of Pareto tails for the top-income earners (Saez, 2001; Jacquet et al., 2010; Zoutman et al., 2011). Earlier papers in the literature assumed less realistic synthetic skill distributions (Mirrlees, 1971; Tuomala, 1984).

Figure 1
Examples of Optimal NonLinear Taxes



Notes: Simulations with an intensive margin only employ the Mirrlees (1971) model. The simulations with an extensive and intensive margin are based on Jacquet et al. (2010), which merges Mirrlees (1971) with Diamond (1980). Households maximize a separable utility function, with constant elasticities in consumption and labor, and a separable, discrete participation cost. Nonobserved distributions of earning ability and participation costs are estimated using a structural labor supply model with carefully reconstructed individual budget constraints based on the Dutch tax-benefit system. The skill distribution is supplemented with direct estimates of the Pareto parameter (3.35) for the top tail of the income distribution. The simulations assume an uncompensated wage elasticity of labor supply of 0.25 and an income elasticity of 0.1. The average participation elasticity is 0.57 in simulations with an extensive margin.

Source: Zoutman et al. (2011).

The intuition for the U-shape is as follows. The distributional benefits of a higher marginal tax rate decline continuously as the income level increases. The reason is that, as incomes rise, 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, up to the modal income level, the distortions associated with higher marginal income taxes increase, as both earnings and densities of individuals with higher earnings are larger. Since distributional benefits decrease and efficiency costs increase, marginal tax rates should decline until the modal income level is reached.

Beyond 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. Indeed, Boadway and Jacquet (2008) demonstrate that if the government has Rawlsian, maximin preferences, marginal tax rates could be continuously declining with increasing income as long as the skill distribution has a declining relative hazard rate. Hence, the optimal nonlinear structure of income taxes is critically determined by the shape of the skill distribution. 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., 2011). In addition, the marginal tax rate beyond the modal income is also determined by the social desire to redistribute income. The average distributional benefit of taxing individuals with higher incomes increases, since the utility loss inflicted on the individuals paying higher taxes diminishes as the income level rises (Diamond, 1998). Hence, marginal tax rates rise for incomes above the modal income if the government cares most about the middle-income groups. Only for the Rawlsian social welfare function is this not the case, since the utility loss on all tax-paying individuals is not valued at all.

The U-shape of optimal marginal tax rates often confuses policymakers and politicians, but makes perfect economic sense. Again, it is noted that 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 confused, but these are very different concepts. Similarly, and just as confusingly, when the social desire to redistribute incomes diminishes, the marginal tax rates should decline, and the more so at the *bottom* end of the income scale. Then, the average tax burden for middle and higher income groups falls.

Rising marginal tax rates for higher-than-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 above the modal incomes, whereas the right-wing

parties want to do the opposite. The left-wing parties thus pursue a less “Rawlsian” type of tax policies than the right-wing parties.

The optimality of sharply declining marginal tax rates from low- to middle-income groups is an important argument against universal programs that are observed in Scandinavian welfare states, viz., welfare-state arrangements that are provided to all individuals irrespective of their earned income, such as flat-rate benefits for pensions or other responses to unemployment, or universal (often costless) access to health care, child care, and education. As universality implies that middle and high income groups also 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 public 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). If income effects are absent, the optimal top rate in the highest tax bracket equals $\tau = (1 - g)[1 - g + \alpha\varepsilon]^{-1}$, where $g < 1$ is the social marginal welfare weight for top-income earners, ε is the (un)compensated elasticity of taxable income, and α is the Pareto parameter of the earnings distribution (Saez, 2001). g measures the social value in euros of transferring an additional 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 marginal social value of income is diminishing.

Table 1 provides revenue-maximizing tax rates for top-income earners for a selection of countries. Tax rates for top-income earners are generally set below the revenue-maximizing level for the baseline elasticity of $\varepsilon = 0.3$, except for the Netherlands and France. The revenue-maximizing top rate is generally around 60–65 percent, except in the Netherlands, where it is around 50 percent, due to a very thin tail of the earnings distribution.

It does not make a lot of economic sense to introduce a separate top bracket for the very high-income earners as many politicians suggest. The simulations of optimal schedules demonstrate that tax rates increase much earlier (Saez, 2001; Zoutman et al., 2011). The function of a higher marginal tax rate is to redistribute income from very high-income earners to everyone below the high-income earners, including the not-as-high-income earners. Since social valuations of income among high-income earners should be small and very similar, the social value of such redistribution should be regarded as very small, while it does distort behavior among the top-income earners. Hence, a separate top bracket for very high income levels cannot be defended on welfarist grounds. Effective income redistribution requires that

Table 1
Revenue-Maximizing Top Rates for a Selection of Countries

Country	Pareto parameter ^a	Effective top rate ^b	Revenue-maximizing top rate		
			$\varepsilon = 0.3$	$\varepsilon = 0.15$	$\varepsilon = 0.45$
Australia	1.89	0.45	0.64	0.78	0.54
France	2.54	0.62	0.57	0.72	0.47
Germany	1.61	0.47	0.67	0.81	0.58
Netherlands	3.35	0.54	0.50	0.67	0.40
Spain	2.04	0.40	0.62	0.77	0.52
United Kingdom	1.77	0.52	0.65	0.79	0.56
United States	1.58	0.43	0.68	0.81	0.58

^a Pareto parameters apply to most recent estimates (2007–2010) and were extracted from the World Top Incomes Database: <http://topincomes.g-mond.parisschoolofeconomics.eu/> except for the Netherlands (2006), which comes from Zoutman et al. (2011a).

^b Top rates are the total tax wedges (including employer contributions) in 2011 on the incomes of a single worker earning 167% of the average wage and are taken from the OECD: <http://www.oecd.org/tax/taxpolicyanalysis/Table>. Indirect taxes apply to 2003–2006 and are taken from OECD (2011): <http://dx.doi.org/10.1787/888932482688>. Effective top rates are calculated as $\frac{\text{top rate} + \text{indirect tax}}{1 + \text{indirect tax}}$.

the top rate be increased at a much lower level of income, somewhere above the modal income.

Nonwelfarist 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 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 – in the absence of taxation – tend to supply too much labor, and this causes status races 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 might erode the 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.

A substantial poverty trap with marginal tax burdens on the order of 60–70 percent is unavoidable; see also Saez (2001), Jacquet et al. (2010), and Zoutman et al. (2011). 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 on the low-income groups can the average tax burden for these groups be lowered. In other words, it is not generally possible to reduce the poverty trap without reducing poverty alleviation.

Marginal tax rates higher than 100 percent are generally 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 cumulation of means-tested income support, income-dependent subsidies, tax credits, and marginal tax rates (OECD, 2011a). However, Zoutman and Jacobs (2013) demonstrate that this could be an optimal policy in the presence of costly monitoring of work effort (or ability). Monitoring of work effort provides an implicit subsidy on work, partially offsetting the explicit tax on work. Nevertheless, effective marginal taxes larger than 100 percent should preferably be avoided, especially if the government does not monitor work and job-search efforts of nonparticipants.

