

HOW SHOULD CAPITAL BE TAXED?

Spencer Bastani* 

Linnaeus University

Daniel Waldenström 

Research Institute of Industrial Economics (IFN)

Abstract. This survey discusses how capital should be taxed in advanced economies. We review the theoretical optimal tax literature, survey empirical studies on the distribution of capital and the distortionary costs of capital taxation, and analyze the desirability of specific taxes on capital income, wealth, property, inheritances, and corporate profits. Our overall conclusion is that capital taxation plays an important role in an optimal tax system, but only certain ways of taxing capital are able to strike a balance between optimality and administrative feasibility.

Keywords. Capital taxation; Income inequality; Inheritance tax; Optimal taxation; Property tax; Wealth inequality; Wealth tax

1. Introduction

How should capital be taxed? This question has spurred substantial academic and political dispute for a long time. Perhaps, this is not that surprising given the complex nature of capital. Capital is needed to fund investments, it can provide consumption benefits, and it serves as a vehicle for individuals to transfer resources across time, jurisdictions, and generations. Empirical studies have shown that capital is more unevenly distributed than labor income, and that the aggregate value of capital relative to total labor income has grown in many countries in recent years. At the same time, capital is more mobile than labor income and appears increasingly important for the growth of the economy. There is therefore no doubt that designing an equitable and efficient system of capital taxes is a difficult task.

The purpose of this paper is to review the current theoretical and empirical literature on capital taxation in order to address the question of how personal taxes on wealth and capital income should be designed in advanced economies. We discuss the current theoretical research on the subject of capital taxation in an attempt to provide a unified discussion about the optimal taxation of capital with an eye toward practical policy recommendations. Our survey complements earlier articles on the connection between optimal tax theory and tax policy, such as Mankiw *et al.* (2009), Banks and Diamond (2010), Diamond and Saez (2011), and Jacobs (2013). Our work also relates to the contemporary discussion about wealth taxation in several countries (see Boadway and Pestieau, 2019; Kopczuk, 2019; Saez and Zucman, 2019; Scheuer and Slemrod, 2019 for recent contributions).

We begin our paper by portraying the role of capital taxation in today's developed economies, and then continue with an analysis of the aggregate importance and distribution of wealth and capital income.

*Corresponding author contact email: spencer.bastani@lnu.se; Tel: +46 470 70 8 432.

Distributional aspects of capital have not played a prominent role in traditional theories of optimal capital taxation, but recent studies highlight their importance. We then discuss what is known about behavioral responses to capital taxation and, in particular, the implications of hidden offshore wealth and recent international information exchange agreements.

Our theoretical discussion begins in the modern optimal tax literature, and it is divided into three parts. First, we discuss traditional arguments against the taxation of capital income, explaining the role of distortions of the intertemporal allocation of consumption and physical investment. Second, we discuss arguments in favor of capital taxation. These arguments concern both equity and efficiency. We highlight that individuals are heterogeneous and that taxing capital income enables more redistribution than if labor income would be taxed alone. We also highlight situations where a capital tax can be seen as a tax on economic rents, can reduce distortions on human capital accumulation, and mitigate the distortions associated with progressive labor income taxation. The third part discusses theoretical considerations regarding specific capital tax bases: wealth taxation, taxes on personal capital income, property taxation, inheritance taxation, and corporate income taxation.

The paper is organized as follows. Section 2 begins by describing current practices of capital taxation and evidence on the distribution of wealth and capital income. We then continue with Section 3 that provides the theoretical background of our analysis. Section 4 presents the classical arguments against capital taxation. Section 5 thereafter analyzes the various reasons why capital taxation serves an important role in an optimal tax system, dividing the analysis into equity and efficiency arguments. Section 6 analyzes how specific capital tax bases should be taxed, examining both theoretical arguments and empirical evidence on the distortionary costs of capital taxation. Section 7 provides a brief discussion of how capital taxation should be taxed in light of technological change and an increased automation of the workforce. Finally, Section 8 concludes by delivering some concrete policy recommendations, and discusses limitations and ideas for future research.

2. Capital Taxation and Wealth Distribution: An International Outlook

We begin by discussing current practices of capital taxation in advanced economies and examine the economic importance and distributional characteristics of personal wealth and capital income.

2.1 *Current Practices of Capital Taxation*

In most empirical assessments of capital taxation, a capital tax refers to any tax on the return to savings, capital gains, dividend income, firms' profits (corporate taxation), property taxation, inheritance/estate taxation, and wealth taxation. Some of these taxes are levied on an income stream and some are levied on the stock of capital. From an economic perspective, it may not matter much whether the stock or the flow is taxed. For example, if someone's wealth yields an annual rate of return of 4%, a wealth tax of 1% and a capital income tax of 25% results in the same total annual tax burden. In the canonical life cycle model of labor supply and savings, taxes on the stock and the flow are equivalent. However, as will be discussed below, if rates of return differ across individuals, or are uncertain, taxes on the stock of capital and capital income taxes are no longer equivalent.¹ Moreover, for practical reasons it might be possible to tax the stock of an asset but not the income flow (or the other way around), breaking the equivalence in practice.