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 drives the participation choice. The larger is the average level of taxation, the more participation will be discouraged. Zoutman et al. (2011) show that including the extensive margin in the optimal nonlinear tax framework does not change its qualitative shape. However, marginal tax rates are lower and the U-shape is more pronounced; see also figure 1, where also the optimal tax schedule is depicted with both intensive and extensive labor-supply responses for Rawlsian and utilitarian governments. As can be seen, the optimal tax rate generally decreases in income. The effect at the bottom is quite large, and the effect at the top is negligible. Since the participation margin has the strongest effect at the lower end of the income scale, marginal tax rates should be especially lowered there.

An important question is whether participation should be taxed or subsidized on a net basis. Diamond (1980) and Saez (2002a) have demonstrated that EITC-type programs could be optimal if the welfare weight attached to the working poor is larger than unity. A Rawlsian government would never want to use participation subsidies, since these subsidies imply a redistribution from the nonworking to the working population. Indeed, participation should then be taxed on a net basis. Christiansen (2012) demonstrates that the use of participation subsidies is mainly associated with raising efficiency, as EITC programs imply reverse redistribution from the nonworkers to the working population. By providing a participation subsidy, the adverse consequences of income redistribution on labor-force participation are alleviated.

Jacquet et al. (2010) and Zoutman et al. (2011) demonstrate for the U.S. and the Netherlands, respectively, that participation is subsidized only on a net basis using utilitarian social objectives. Moreover, an EITC is optimal only at the very low skill levels.

It often seems feasible to reform the tax system so that it will become more efficient in redistributing income. de Mooij (2008), using the MIMIC model of the CPB Netherlands Bureau for Economic Policy Analysis, demonstrates that it is feasible in the Netherlands to introduce EITCs that do not harm aggregate employment, but do redistribute more income towards the working poor at the same time. Also, Zoutman et al. (2011) 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 working poor. Blundell and Shephard (2012) find exactly the same for the UK.

From a nonwelfarist perspective, redistribution towards the working poor rather than the unemployed 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 nonparticipation. However, the price of supporting the working poor is less redistribution towards the nonworking poor.

Typically, 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 taxpayers may need to apply for these additional income-support schemes. As a general principle – exceptions are discussed later, in the section on commodity taxation – 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 patterns, 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 probably not a very efficient redistributive device, in comparison with income taxes, to redistribute income in competitive labor markets (Gerrit-

sen and Jacobs, 2011, 2013).⁶ Introducing a minimum wage, while adjusting tax rates to keep net incomes fixed, pushes low-skilled workers out of the labor market, and provides incentives to become high-skilled so as to avoid low-skilled unemployment. Low-skilled workers that become unemployed cease to pay taxes and start collecting benefits. Moreover, they suffer a utility loss if they are involuntarily unemployed. The additional revenue from having more high-skilled workers is typically not sufficient to offset this. In addition, high wage floors promote work in the informal economy or black market, which is generally ignored in the literature. It is often better to provide *income support* rather than *price support*. 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 it discourages black-market employment.⁷

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 could be distorted by unions, search frictions, efficiency wages, and insider–outsider considerations. There is an active area of current research exploring the consequences of labor-market frictions for optimal income taxation; see the excellent overview in Boadway and Tremblay (2013). Whether labor market distortions should increase or decrease optimal marginal tax rates is *a priori* unclear. This depends on the many particulars of the labor market in question.

Apart from redistribution, redistributive income tax systems also help to insure against 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 noninsurable income risk, being on the order of 10 percentage points higher. 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 whose low income is due to low ability from those whose low income is due to bad luck. Hence, the insurance gains are at least partially captured in the calculations of optimal taxes mentioned above.

In addition, redistributive tax systems may be helpful to alleviate capital-market imperfections by relaxing credit constraints. Progressive income taxes redistribute resources from nonconstrained to constrained individuals; see

6 Gerritsen and Jacobs (2013) allow for a completely general rationing scheme, of which Lee and Saez (2012) is a specific, knife-edge case.

7 In noncompetitive labor markets minimum wages could be second-best instruments to correct failures in labor markets; see for example Hungerbühler and Lehmann (2009) and the references therein.

also Jacobs and Yang (2013). Hence, the labor-income tax helps to correct failures in capital markets. Hubbard and Judd (1986) and Jacobs and Yang (2013) demonstrate that optimal marginal tax rates could be substantially higher when capital market failures are present. However, from a practical point of view it is probably more useful to address these liquidity constraints directly by providing borrowing facilities, rather than by making the tax system more progressive.

4. Flat Income Tax not Desirable

Friedman (1962) was among the first to propose a flat tax.⁸ Thereafter, Hall and Rabushka (1983) greatly popularized the idea. Recently, Mankiw et al. (2009) also argued in favor of a flat tax.⁹ In many countries many politicians and some economists propose to introduce a flat tax rate on labor earnings that replaces the progressive rate structure, while maintaining a general tax credit. 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 a Dutch 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.

Often, 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, intact. Then, there is no real flat tax, since effective marginal tax rates are still (highly) nonlinear. Then, the supposed advantages of a flat-rate tax structure as emphasized by its proponents will not materialize, since the presumed benefits of a flat-rate tax critically depend on constant marginal tax rates.

Of course, it would be a very good idea to clean up the tax system thoroughly by removing undesirable tax arrangements, eliminating illogi-

8 A flat tax is defined as a tax system with a linear tax rate on labor income with a general tax credit, a general tax exemption, or even a refundable, general tax credit (a negative income tax). Often, the flat labor tax is combined with a zero tax on capital income or a zero tax on the normal return on capital income. In any case, the critique of the flat tax in the main text applies to all these different flat-tax proposals.

9 The analysis of Mankiw et al. (2009) suggests that a flat income tax could be roughly optimal. However, this conclusion is based on the empirically unwarranted assumption that the upper tail of the income distribution is lognormally distributed. These authors argue that the differences between the lognormal and the Pareto distribution are negligible. However, the tails of empirical earnings distributions are too thin when approximated by a lognormal distribution, especially at the very high income levels. See also Atkinson et al. (2011) and the discussion in Diamond and Saez (2011).

cal exceptions, and closing loopholes. The proceeds could be used 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 will yield a genuine welfare gain – provided of course that many exceptions and tax provisions have no direct economic value. This is where everyone would 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 is the ultimate consequence of redistributive objectives (see previous section).

The most important argument put forward in favor of a flat tax is that a nonlinear tax system opens up opportunities for arbitrage and income shifting between taxpayers, over time and across tax bases. In particular, households would like to shift income towards the person with income in the lowest tax bracket. Hence, increasing marginal tax rates with income provides 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 primary earners (mainly men) earn on average more than secondary earners (mainly women), this argument appears to be quite strange. The distortion created by a nonlinear tax system in the allocation of time would imply that primary earners would be doing inefficiently large amounts of household production, whereas secondary earners would be doing inefficiently little. I am not aware of any empirical evidence supporting this claim. However, it is conceivable that some correction in the time allocation between primary and secondary earners could be seen as socially desirable, since the incidence of household tasks is typically very skewed towards women. Moreover, even if there are distortions in the time allocation within households, this is probably second-best efficient, since secondary earners typically have much higher labor-supply elasticities than primary earners (Blundell and MaCurdy, 1999; Meghir and Phillips, 2010; Blundell et al., 2011). The Ramsey principle then insists on taxing secondary earners at a lower rate than primary earners (Boskin and Sheshinski, 1983). However, as long as this is impossible, and primary earners earn more on average than secondary earners, it is second-best desirable to have some distortion in the time allocation of households through increasing marginal tax rates to smooth labor-supply distortions over primary and secondary earners.

A nonlinear income tax creates possibilities to shift income over time. Individuals typically have a lower taxable income during retirement than during working age. Hence, a nonlinear tax schedule would provide incentives to save for retirement if the government allowed individuals to deduct their retirement savings from the income tax, as it does in many countries

(OECD, 2011c). The question is, however, how important these distortions are, since in many instances the level of tax-favored pension saving is determined by the institutional setting. For example, in the Netherlands all workers covered by a collective labor agreement (about 80 percent of work force) are obliged to save for occupational pensions and can choose neither their desired level of pension saving nor the pension fund in which to save. 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). Empirical evidence by Kleven et al. (2011) indeed suggests that tax evasion is important for self-employed. Whether the erosion of the tax base is larger than the insurance gain is not clear.

Finally, a nonlinear 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 Fuest and Weichenrieder, 2002; de Mooij and Nicodème, 2008). However, this form of arbitrage is inevitable if one wishes to tax capital incomes at a lower rate than labor incomes. Introducing a comprehensive income tax where capital incomes are taxed at the same rate as labor incomes eliminates any tax arbitrage between labor and capital income, but cannot be defended on welfare-economic grounds. This paper will argue below that a dual income tax is indeed optimal. Hence, 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 also below. In addition, tax authorities should try to secure 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 (Sørensen, 2009). 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 schedule should be flat.

In principle, a flat tax avoids all these forms of arbitrage. However, this is the case only if *all* effective marginal tax rates are in fact flat. Thus, as long as not all income-dependent measures in the entire tax-benefit system are eliminated, effective marginal tax rates are not flat, and tax arbitrage will potentially remain a problem.

A number of fallacious arguments are often put forward by proponents of a flat tax. Many politicians argue that a flat tax is more efficient than a nonlinear income tax. Even Hall and Rabushka (1983) claim that a flat

tax generates more employment.¹⁰ However, the discussion of the optimal nonlinear income tax suggested that this is a flatly incorrect argument. The equity–efficiency trade-off stems from the informational constraint in verifying individual earning ability. The government can only observe earnings; labor effort and earning ability are private information. Nevertheless, individual earnings correlate with individual earning ability. The flat tax employs no information on individual earnings, only on aggregate earnings. Hence, costly information is not used, and the equity–efficiency trade-off worsens.¹¹ Consequently, with a linear income tax the government can redistribute fewer resources at the same efficiency cost, or it has to tolerate more dead-weight loss to achieve the same income redistribution as under a nonlinear income tax. Hence, pleas for a flat tax should be discarded on the basis of fundamental economic logic.

Saez (2001) and Zoutman et al. (2011) 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 nonlinear income tax. Zoutman et al. (2011) calculate that the welfare difference between the optimal flat tax and the optimal nonlinear tax amounts to 0.5% of GDP for utilitarian social preferences and about 9% of GDP for Rawlsian social preferences. The more redistributive is the social objective, the more the flat tax will be a straitjacket.

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. The government then wishes to introduce taxes on commodities that are consumed disproportionately by the rich and subsidies on commodities that are consumed disproportionately by the poor. Think of rent assistance and health-care subsidies. These indirect instruments do cause additional distortions in consumption behavior, which can be avoided by only taxing earnings nonlinearly – see also the section on commodity taxation. Similarly, when the government has only access to flat income taxes, and environmental taxes fall disproportionately on the poor, the optimal corrective tax will be set below the Pigouvian level, so that the environment is harmed. This can be avoided by taxing income nonlinearly – see also the section on corrective taxation.

Many proponents claim that a flat tax would make the tax system simpler, as every taxpayer would know her marginal tax rate. Again, this is a fallacy. Even under a fully nonlinear income tax (with a potentially infinite number

¹⁰ This is probably due to other factors than the flat rate structure of the labor-income tax, such as exempting capital income from taxation.

¹¹ This logic is the same as the logic underlying the nonoptimality of universal government support systems that do not condition public services or benefits on individual income. With universality, the government does not employ information on individual earnings.

of tax brackets), taxpayers can use a table 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 is very simple 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 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.

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 payroll tax is based. As a result, the administrative burden on firms can be reduced. In addition, the flat payroll tax might serve as a final withholding tax on income. Filing a tax return at the household level would then become superfluous. Hence, the government could 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 nonlinear payroll tax only shifts the administrative burden from firms to households; it does not reduce it. Moreover, Kleven et al. (2011) 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, as 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 weak. Tax rates cannot 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, for example, Mankiw et al. (2009), Banks and Diamond (2010), the Mirrlees Review (2011), and Diamond and Saez (2011).

The first point of reference is Chamley (1986) and Judd (1985). In these analyses households are infinite-lived or they form dynasties of altruistic generations that are perfectly linked with each other through bequests (cf. Barro, 1974). 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 in the future. 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 nonlinear 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 a 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 cornerstones in public finance are 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). Neither can they be represented by a altruistic dynasty of households that are perfectly connected through a chain of bequests. In addition, one can question the separability of preferences needed to apply the Atkinson–Stiglitz theorem. Finally, financial markets may not work perfectly, since individuals may be liquidity constrained or find it impossible to insure against risks to 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 pure rents. In addition, capital-income taxes can be helpful in complementing the labor-income tax to redistribute resources and to insure against labor-income risk. Finally, capital-income taxes are generally desirable when capital and insurance markets fail.

Capital-Income Taxes Alleviate Labor-Supply Distortions

By taxing capital income, the government could implicitly tax leisure, which would then help to offset the distortionary effect of labor-income taxation on labor supply. Hence, capital taxes could be useful for efficiency reasons. 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 older ages becomes more complementary to leisure than consumption at young ages. One should be wary in concluding, however, 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, Atkinson and Stiglitz's (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, then the total labor supply over the life cycle increases, and a positive capital tax is optimal. In common macroeconomic 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 off mortgage debt on owner-occupied housing. Pirttilä and Suoniemi (2010) demonstrate 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 pension wealth, they stimulate later retirement (Jacobs, 2009b). As long as retirement choices are distorted by explicit or implicit taxes on continued work, it is therefore optimal to have positive capital-income taxes to counter these distortions in retirement.

Capital-Income Taxes Reduce Human-Capital Distortions

By taxing labor income at nonlinear 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 steeper working careers are mainly nonverifiable 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).

Jacobs and Bovenberg (2010) show that it is optimal to tax capital income to reduce the distortions imposed by 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. These authors 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 investment 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.¹²

Capital-Income Taxes Reduce Arbitrage Between Capital and Labor Income

Capital income should be taxed as well to contain arbitrage between the labor- and capital-tax bases. The self-employed get stronger incentives to start a closely held firm and be paid 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 were not 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, 2011). Fuest and Weichenrieder (2002) and de Mooij and Nicodème (2008) demonstrate that these

¹² Judd (1999) demonstrates that when there are nondeductible 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.