One way to assess the fiscal importance of capital taxation is to look at the aggregate revenues of capital taxes as a percentage of GDP. Figure 1 shows these outcomes for a selection of OECD countries in 2016. Panel (a) shows the overall tax-to-GDP ratio and its main components, and from these numbers it stands clear that capital taxes represent a relatively small share of total tax receipts. Their average share

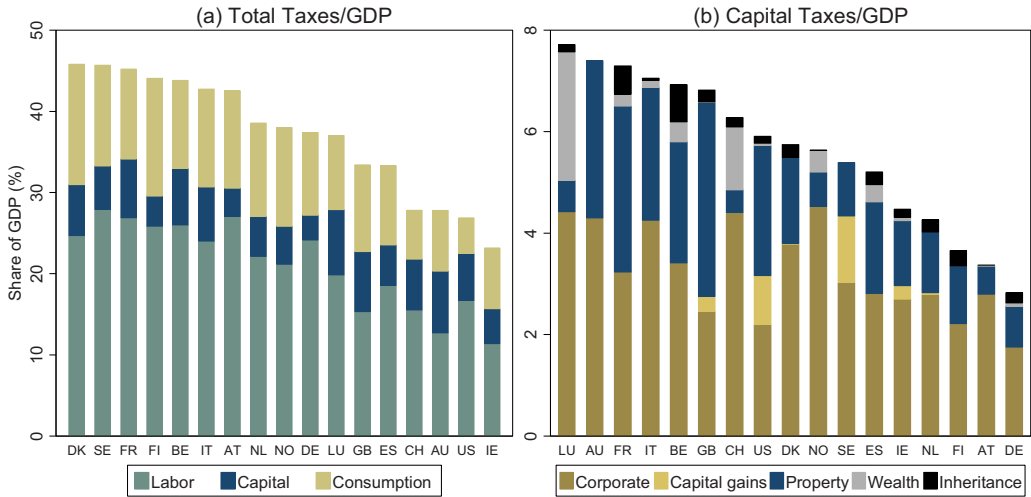


Figure 1. Tax Revenues in OECD Countries (Percentage of GDP). [Colour figure can be viewed at wileyonlinelibrary.com]

Source: Data from 2016, OECD tax revenue statistics.

is about one-tenth of all tax revenues and there is not much variation across countries. Direct labor taxes constitute the largest source of tax revenues followed by indirect consumption taxes.

Is it surprising that capital taxes are of such relatively limited fiscal importance? Perhaps not. The numbers make sense if we relate them to macroeconomic fundamentals. For example, assuming a private wealth-to-GDP ratio of 500% (the ratio ranges between 200% and 600% in developed economies), a real rate of return to capital of 3% and a capital income tax of 30%, this would result in capital tax revenue at 4.5% of GDP ($500\% \times 3\% \times 30\%$). Alternatively, if one uses the net capital share of national income, which is at around 20% (ranging between 10% and 30% in rich countries), and a capital income tax of 30%, this would result in a capital tax revenue of 6% of GDP ($20\% \times 30\% = 6\%$).

Panel (b) in Figure 1 shows the composition of different capital tax bases for the same set of countries. The corporate tax is the most important capital tax, representing roughly half of total capital tax revenues. Property taxes, which include both recurrent taxes (on either the stock or the value of imputed property income) and one-time transfer taxes, are also relatively important, representing on average one-third of all capital taxes. The other capital taxes are smaller and include taxes on households' interest and dividend income, realized capital gains and taxes on net wealth and intergenerational transfers.

Information exchange agreements between countries with the purpose to obstruct tax evasion and tax-driven capital flight to tax havens are important components of capital taxation. Since the mid-2000s, cross-national organizations such as OECD, G20, and the EU have initiated the signing of bilateral and multilateral agreements among both developed and developing countries. These efforts largely consist of introducing reporting standards and automated information exchange arrangements, aimed at curbing tax evasion and tax planning.² The number of participating countries has increased steadily, from zero in the early 2000s to 129 in late 2019.

The effectiveness of information exchange agreements relies on the number of participating countries and the credibility of the sanctions set up by the participating countries. In a survey of the impact of the early agreements, OECD (2017) estimates that over 500,000 taxpayers have disclosed assets over the past eight years, resulting in an increase of over 85 billion euros in tax revenues. Johannesen and

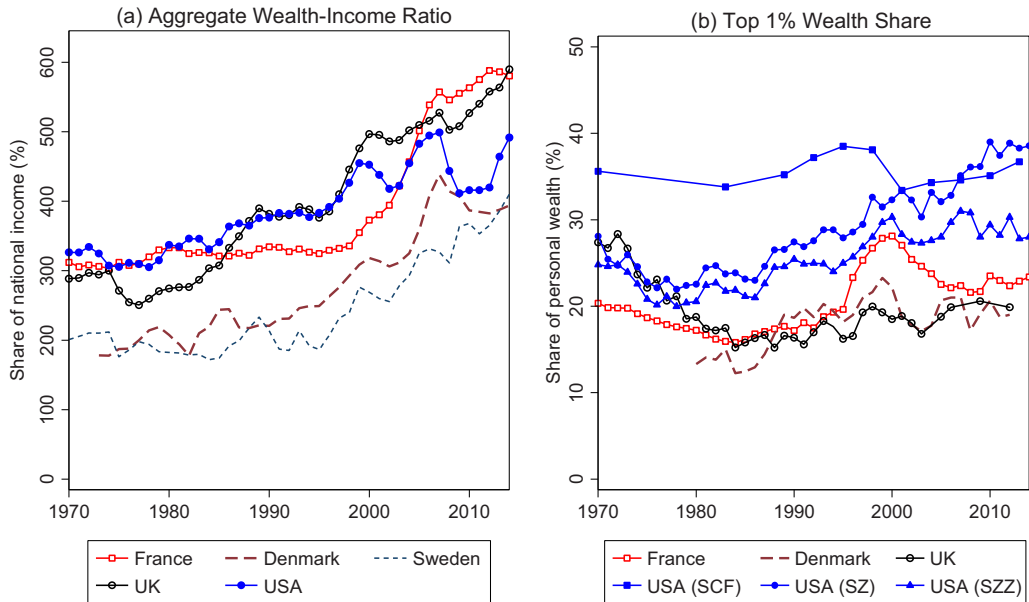


Figure 2. Wealth–Income Ratios and Top 1% Wealth Shares. [Colour figure can be viewed at wileyonlinelibrary.com]

Notes: Panel (a) shows the ratio of aggregate private wealth (sum of all assets less liabilities of households and nonprofit institutions serving households) to national income. Data come from www.wid.world for Denmark, Piketty and Zucman (2014) for France, UK, and USA, and Waldenström (2017) for Sweden. Panel (b) shows the share of the same private wealth as in (a) that is held by the richest percentile of the distribution of adult residents.

Sources: Jakobsen *et al.* (2020) for Denmark, Garbinti *et al.* (2019) for France, Wolff (2017) for “USA (SCF),” Saez and Zucman (2016) for “USA (SZ),” and Smith *et al.* (2019) for “USA (SZZ).”

Zucman (2014) studied the effect of bilateral treaties regarding the reporting of banking transactions, finding that tax evaders are sensitive to the risk of exposure, but instead of repatriating, shifted their funds to tax havens that were not covered by the treaties. Johannesen *et al.* (2020) analyzed how a series of US initiatives to curb the use of offshore accounts, which started in 2008, affected tax evasion of US citizens, finding that the initiative caused approximately 50,000 individuals to disclose offshore accounts with a combined value of about \$100 billion, the largest effects coming from voluntary compliance outside the control initiatives. This corresponds to 10% of the total offshore wealth of \$1000 billion estimated to be owned by US households (Alstadsæter *et al.*, 2018). Despite these findings, much uncertainty remains concerning the total impact of effects to combat offshore tax evasion, not least concerning the corporate sector where dimensions of legality are less easily defined.

2.2 Distributional Evidence

In Figure 2, we present two general trends in the Western world: (a) the ratio of total aggregate private wealth over national income and (b) the share of wealth held by the richest 1%. Looking at the aggregate

wealth–income ratio, the evidence shows that it has grown from approximately 200–300% (two–three years of national income) in the 1970s and the 1980s to a level twice as high today, approximately 400–600% of national income.³ Many different factors account for this upward trend, including the deregulation of postwar markets, relative asset price gains (especially in housing markets) and the marketization of funded pension assets.