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.

Capital-Income Taxes to Tax Pure Rents

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 income 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., 2007). 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. For the same reason it would also be optimal to tax nonintentional bequests. Capital incomes consist, at least in 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 Are Optimal 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 result in moral hazard and adverse selection. Moreover, labor earnings cannot be used as collateral in financial contracts, since modern states have abolished slavery. Ideally, borrowing 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 constraints the price of future consumption relative to 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. 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. 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 U.S.

Capital-Income Taxes Are Optimal when Insurance Markets Fail

Capital-income taxes are desirable when individuals cannot insure against the risks in their labor earnings. This is true even if the government directly insures against 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, 2012). 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, the labor supply at later ages is increased, whereas the labor supply at earlier ages is decreased. 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 labor-tax distortions (Jacobs and Schindler, 2012). 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 against labor income risks. This is relevant when the government can only use linear labor-income taxes (see Jacobs and Schindler, 2012).

Banks and Diamond (2010) refer to many empirical studies showing that the earnings risk over the life cycle is very substantial. Nishiyama and Smetters (1995) simulate a detailed applied stochastic general-equilibrium model of the U.S. They find that introducing earnings risk radically changes the optimal tax policy. In particular, in the absence of earnings risk they demonstrate that replacing a comprehensive income tax (equal rates on capital and labor incomes) with a pure expenditure tax delivers a huge lifetime welfare gain of \$154,000 for each household. However, when labor-market risk is not insurable, the same tax reform *lowers* expected lifetime welfare by \$86,000 per household. Consequently, ignoring noninsurable labor-market risks can substantially bias policy conclusions.

Capital-Income Taxes Tax Labor Income in Disguise

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

Capital income can be labor income in disguise. Some individuals generate substantial higher returns to savings, stock-market investments, entrepreneurial efforts, and other investments. Then, capital incomes are to some extent a return to labor supply, work effort, human capital, or investment ability (Cnossen and Bovenberg, 1999; Banks and Diamond, 2010). Hence, taxing capital income is 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 nonlinear 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. However, taxing capital income is then also optimal (see also below, where heterogeneous preferences are discussed).

Capital-Income Taxes Complement Flat Labor-Income Taxes

Empirical research demonstrates that inequality increases rapidly over the life cycle (Attanasio and Weber, 2010), especially because consumption 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. The reason is that taxing consumption at later dates provides larger distributional benefits than taxing consumption at earlier dates in the life cycle. However, this argument is valid only if the government is constrained to employing a fully nonlinear labor-income tax, and if the government does not directly tax (nonintended) bequests. In that case, capital-income taxes reduce inequality over the life cycle and reduce differences in initial wealth holdings. With a nonlinear 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, a tax on bequests is required so as to reduce initial wealth differences.

Capital-Income Taxes Are Optimal when High-Ability Individuals Have Stronger Preference to Save

If individuals with 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; Diamond and Spinnewijn, 2011). Intuitively, conditional on observing labor income, saving patterns then provide additional information as to who has a higher earning ability. Consequently, taxing savings helps to redistribute more income than by taxing labor income alone. Note that rising inequality over the life cycle, as discussed in the previous subsection, might be explained by differences in preferences for allocating consumption over the life cycle. Banks and Diamond (2010) discuss many studies presenting evidence that earning ability and the willingness to save are strongly correlated. Hence, taxing savings is helpful to complement the labor-income tax in redistributing income in the most efficient way.

Summary: Taxation of Capital Income

In contrast to the Mirrlees Review (2011), it is concluded that some taxation of the normal return to capital is desirable, in accordance with Banks and Diamond (2010). A dual income tax, as is present in many Scandinavian countries, appears to be most desirable from a welfare-economic point of view; see also Cnossen and Bovenberg (1999). However, one should not conclude that the two tax bases should be taxed at the same rate except in knife-edge cases.

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 placing different 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 probably be taxed symmetrically under one uniform tax regime for capital incomes. However, additional measures could be taken for housing wealth and bequests in order to tax rents and initial wealth. If capital incomes are taxed, then the costs of generating these capital incomes should be deductible. This implies, for example, that costs of mortgages, and also the interest payments on consumption or student loans, should be deductible for the capital-income tax.

How high should the optimal tax rate on capital income be? This question is easily posed, but a definitive answer cannot be given, because research is lacking that precisely quantifies all arguments raised above in realistic applied models. Like the optimal labor-income tax, the optimal capital-income

tax also depends on political preference for income redistribution. In any case, it seems reasonable to expect that the optimal tax rates on capital and labor income should move up and down together (Banks and Diamond, 2010).

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

To conclude, the optimal-tax literature does not provide any evidence that capital incomes should be taxed in the same way as labor incomes. Indeed, the Schanz–Haig–Simons concept of ability to pay appears to be completely at odds with optimal-tax principles. A pure consumption (expenditure) tax cannot be defended either from welfare-economic principles. Indeed, such a tax is optimal only when *all* the following very strict conditions are met:

- Individuals act as if they have an infinite time horizon, or they form a dynasty of perfectly altruistic generations that are linked through an unbroken chain of bequests.
- When individuals have finite lives (or are not perfectly linked across generations), their marginal willingness to save should be independent of labor supply or earning ability (weakly separable and identical preferences), and the government should be able to levy a perfectly nonlinear 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 (for small enterprises and closely held firms with a large owner–shareholder).
- Capital markets should work frictionlessly; 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 private insurance against 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 earning ability and the willingness to save through ordinary saving, housing, or pensions.

Clearly, these conditions are not met in reality. Therefore, it still is something of a mystery why the Mirrlees Review (2011) recommended exempting the normal return to saving, thereby overriding the recommendation of Diamond and Banks (2010), in the same Mirrlees Review, of having some taxation of the normal return on saving.

A Sorry Tale: The Dutch Wealth Tax

The Netherlands abolished the capital-income tax on the personal level in the large tax reform of 2001. Based on the analysis of this paper, this reform made no economic sense at all. Before 2001, interest incomes and dividends were taxed. Since 2001, all assets (apart from housing and pension wealth) have been subject to a wealth tax of 1.2 percent, above an exemption of about 20,000 euros per person. In addition, the pre-existing wealth tax – with a low rate above a very large exemption – was abolished in 2001. The new wealth tax of 1.2 percent is based on the fiction that all assets earn a nominal return of 4 percent, which is taxed at 30 percent.¹³ Capital gains are untaxed before and after 2001. The tax reform of 2001 did nothing to change the taxation of pensions and housing, as both remained heavily subsidized. Realized capital income earned by large shareholders in closely-held companies has been taxed separately at a rate of 25 percent, both before and since the reform.

The Netherlands has moved in the opposite direction to the recommendations of the Mirrlees Review (2011): tax the normal return on capital; exempt the above-normal return to capital. The tax reform thus went in exactly the wrong direction. Taxing above-normal returns is less distortionary than taxing the normal returns. Moreover, exempting the above-normal return renders the capital tax steeply regressive. 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.¹⁴ Similarly, the current capital-tax system provides less social insurance, since the government no longer shares in the good and bad luck of asset holders. The risk premium remains untaxed, as the wealth tax is levied irrespective of whether asset returns are positive or negative.

The introduction of the wealth tax was defended politically by referring to the *robustness* of its revenues. Robust tax revenues can be nice for the Minister of Finance, but they also reduce social welfare, since they are the

¹³ Tax authorities euphemistically call this wealth tax a “presumptive capital-income tax.”

¹⁴ For illustrative purposes this example presumes that both individuals are above the tax exemption.

mirror image of lower social insurance. From a macroeconomic point of view, such a tax policy is procyclical; average taxes in good times are lower, and in bad times are higher, due to the regressive nature of the tax.

The wealth tax in the Netherlands should preferably be replaced by a genuine capital-income tax, which taxes capital incomes, not wealth holdings (Cnossen and Bovenberg, 1999). Capital losses can be offset 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 that are traded in markets and have a clear valuation, such as stocks.

6. Taxation of Pensions

In many countries premiums for pensions are tax deductible, accrual of pension wealth remains untaxed, and pension benefits are taxed. Moreover, pensioners generally pay lower social security contributions, sometimes even zero (OECD, 2011c). This tax treatment of pension income implies that a large 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 if tax systems are progressive, labor incomes when retired fall in lower tax brackets, and if pensioners face reduced tax rates. Second, ordinary savings are generally subject to the capital-income tax, whereas accrual of pension wealth typically remains untaxed. The distributional effect of these subsidies on saving is generally regressive, since high-income earners save more for their pensions.

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

In addition, if capital income should optimally be taxed at a positive rate (see the 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. Even when taxing the investment returns in pension funds, one might keep a deduction for pension contributions in the income tax, but it would then be desirable to apply the same tax rate to pension benefits as the rate at which pension contributions have been deducted (no reduced tax rates for the elderly).

Removing the tax-favored status of pension savings potentially yields a lot of tax revenue, which can be used to cut tax rates on labor income, so as to reduce the distortions associated with labor-income taxes. Naturally, there could also be distortions in saving decisions due to taxing accrual of pension wealth. However, the previous subsection demonstrated that some taxation of capital income is optimal. Voluntary pension savings will certainly be affected, but this typically applies to savings by self-employed individuals, wealthy individuals who have large noninstitutional savings, and employees with a pension gap, whose accumulated pension entitlements are low. However, distortions in pension saving will be relatively limited when individuals have little control over their savings, for example when these are determined institutionally.

7. Taxation of Housing

Many countries have an extremely lenient tax treatment of owner-occupied housing. Examples include the Netherlands, Norway, Sweden, Denmark, Belgium, and the U.S. (OECD, 2011b). Interest costs of mortgages can be deductible from the income tax, and taxation of imputed rent is low or even absent (Andrews et al., 2011). The budgetary cost of this favorable tax treatment can be large, especially when households have built up large leverage (large mortgage debt relative to housing equity).¹⁵

Why would the government subsidize owner-occupied housing to such a large extent? Very often it is claimed that homeownership generates positive externalities in that homeowners take more care of their house and their neighborhood. Indeed, a robust correlation between homeownership 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., 2007). Indeed, on average have typically a higher income and are better educated than tenants. Arguably, most of these homeowners would take better care of their environment and house as well if they rented a house.

¹⁵ Generally, housing is also subject to property taxes at the local level. These taxes can be viewed as benefit taxes to finance local public-good provision.

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

Moreover, housing supply is typically not very elastic, depending on government regulations. Housing supply appears to be least elastic in continental Europe (supply elasticities below 0.5), and more elastic in Nordic and Anglo-Saxon countries (Caldera Sánchez and Johansson, 2011). The incidence of a subsidy (or a tax) always falls on the least elastic side of the market. If housing supply is inelastic, the main part of the housing subsidies will then simply be capitalized in higher housing prices. This implies that it is mainly home sellers that benefit from housing subsidies, i.e., the older generations, and not 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 homeownership through tax facilities, such a policy will hardly be effective when the elasticity of housing supply is very low. Indeed, such a policy then mainly promotes high housing prices, not more widespread homeownership.

Given a decision to buy a house, households receive strong tax incentives to finance their houses as much as possible with debt if interest costs are deductible and taxable imputed rent is very low (or zero). By raising leverage of households, such tax incentives to promote debt financing strengthen boom-and-bust cycles in the economy. The global financial crisis has demonstrated that high leverage can be very risky. In addition, tax incentives for debt financing raise the exposure of the banking sector to risks in the housing market, thereby further exacerbating boom-and-bust cycles. In the Netherlands, Sweden, the UK, the U.S., Australia, Ireland, and Denmark mortgage debt hovered between 80 and >100 percent of GDP in 2009 (IMF, 2011).

Low housing-supply elasticities also imply that the welfare losses of stimulating home-ownership in the housing market (i.e., overconsumption of housing) are limited. Indeed, the main welfare losses can be found in the labor market. The tax burden on labor income needs to increase substantially to finance the subsidies on owner-occupied housing. Marginal taxes on

labor income could therefore decline across the board if the tax subsidies on owner-occupied housing were abolished.

From an economic perspective, mortgage-rent deductions and low (or no) taxation of imputed rent hardly make any sense. In principle, 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 could be deducted against the rate of the capital-income tax, whereas imputed rent should be taxed at that same rate. 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 contains a risk-liquidity premium and corrections for depreciation, costs of insurance and maintenance, and transaction costs (Poterba, 1984). Accordingly, an imputed rent on housing of about 4–6 percent of the property value seems reasonable.¹⁶

Since real property is an illiquid asset, the government might introduce a borrowing facility for homeowners who have fully paid off their mortgage loan and have no labor earnings, but still have to pay the tax on imputed rent. If capital markets do not provide consumption loans using the house as collateral, homeowners need to sell their property so as to pay the tax on imputed rent. This can be avoided by giving taxpayers the possibility to defer these tax payments for a number of years until the house is sold or the taxpayer dies or migrates. At the moment the house is sold, there is no liquidity problem anymore, and government can collect the tax claim, including interest.

When imputed returns on owner-occupied housing are raised to the same rate as the nominal return on housing, debt and equity invested in owner-occupied housing are taxed symmetrically. Hence, the incentives for excessive leverage in financing owner-occupied housing vanish.

In addition, capital gains made on selling owner-occupied houses should be taxed as well, just like ordinary capital gains on stocks, for example. 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) imputed annual return of 4–6 percent (r): $G = P_t - (1 + r)^t P_0$. Capital losses could be offset against realized capital gains for a number of years.

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

¹⁶ Of course, taxing imputed rent entails administrative costs to assess property values for tax purposes. In order to adequately reflect property values, the assessments need to be made frequently and with substantial differentiation between properties. Some countries do tax imputed rent (e.g., Iceland, Luxembourg, the Netherlands, Slovenia, and Switzerland); see Andrews et al. (2011). Thus, taxing imputed rent is possible in practice. In the Netherlands this is done on the basis of property values in housing-transaction registers.

true when housing supply is not very elastic. According to optimal-tax principles, these rents should be taxed, preferably at high rates. It is baffling for an economist to see countries like the U.S., the Netherlands, and Norway subsidize homeowners rather than tax them. Indeed, it may even be desirable to tax housing assets at a higher rate than other assets. One could do so by increasing imputed rent. An alternative is local property taxation, since housing prices also reflect the value of public-good provision at the local level. Hence, property taxes can serve as a 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 this view, homeowners should not be able to deduct mortgage-rent payments from their income tax, and they should not need to pay tax on imputed rent either. This is not a desirable policy option, since houses are (besides pension wealth) the most important assets of households. If housing is not treated as an asset, individuals will get very strong incentives to accumulate wealth through untaxed housing investments. Moreover, capital gains on houses will also remain out of reach of the tax authorities. And, if housing supply is very inelastic, the government will not be taxing a tax base consisting mainly of rents, thereby shifting the tax burden to other, much more distortionary tax bases.