The level and trend of wealth inequality matters for capital taxation through equity concerns. Estimating wealth inequality is, however, more difficult than estimating income inequality due to problems with the definition, valuation, and measurement of private assets and liabilities. There is currently a discussion in the United States about how to measure levels and trends in wealth inequality. Data from the Survey of Consumer Finances indicate a fairly stable top percentile wealth share (see Wolff, 2017; Bricker *et al.*, 2018). Saez and Zucman (2016) used capitalized capital income data and found that the top wealth share level significantly increased since the 1980s, but their estimates have been questioned by several papers (Kopczuk, 2015; Bricker *et al.*, 2018; Smith *et al.*, 2019). Panel (b) of Figure 2 shows some recent attempts to estimate the top 1% wealth share since 1970 using consistently defined data for a handful of Western economies. The results indicate a scattered overall picture: Denmark, France, and the United Kingdom have experienced an almost stable top percentile wealth share, around 20–25%, during the entire period (the United Kingdom is down from almost 30% in 1970), whereas the United States seem to have experienced increased wealth concentration, although the trend (and level) depends quite starkly on which data source (survey or capitalized income data) or method (of capitalizing incomes) one uses.

Hidden wealth in tax havens could potentially alter the picture of the aggregate size and distribution of wealth and capital income. Zucman (2013) attempted to estimate the extent of hidden offshore wealth globally using an ingenious approach based on netting out financial assets and liabilities in national balance sheets with the purpose of identifying unexplained gaps. His finding was that approximately USD 6 trillion, or 8% of global wealth, was placed in tax havens in 2007. Statistics from the Swiss tax authorities presented in Johannesen (2014) suggest that as much as 80% of all wealth that Europeans placed in Switzerland is not reported in their respective countries. Annual tax losses due to tax evasion are also significant, estimated to range between 300 and 1000 billion globally, of which the majority of these are concentrated to OECD countries (Crivelli *et al.*, 2016). The distributional consequences of this tax evasion are probably important, but are difficult to estimate.⁴

Wealth mobility and intergenerational transfers are other inequality dimensions with relevance to the analysis of capital taxation. Little is known about these outcomes in most countries because of the unusually high data requirements. Studies of different countries have shown that intergenerational wealth mobility tends to be lower than intergenerational income mobility (see, e.g., Charles and Hurst (2003) for the United States, Adermon *et al.* (2018) for Sweden; Boserup *et al.* (2016) for Denmark). The role of inheritances appears to be of specific importance: Adermon *et al.* find that that a large part, perhaps half, of the expected wealth rank transmission from one generation to the next adheres to inheritance and gifts.⁵ A similarly large role of intergenerational transfers, but for intergenerational income transfers in the top of the income distribution, was found by Björklund *et al.*, (2012). They found that the role of family background was stronger when capital income is considered alongside labor earnings, and that this pattern seems largely driven by intergenerational transfers. Inherited wealth flows at the aggregate level have been studied in some countries, relating these flows to national income or the stock of total wealth. Findings for France (Piketty, 2011) and Sweden (Ohlsson *et al.*, 2020) suggest that inherited wealth flows as share of total income have become increasingly important in the recent decades.⁶

3. Theoretical Background

To approach the question of the most desirable way to tax capital, a framework for the analysis is needed that specifies the objective of tax policy as well as the relevant constraints facing the policymaker. Most of our discussion will be based on the modern approach to optimal taxation, initiated by Mirrlees (1971), where the government balances the gains from redistribution and the financing of several private and public goods, with the harmful effects of taxes on economic activity.

3.1 *The Modern Theory of Optimal Income Taxation*

The starting point of optimal tax theory is the study of a population of taxpayers that differ in terms of their skills, or capacities, to earn income.⁷ If the government could observe each individual's skill level, the tax planner could assign each individual a tax or transfer depending on their unique personal capacity to earn income. Such a hypothetical tax system would fulfill all of society's distributional objectives, whatever those may be, without disrupting economic activity. Individual economic circumstances are not, however, observable to the government and individuals have no incentives to truthfully reveal them. For this reason, taxes must be based on observable characteristics and economic quantities, such as income or wealth. This causes economic distortions as individuals will change their income and wealth in response to taxation. It should be emphasized, that the economic costs of taxation (often referred to as excess burden or deadweight loss) are rooted in the information problem of the government, namely, the government's inability to verify individual earning ability. As we will explain in more detail below, capital taxes can serve an important function by mitigating the information asymmetry between the government and private agents.