Equalizing the tax treatment of owner-occupied housing to that of ordinary savings would allow the government to reduce labor-income taxes. Moreover, overconsumption of housing would be avoided, thereby reducing distortions in the housing market. This distortion is smaller, the more inelastic is housing supply. However, income effects are very complex when housing supply is inelastic. Indeed, removal of the subsidies on the demand for houses will inevitably result in house-price declines. 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 homeowners for price declines, will erode the potential welfare gains. Indeed, if homeowners were all perfectly compensated for a price decline, then no revenue would be left to reduce income taxes. In that case, the policy reform would be useless.

A policy change is more likely to be successful when tax rates are lowered for those groups that are hurt by the removal of the housing subsidy, i.e., the higher income groups. Lower income taxes also help to sustain housing demand so that the decline in housing prices is less pronounced. Given that housing markets are forward looking, a slow phase-in of policy measures need not be successful to avoid immediate house-price declines. Since buying a house is a long-term investment, future policy changes directly translate into changes in current housing demand. A well-designed transition regime should preferably protect homeowners 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 problems, because they have paid off 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 or 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 in the right direction, but it is also generic and may therefore be unsuited to address transition problems.

As a final remark, in some countries there are stamp duties on the value of housing transactions. These are very distortionary taxes, since they reduce both labor and housing mobility a lot (van Ewijk et al., 2007; OECD, 2011b). There is no clear economic rationale for such transaction taxes; hence it would be desirable to abolish them.

8. Indirect Taxation

If the government can use direct instruments for income distribution, viz., 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 versus indirect taxes. From this literature it follows that there are three possible reasons for using indirect instruments.

First, taxing or subsidizing commodities is useful if doing so raises the labor supply. Intuitively, the government then alleviates the distortionary effects of the income tax on labor supply. Hence, goods that are more complementary to leisure should be taxed more. Examples could be alcohol, travel, and tourism. Goods that are more complementary to work should be taxed less. Examples could be work-related costs of travel, child-care facilities, or education. However, this comes at the cost of distorting commodity demands, since households demand relatively 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. When the willingness to pay for commodities does not vary with labor effort, preferences of households are weakly separable between consumption and leisure. In that case, the famous Atkinson–Stiglitz (1976) theorem applies, and indirect instruments are redundant.

There is surprisingly little empirical evidence bearing on the degree of complementarity of various commodities with work effort. Available 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 (remarkably), 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 no more direct evidence is available on its empirical validity.

The scarce 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, it would probably be best to have no commodity tax differentiation, with exceptions in particular, well-reasoned cases. 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 national borders (Cnossen, 2010). 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 small welfare gains to compensate these costs and is therefore not desirable.

Second, indirect instruments might be useful as a distributional device. The question is whether indirect instruments should be used when the government can also redistribute income through the income tax. Politicians often argue in favor of indirect instruments for equity reasons. In many countries large amounts of resources are redistributed through subsidies on commodities, for example through low VAT rates, income-dependent tax credits, subsidies, or provision in kind. The equity argument in favor of indirect taxation is only 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 ability, but also in their preferences for certain goods.

Under a fully nonlinear 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 does distort commodity demands. Intuitively, all heterogeneity is in earning ability. Conditional on observing (and taxing) earnings, it is not useful to levy taxes on other tax bases if these

tax bases provide no 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.

However, when the government can only employ linear income taxes, much stricter conditions are needed to find no role for indirect instruments (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 nonlinear 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 appears 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 nonlinear income taxes; see also the discussion on the flat tax.

Moreover, if individuals do not only differ in their earning ability, but also in terms of their willingness to pay for certain commodities (i.e., preference heterogeneity), then taxing these commodities helps to redistribute resources, even under nonlinear income taxation. Intuitively, when the preference to consume certain commodities correlates with earning ability, then, conditional on observing earnings, commodity demands provide useful additional information on who has a high or a low ability and therefore should be taxed for redistribution (Mirrlees, 1976; Saez, 2002b). For example, Gordon and Kopczuk (2010) present empirical evidence that homeownership (and capital income) strongly correlates with earning ability.

There is no clear evidence supporting low VAT rates on necessities and high VAT rates on luxuries. These categories of goods are generally too broad to offer substantial distributional benefits. Crawford et al. (2010) show for the UK that a flattening of VAT rates with the appropriate adjustments in the nonlinear income tax hardly has any distributional consequences. This implies that the distributional objectives can be achieved with an income tax, and no distinction between luxuries and necessities need be made.

Goods are often exempted from VATs or are taxed at a zero rate, for example in education, agriculture, real estate, public services, arts, books, child

care, or the financial sector. These exemptions do not have a clear welfare-economic rationale. Exemptions distort production decisions (violations of the Diamond–Mirrlees (1971a) production efficiency theorem), create non-level playing fields, obstruct fair competition, and distort the terms of trade. Hence, these exemptions should be abolished; see also Crawford et al. (2010) and Cnossen (2010).

VATs are not the only indirect instruments. Indeed, most countries also provide indirect subsidies on, for example, housing costs and health care. 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. 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.¹⁷ Highly subsidized housing or health care promotes overconsumption of housing and health care. Therefore, many income-support programs directed towards the poor might be integrated into the income tax system. In principle, the same income redistribution could be organized while avoiding overconsumption of particular commodities.

Although there are no clear welfare-economic motives for subsidizing goods such as health care and housing, there might well be nonwelfarist reasons for doing so. For example, in Sen's (1985) capability approach, maximizing social welfare is not seen as a 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, and hence can be defended on that ground. Similarly, from behavioral economics we know that individuals may be subject to various self-control problems. Thus, 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 the consumption of goods that are produced in labor-intensive sectors is more complementary to work than that of goods produced in other sectors. 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 labor-intensive sectors, in general, produce goods

¹⁷ One could make the argument that expenditures on health are some form of human-capital investment. Hence, there would be a case for subsidizing 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 may suspect that an ability bias in health is present. High-ability and therefore high-income groups benefit more from the same health expenditure in improved labor-market prospects. Consequently, it is not clear that health should be subsidized or publicly provided for redistribution (see also Jacobs and Bovenberg, 2011).

that are indeed more complementary to work than goods produced in labor-extensive sectors. That 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 houses and gardens, bars, and shops. Insofar as one wishes to lower the marginal tax burden at the lower end of the earning 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 providing general tax relief for labor-intensive services.

9. Corrective Environmental Taxation

Apart from income redistribution, the government also needs to correct externalities. Ever since Pigou (1920), economists have been forceful advocates of using tax instruments to internalize externalities, although also other instruments could be used that achieve the same goals: regulation, subsidies, auctions, and so on.