Formally, an optimal income tax problem amounts to the maximization of a social welfare function that describes how the welfare of agents in the economy should be valued and aggregated. This maximization is subject to a set of incentive constraints and a government's budget constraint. The incentive constraints capture that individuals freely choose their desired income subject to the taxes set by the government. This implies that whenever the government attempts to raise the welfare of low-skill individuals through changes in taxes and transfers, it has to fear that high-skill individuals might adjust their income in an attempt to replicate the income of low-skill individuals in order to qualify for a lower tax burden.⁸ The social welfare function is typically formulated as a function of individual utilities. One such social welfare function is the "Utilitarian" one where the government is maximizing the sum of individual utilities. The goal of redistributive taxation is then to equalize marginal utilities across individuals. Another social welfare function is the so-called max–min social welfare function, where the government's aim is to maximize the utility of the lowest skilled agent in the economy. If the lowest skilled agent in the economy does not work, the max–min social objective is equivalent to the objective of tax revenue maximization from the working population. It is also possible to construct a social welfare function where individuals in the economy are attached general weights (so-called generalized social welfare weights) that are not necessarily tied to individual utility, which are able to capture a broader range of fairness concerns (see Saez and Stantcheva, 2016). Note that the social welfare function embodies a normative assumption, and is specified by the researcher. Researchers often compute optimal policies under different social welfare functions with the hope of identifying desirable features of tax systems that are fairly robust with respect to these assumptions.⁹

3.2 *Dynamic Models of Optimal Income Taxation*

The original Mirrlees (1971) model was static. However, subsequent contributions have analyzed richer, multiperiod, Mirrleesian economies. In such models, researchers need to specify how the labor

productivity of agents evolves over time. A common approach is to view individual productivities as partially predetermined (depending for example on inherited traits, the childhood environment, access to education, etc.), partially evolving over time (as a consequence of circumstances, such as luck, and health conditions), and partially being the result of economic choices (such as the investment in education, on-the-job training, etc.). This implies that, at any point in time, the distribution of utility depends on the initial heterogeneity in the economy (what individuals are born with), current and past realizations of economic shocks as well as individuals' past economic choices.¹⁰

A persistent feature of the economy is that capital income is more unevenly distributed than labor income. Thus, from a purely distributional point of view, capital taxes appear desirable as instruments to combat inequality. The relevant question, however, is to which extent capital taxation enables the tax system as a whole to more efficiently raise tax revenue and achieve distributional objectives. Our discussion about the optimal taxation of capital will focus mainly on the desirability of capital taxation in economies where labor income is already subject to progressive income taxation. The relevant question then becomes whether or not taxing capital income in addition to labor income allows for more income redistribution than what can be achieved with a nonlinear tax on labor income alone. Moreover, the fundamental task is to balance the equity gains from taxing capital income against the distortions of capital income taxation, in the form of distorted savings decisions, labor supply distortions and distortions in portfolio choice.

In the early macroeconomic models used to study optimal capital taxation, the analysis centered on the dynamic decisions of a representative individual, focusing mostly on the efficiency properties of a tax system that raises a given amount of revenue. In these models, distributional concerns were absent. At the same time, introducing heterogeneity in terms of skills, as in the Mirrlees (1971) framework, did not appear to change the result that capital income should not be taxed, at least not in the simple setting of Atkinson and Stiglitz (1976).

Today, these models serve as important theoretical benchmarks. If all inequality in capital income originates from inequality in labor income (because of differences in work ability), it is perhaps not surprising to find an unimportant role for capital income taxation in the optimal tax system. The opposite extreme would be a situation where all inequality derived from inequality in capital income. In such a situation, the only way to achieve redistribution would be to tax capital income.

3.3 *Dimensions of Taxpayer Heterogeneity*

One major development in the recent research literature is that researchers now are beginning to explore the implications of individual heterogeneity beyond differences in labor market ability for the design of optimal tax systems.¹¹ The most attractive reason to tax capital income, in our view, is the regular empirical finding that there is substantial heterogeneity in capital income conditional on labor. Thus, taxing capital income in addition to labor income allows to achieve more redistribution than taxing labor income alone, even if the labor income tax is optimal and fully nonlinear.¹² The normative implications depend on where the inequality in capital income conditional on labor income derives from. The literature has recently highlighted, for example, heterogeneity in bequest behavior and investment returns.¹³ Although the specific policy implications depend on the type of heterogeneity that is considered, a common theme is that they lead to a role for positive optimal capital income taxation.

Another important development is that the literature has begun to connect theories of optimal capital taxation to the distribution of capital and the elasticity of capital supply with respect to the after-tax return in terms of so-called sufficient statistics. Saez and Stantcheva (2018) provide a framework in which many policy questions about capital taxation can be addressed, including the role of heterogeneous returns and differences in preferences for different types of wealth. The main benefit of this approach is

to assess small reforms to existing tax systems, since large discrete reforms to tax systems also change the parameters that the formulas depend on (see Kleven, 2018 for a recent discussion).

3.4 *Open Versus Closed Economies*

A limitation of many modern studies of capital taxation is that they are set in a closed economy where the efficiency costs of capital taxation relate to how individuals change their intertemporal consumption patterns and how capital taxation discourages productive domestic investments and growth. In an open economy, additional efficiency costs arise to the extent that individuals can migrate and/or move their wealth abroad. Most countries' tax systems abide by the so-called residence principle, which means that individuals are liable to pay taxes on all their incomes, independently of where these incomes have been earned (an important exception being the corporate income tax). A major determinant of the economic costs of capital taxation are the possibilities for individuals to engage in tax evasion and tax planning, thereby avoiding taxation in their home country. As there is a clear upward trend in terms of information exchange agreements between countries, the possibilities to avoid taxation in the home country are diminishing. This increases the capacity of small open economies to tax capital. Here, it should be mentioned that if all tax planning and tax avoidance possibilities disappear, the only way for an individual to avoid taxation in the home country is to migrate. Therefore, capital taxation is also related to the migration margin.

3.5 *Uniform Versus Differential Taxation of Assets*

Most of the theoretical research on the optimal design of capital taxation starts from models where a single asset is used as vehicle for consumption smoothing and to fuel investments in the economy. In practice, there are different types of capital (such as housing capital and corporate capital) and an important question is how taxes on different forms of capital optimally should be differentiated.

A principle that is often discussed is "neutral" or "uniform" capital taxation. The main rationale for uniform capital income taxation is to avoid distortions in production, supported by the so-called production efficiency theorem developed in the seminal contribution of Diamond and Mirrlees (1971).¹⁴ In short, the result relies on the observation that taxing different input factors in different ways distorts production, and that these distortions, in the end, manifest themselves in the form of different consumer prices. The effect of the input tax differentiation can be replicated by using differential taxation of final consumption goods. Eliminating the differential taxation of production inputs, and replacing it with differential taxation of final commodities, generates a Pareto-improvement, as it will increase total output produced in the economy. An important limitation of the Diamond and Mirrlees is, however, the assumption that pure profits can be fully taxed. If that is not the case, it is desirable to impose higher tax rates on input factors used in sectors characterized by imperfect competition or assets where prices are above long-run marginal costs that reflect economic rents (Dasgupta and Stiglitz, 1972). This relates to the often-overlooked distinction between wealth and capital. Not all savings and wealth are productive and facilitates physical investment.

There are two additional arguments in favor of uniformity that carry substantial weight in practice, and are often regarded as the main arguments why uniformity is an important principle in modern tax systems. The first argument is that it is difficult to know how tax rates on different assets optimally should be designed. An optimal tax differentiation depends in a complex way on a range of different elasticities of substitution in consumption and production as well as on the properties financial markets.¹⁵ The second argument is that uniform taxation, as a general principle, can be valuable to suppress attempts of special interest groups to pressure politicians to modify the tax system.

4. The Classic Argument Against Capital Taxation

One way to approach the issue of capital taxation is to study a neoclassical growth model where an infinitely lived representative individual supplies labor in each time period and transfers resources across time periods through savings in order to smooth consumption.¹⁶ The savings of the representative individual finances the investments in the economy and the optimal tax problem is to design taxes on labor and capital income in every time period in order to reach a given amount of tax revenue in the most efficient way (maximizing the welfare of the representative individual). In such a framework, Chamley (1986) argued that the tax on capital should be zero in the long run. The same conclusion was reached by Judd (1985), who studied redistribution from capitalists to workers in a related framework.

These studies have been extremely influential and have established a widespread intuition that capital income taxation is undesirable because it becomes very distortive over long time horizons. The reason being that the distortion from capital income taxation grows over time as the interest on savings becomes increasingly important to finance future consumption the further one looks into the future.¹⁷ Many scholars have questioned the Chamley–Judd result because it rests on unrealistic assumptions. For example, infinite planning horizons reflect the decisions applying for a dynasty, where different generations are perfectly connected through altruistic bequests, and neglect the inequality that is created over time between individuals who receive and individuals who do not receive inheritances. We will come back to these issues below, but perhaps the most important criticism against the result is that it might be logically incorrect. Straub and Werning (2020) argue that the steady-state optimal (long-run) capital tax in fact can be very large (equal to an upper bound) due to the possibility that income effects dominate substitution effects, implying agents save more when they are being taxed more, leading to increasing benefits of raising capital taxes over time.¹⁸

A different starting point for analyzing capital income taxation is models building on Mirrlees (1971). As already discussed, in this framework, the government desires to redistribute between individuals with different abilities to generate labor income, but since ability is assumed to be private information, the government has to do so *indirectly* by taxing observable economic quantities (such as labor and capital income). The important question that arises is whether enhanced redistribution can be achieved by taxing capital income in an economy where labor income is already subject to progressive taxation.