The deterioration of the environment caused by global warming is a threat to the survival of the planet. Stern (2007) therefore speaks of the “the greatest and widest-ranging market failure ever seen.” Tax instruments can potentially 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), and other CO₂ emittants.

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 depends only on the size of the marginal external damage and does not depend on the demand elasticity (as sometimes suggested). Lower consumption of a polluting good generally induces substitution towards nonpolluting alternatives. Therefore, positive externalities in the development of alternative and sustainable energy sources can also be interpreted as negative externalities of 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 nonenvironmental point of view, indirect taxes on particular commodities should not be used to raise revenue as long as the demand for those 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 (or uniform consumption tax) would do. In addition, environmental taxes distort the composition of consumption. These distortions are desirable from an environmental point of view, but not from a nonenvironmental 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 nonenvironmental 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). Therefore, “greening of the tax system” cannot be a correct policy goal.

Similarly, maximizing the revenue from environmental and pollution taxes cannot be a goal of environmental tax policy. The level of environmental taxes is primarily determined by the size of the environmental damages. Only in knife-edge cases do Pigouvian environmental taxes coincide with the revenue-maximizing tax rates. Indeed, the optimal environmental taxes could be either below or above the revenue-maximizing rates.

If for environmental reasons (not revenue reasons) a positive environmental tax is levied, labor-market distortions increase if there are preexisting labor-income taxes. However, this should not lead to the conclusion, as in Sandmo (1975) and Bovenberg and de Mooij (1994), that optimal environmental taxes should be set below the Pigouvian rate. Jacobs and De Mooij (2011) demonstrate that 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 will still be identical to the first-best Pigouvian tax.

When preferences are not separable, 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 than the Pigouvian one. Similarly, if better environmental quality boosts (reduces) labor supply, environmental taxes should be set lower (higher) than the Pigouvian level.

However, not much is known empirically about the complementarity of polluting goods and environmental quality with respect to leisure in comparison with nonpolluting goods. Fossil fuels appear to be complementary to labor supply in the UK; see Crawford et al. (2010). Crawford et al. (2010) also demonstrate that energy use in the UK is more complementary to leisure. 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 nonlinear 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 nonlinear income tax. However, if the government is constrained in using a nonlinear tax, for example because there is a flat tax, then the distributional effects of environmental taxes determine also environmental policy. In particular, environmental taxes should be set lower than the Pigouvian rate when environmental policies have adverse consequences for the income distribution (Jacobs and de Mooij, 2011). Similarly, under preference heterogeneity pollution taxes could optimally be higher than the Pigouvian level if the high-ability individuals would have a stronger preference for polluting goods than low-ability individuals – conditional on earned income.

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 yield an estimate of \$24–35 per tonne of CO₂ emissions. Stern estimates that the social cost of carbon can be as high as \$85 per tonne of CO₂ emissions. These estimates are among the highest in the literature. Nordhaus (2007) criticizes Stern's estimates in that the calculations cannot be reproduced, insufficient weight is given to counterarguments, and discount rates are set too low. Whatever the outcome of this scientific debate, by taking a baseline estimate for the social cost of carbon, one can in principle calculate the implied Pigouvian taxes on energy and fuels and compare them with the current level of excises. An international comparison of effective taxes on energy or fuel per tonne of CO₂ emissions is difficult to make, due to the large heterogeneity in systems of energy and fuel taxation (OECD, 2010).

We will take the current Dutch case as an illustrative example. Excises on households' energy use are already way above Stern's value for the social cost of carbon: for gas, 89 euros per tonne of CO₂; for electricity, 192. For small enterprises and services the excises are close to Stern's social cost of carbon: for gas, 78 euros per tonne of CO₂; for electricity, 70; see Ter Haar (2010). Given the conservative estimate for the social cost of carbon, there

appears to be no good reason to raise energy taxes any further at this time. Similarly, Dutch excises on fuels – except those for kerosene and liquefied petroleum gas (LPG) – are far above \$85 per tonne of CO₂ emissions: diesel, 130 euros/tonne; “red” diesel (diesel for agriculture and shipping), 80; petrol, 250; LPG, 40; biodiesel, 160; ethanol, 460; and kerosene is exempt (Ter Haar, 2010). It appears that the excises on these latter fuels have also overshot their Pigouvian values, although it would be good if the government would equalize the excises per tonne of CO₂ over all fuels. Moreover, the Dutch government levies a CO₂-based vehicle tax on new-car purchases. Such taxes are also levied in many other countries (OECD, 2010).¹⁸

In many countries, (greenhouse) farmers, airline companies, and shipping companies are exempt from environmentally motivated taxes or receive substantial reductions in their tax bills (OECD, 2010). These exceptions should be abolished. International coordination may be necessary to achieve this, since countries use these tax instruments for tax competition.

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. In addition, more energy-saving technologies and alternative energy sources will be developed over time. Positive externalities of alternatives for fossil energy sources may therefore rise over time as well. Although energy taxes could be too high at this moment, they still need to display a rising pattern over time (see for example Nordhaus, 2007; van der Ploeg and Withagen, 2012).

Essentially all Western countries have open economies. This implies that no individual country can really do anything about global warming on its own. The environment is a global public good, which is not, or is only to a limited extent, provided by the private sector, due to its nonrival and nonexcludable nature. 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 other’s efforts to reduce global warming. CO₂ emissions will be reduced only if all countries in the world commit themselves to binding agreements on carbon taxes or tradable emission permits. As long as individual countries or groups of countries unilaterally try to reduce energy demand, the world price of energy will merely fall so as to restore equilibrium on world energy markets. 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. Moreover, even global coordination of environmental policies could induce a “green

¹⁸ It may well be that the use of biofuels generates more rather than less CO₂ emissions (see Searchinger et al., 2008) due to the great damage done to ecosystems as a result of, for example, deforestation. Biofuels should therefore be subject to higher excises.

paradox” where fossil fuels are extracted at a faster rate, thereby speeding up global warming (Sinn, 2008; van der Ploeg and Withagen, 2012).

If small open economies really want to directly contribute to reductions of CO₂ emissions, they should not try reducing demand for energy through energy taxes, but rather leave their own fossil fuels *in situ*. Of course, this will diminish public revenue from gas or oil sales (or from the taxes and excises levied on these resources), but it will directly reduce the supply of carbon to world energy markets.

10. Corrective Taxation of Other Goods

Apart from externalities associated with global warming, there are other externalities associated with the consumption or production of certain commodities.

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

In addition, the government can use the tax system to internalize externalities associated with unhealthy lifestyles. Gruber (2010) views obesity as the largest threat to public health in the U.S. Associated with deteriorating health quality are larger outlays on (public) health-care expenditures. As a result, it could be worthwhile to levy excises on fast food, sugar, and saturated fats. Of course, there could also be reasons for paternalistic government intervention to increase individual well-being if individuals have self-control problems due to time-inconsistent preferences (Gruber, 2010). Individual health benefits could be substantial if individuals reduce intake of unhealthy foods.

Excises on alcohol and tobacco help to discourage their consumption and align the private costs of consumption with their social costs. In addition, behavioral-economic arguments could justify public paternalism in setting such excises. However, how big are the externalities of smoking and drinking?