The relevant starting point to think about this issue is Atkinson and Stiglitz (1976), one of the most influential studies in public finance. Atkinson and Stiglitz provided conditions under which it is undesirable to use differentiated commodity taxation if the government is allowed to simultaneously use nonlinear income taxation to pursue redistributive goals. More specifically, they showed that if preferences are homogenous across individuals and weakly separable between consumption and leisure, all information about individuals' earnings abilities is contained in their choices of labor income, and differentiated commodity taxation would only create distortions without resolving any of the asymmetric information between the government and private agents. Since consumption in different time periods can be viewed as different commodities, and a tax on capital income is equivalent to making consumption tomorrow more expensive than consumption today, their work has been interpreted to imply that capital income should not be taxed. Today, however, many scholars view the application of the Atkinson–Stiglitz result to capital taxation to be an unfortunate misinterpretation and oversimplification of the issue of capital taxation, see Stiglitz (2018).

Although intuitively appealing, the result is not robust to perturbations in the modeling framework. Here, we present four broad classes of situations where the Atkinson–Stiglitz theorem breaks down, providing more detailed arguments for taxing capital income in Sections 5.1 and 5.2.

First of all, Atkinson and Stiglitz analyzed a model where individuals live for two time periods, and work only during the first. Later studies have extended the analysis to life spans over several periods. A zero tax on capital income is then optimal only if the labor income tax is allowed to be a complicated function of current annual income, as well as annual income each year in the past. Such labor income

taxation does not exist in practice, restricting the policy relevance of the application of the Atkinson–Stiglitz result to the issue of optimal capital income taxation (see the discussion in Section 5.2.5).

Second, and perhaps most importantly, a fundamental restriction of the Atkinson–Stiglitz framework is that individuals are assumed to differ only along a single dimension. This implies that all inequality in capital income originates from individuals' labor incomes (and labor earning abilities, in particular). Therefore, the optimal nonlinear labor income tax is able to extract all information about individuals' underlying earnings abilities, removing any equity role for capital income taxation. This is perhaps the strongest reason why the Atkinson–Stiglitz framework is not very useful to think about the optimal taxation of capital income. Later in this section, we discuss how heterogeneity in additional dimensions, for example, the form of inheritances received or differences in returns to investment, creates robust reasons to tax capital income.

Third, in their benchmark case, Atkinson and Stiglitz assumed that preferences are separable in consumption and leisure, implying that current and future consumption is equally substitutable for leisure. With nonseparable utility, where consumption and leisure are complements, taxing consumption becomes an indirect way of taxing leisure. Depending on how consumption and leisure move over the life cycle, capital income taxation can be desirable to offset the tendency for the labor income tax to induce substitution toward leisure.

Fourth, the Atkinson and Stiglitz result assumes that the government can optimize a nonlinear tax on labor income. If the labor income tax cannot be fully optimized or is not allowed to be fully nonlinear (e.g., due to political constraints), then a positive tax on capital income is generally desirable provided that individuals with high labor income have disproportionately more capital income than those with low labor income (even if labor income perfectly predicts capital income).¹⁹ In this case, capital taxes can be seen as contributing to the overall progressivity of the tax system, or simply achieving the progressivity that is missing in the labor income tax. The correlation between labor income and capital income plays an important role when constructing practical policy proposals. In particular, if one wishes to lower marginal labor income taxes for efficiency reasons, raising capital income taxes can be an important tool to off-set the associated distributional implications.

5. Arguments in Favor of Taxing Capital

We divide the arguments in favor of taxing capital income into equity and efficiency arguments. As we have already mentioned, the workhorse models of optimal taxation build on the assumption that individuals only differ with respect to their earnings abilities. This implies that differences in wealth across individuals solely derive from differences in skill and effort in the labor market. Some recent studies shed light on the fact that individuals differ in other important dimensions, which implies heterogeneity in wealth and capital income conditional on labor income. If these additional attributes correlate with individuals' earnings abilities, taxes on capital become useful as indirect means to tax people with high ability.²⁰ This relates to the fundamental information problem in the optimal income tax literature. If there is heterogeneity in capital income conditional on labor income, a tax on labor and capital income can achieve more redistribution than a labor income tax alone since capital income contains valuable information about individuals' hidden earnings abilities.

5.1 *Equity Arguments*

5.1.1 *Heterogeneity in Returns*

In traditional models, individuals are assumed to earn the same risk-adjusted return on their investments. There is, however, a growing empirical literature documenting sizable differences in returns across

individuals.²¹ If individuals with high labor earnings ability also are better at generating a high return on their investment, because of access to social networks, information, or due to the economies of scale, forces working in favor of positive optimal capital taxation arise. For example, either highly skilled agents could achieve a higher rate of return by redirecting some of their time from labor supply into activities that raise their return on investment or they could simply be assumed to be inherently better investors. Gahvari and Micheletto (2016), Kristjánsson (2016), and Jacobs *et al.* (2018) analyze models containing such elements and show that this generally leads to positive optimal capital income taxation even in the presence of an optimal nonlinear income tax. A small literature has also investigated the optimal tax implications of allowing for idiosyncratic investment uncertainty, a topic that we discuss in Section 5.2.2.