Estimates of the externalities created by smoking are controversial, since they suggest that the externalities might actually be positive, rather than negative, despite the extremely high individual cost of smoking in terms of lower life expectancy. For example, Crawford et al. (2010) refer to calcu-

lations made by Viscusi (1995), which demonstrate that smoking generates a positive externality in the U.S. Tollison and Wagner (1992) and Sloan et al. (2004) reach the same conclusion. 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 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. The valuation of the damage done to individuals (including children) in the vicinity of smokers (passive smoking) is of course a very complicated matter. Nevertheless, the social cost of smoking – if there is any – appears to be more than sufficiently compensated by high tobacco excises; see also Cnossen (2006) and Crawford et al. (2010).¹⁹ Finally, low-income groups are overrepresented among smokers, which renders tobacco excises typically regressive. For all these reasons there is no clear welfare-economic rationale to increase excises on tobacco. Current excises on tobacco in some countries could therefore well be too high from a strictly welfarist perspective: these include the Scandinavian countries, and also the Netherlands.

The external costs of alcohol are much less controversial. In principle, the direct individual damage to health (premature mortality), lower earnings, and lower quality of life cannot be treated as an external cost unless the government has paternalistic objectives. Cnossen (2007) summarizes numerous studies calculating the external costs of alcohol. External costs are caused by a relatively small group of heavy drinkers, and include traffic accidents, criminal behavior, (home) violence, and public costs of health care. The external costs vary from country to country. The unweighted country average over seven EU countries and four Anglo-Saxon countries is 20 euros 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 euros per liter when (production) losses on account of absenteeism, unemployment, and premature mortality are included as well. Note, however, that many of these costs cannot be regarded as pure external costs, since they include a substantial of private costs as well.

Cnossen (2007) demonstrates that the external costs of alcohol use are larger than the revenue from alcohol excises in all countries under his consideration (seven EU countries plus the U.S., Canada, Australia, and New Zealand), except for Finland. In other words, alcohol excises are not set at

¹⁹ 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.

the optimal, Pigouvian level.²⁰ For example, in the Netherlands current alcohol excises are only 1.1 euros per liter of pure alcohol in beer, and around 6 in wine and spirits (Dutch Ministry of Finance, 2011). In other words, Dutch alcohol excises are far from being set at the optimal, Pigouvian level. Higher excises on alcohol can therefore be defended for Pigouvian reasons in many countries, with the possible exception of the Scandinavian ones that already have very high excises.

The distribution of alcohol excises could be an issue, 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 nonlinear tax on alcohol, which is increasing in 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, through fines and loss of drivers' licenses when caught drinking and driving, fines with the ultimate loss of licenses when alcohol is sold to minors and drunks, and penalties, including fines, for alcohol-related violence and disturbing public safety.

11. Conclusions

This section derives 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 only 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 all policy recommendations. Some conclusions, in areas where either theoretical analysis or empirical evidence is missing, depend on commonsense judgment or educated guesses. Only future research can bring us to more informed recommendations.

When it comes to the taxation of labor income, taxes should be nonlinear. A flat tax is *never* optimal, irrespective of political preferences for redistribution. Compared to a nonlinear tax, a flat tax does not generate more employment for the same income redistribution, is not simpler, and does not result in fewer political distortions. The only advantage of a flat tax – less arbitrage between tax bases, between taxpayers, and over time – materializes only if all effective marginal tax rates are constant and equal, i.e., if all income-dependent programs are completely abolished.

The optimal nonlinear tax schedule typically follows a U-shape with income. Optimal marginal tax rates at the bottom end of the earnings distribu-

²⁰ Cnossen's (2007) analysis applies to data from 2003. Since then, countries may have raised alcohol excises closer to Pigouvian levels.

tion 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 groups, and may increase thereafter to top rates of around 50 percent. 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 for earnings above model earnings.

Marginal tax rates larger than 100 percent are generally not optimal, unless the government engages in a lot of monitoring of work, training, and job-search effort of nonparticipants. Hence, simplifying and streamlining income-dependent arrangements should preferably reduce marginal tax burdens below 100 percent. The EITC is a useful device to reduce distortions on the extensive margin (i.e., participation), but it redistributes resources away from the nonworking poor to the working poor.

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 for these commodities, while not compromising the distributional tasks of the tax system. Minimum wages are probably not an optimal redistributive device; it is generally more efficient to support low-income households using wage subsidies or tax credits, like the EITC.

The optimal tax system is a dual one where labor and capital incomes are taxed separately. Neither a synthetic income tax nor a pure consumption or 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 nonlinear 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 redistributive device over and above the redistribution that can be organized with labor-income taxes. Capital incomes correlate with earning ability. Capital incomes can be labor incomes in disguise through tax shifting and entrepreneurial efforts. Capital incomes are the result of initial wealth differences. And capital incomes include above-normal returns to investments (luck, informational advantages, monopoly profits, etc.).

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 income. There is no need for

a wealth tax as long as realized capital incomes are taxed. Pension savings can be made deductible for the labor-income tax, as long as pension benefits are taxed under the labor-income tax, and the accrual of pension wealth is taxed under the capital-income tax.

Owner-occupied housing should be seen as an asset, at least subject to the same tax rate 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) or to levy a benefit tax for local public goods. Realized capital gains on houses should be taxed as ordinary capital gains. Ideally, there should be no transaction taxes or stamp duties on housing sales.

On theoretical grounds, uniform commodity taxes (VATs) are not desirable. In particular, goods that are more complementary to leisure should be taxed at higher rates, whereas goods more complementary to work should be taxed at lower rates. Empirical evidence, however, shows that commodity demand patterns can only be systematically related to labor-supply behavior in a couple of 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, or any. There are no good economic reasons to exempt many goods from VATs, and these exemptions should be avoided 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 nonlinear income tax. The differentiation of VAT rates can be abolished while adjusting the income tax at the same time to neutralize the distributional effects. A generic low tax rate on labor-intensive services may not be desirable. It is generally better to lower taxes on low-income earners to promote their employment. Specific instruments targeted at close substitutes for household production (e.g., child-care facilities) are better than generic instruments to discourage informal-sector employment.

The primary goal of environmental taxes is to internalize the negative externalities associated with polluting consumption. Environmental taxes should not be motivated by the desire to raise public revenue or to green the tax system. Differentiated commodity taxation is not desirable from a revenue-raising perspective. The social cost of carbon will rise over time, and energy and fuel taxes should increase as the earth warms up and the environment deteriorates further. So long as no global agreements are reached, unilateral efforts by small countries are not effective in combatting global warming. Only international agreements to which all countries subject them-

selves can solve the coordination failure in providing the global public good of avoiding a climate disaster.

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 generally efficient to increase alcohol excises, as the social cost of drinking is not sufficiently compensated by revenue from alcohol excises in many countries. Regulation to reduce alcohol abuse is also desirable so as to let the “polluter” pay for the damage done, since alcohol excises cannot be targeted well at those individuals causing most alcohol-related damage. Tobacco excises should not be increased, as the external damage of smoking – if there is any – is more than compensated by current tobacco excises.

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