5.1.2 *Heterogeneity in Preferences*

In traditional models, individuals have the same time preferences for consumption. If high-skill individuals have a higher taste for future consumption than low-skill individuals, high-skill individuals will save more, even if they have the same income as a low-skill individual. This implies that capital income should be taxed. The relationship between preference heterogeneity and optimal capital taxation has been analyzed in a few recent contributions (see Saez, 2002; Diamond and Spinnewijn, 2011; Golosov *et al.*, 2013). In this context, an important question is the following: should the government penalize individuals who prefer to consume tomorrow rather than today? Does it matter if the differences in savings behavior are the result of individual mistakes (e.g., failure to estimate how much one values consumption at retirement)? These difficult questions have attracted some attention in the recent literature. For example, the treatment of pension savings in the tax system when individuals are subjective to self-control problems or cognitive biases, and the appropriate role of the government to deal with such issues, is analyzed by Moser and Silva (2019) and Hosseini and Shourideh (2019).

5.1.3 *Heterogeneity in Endowments*

What are the optimal capital tax implications of the fact that individuals start their lives with different endowments of wealth?²² Cremer *et al.* (2003) analyze a model where individuals have the same preference for saving, but instead differ in terms of their endowments/inheritance (assumed to be exogenous). If there is a positive correlation between endowments and earnings ability (for instance, due to a genetic correlation in earnings ability or an intergenerational transmission of economic opportunities), it implies that two individuals with the same labor income, but with different abilities, also differ in terms of the amount they can consume because of their endowment. This implies that these two individuals have different demand functions for goods (including future consumption) providing a motivation for taxing capital income. This argument relies on the government not being able to observe inheritance; otherwise, all differences in initial endowments could be eliminated through confiscatory taxation.²³ Of course, in reality bequests are often taxed. We turn to the issue of optimal inheritance taxation in Section 6.4.

5.2 *Efficiency Arguments*

5.2.1 *Reducing Distortions on Human Capital Accumulation*

One of the most important objections to the Chamley–Judd analysis concerns its assumption that only capital accumulates over time. In economies with progressive income taxation, an equally serious concern should be to provide incentives for individuals to invest in education, exert effort on the job, and advance

in their careers. That is, the accumulation of human capital can be just as important as the accumulation of physical capital. Jacobs and Bovenberg (2010) analyze the role of human capital accumulation for the desirability of taxing capital income. They find that, in a model where not all education investments are verifiable by the government, and therefore cannot be directly subsidized, a positive tax on capital income serves to alleviate the distortions of the labor tax on human capital accumulation. The intuition is that labor taxes encourage individuals to substitute human by financial assets. The optimal capital tax trades off the distortions on the overall level of total savings and the composition of saving (human vs. financial assets), which can lead to positive capital taxation. Importantly, the result in Jacobs and Bovenberg does not depend on nonseparable utility, heterogeneous preferences, or financial market failures. Since that study, there has been a surge of papers emphasizing the importance of considering human capital accumulation in optimal tax analysis. Stantcheva (2017) is a recent contribution that further discusses this strand of the literature.

5.2.2 Taxing Economic Rents

The literature on optimal income taxation has almost exclusively analyzed how the so-called “normal” return to savings should be taxed (such as the return to an average investment or the yield of a government bond). As acknowledged above, returns are likely to be heterogeneous across individuals. If an individual earns a return on an investment that is greater than the normal rate of return, this is an “excess return.” If excess returns reflect chance events (and not factors over which individuals exert control), they are viewed as “economic rents,” which can be taxed without distortions. On the other hand, if excess gains are the result of productive economic activity, taxing excess returns entails distortions.

An important difference between a tax on the stock of capital (a wealth tax), and a capital income tax is the taxation of excess returns. If the normal return on an investment is 5%, a capital income tax of 20% is comparable to a wealth tax of 1%. However, for individuals who receive a return greater than 5%, they will have to pay tax on the excess return under capital income taxation, but not under a wealth tax.

To usefully analyze the taxation of excess returns, one can consider a framework where individual investors choose between risky and safe assets. The standard model to analyze this issue goes back to Domar and Musgrave (1944), which was further generalized by Stiglitz (1969).²⁴ The main message is that, under certain conditions, investors who are faced with a capital income tax with full loss offset (implying that losses can be deducted from the tax base) can change their choice between risky and safe assets in a way that generates the same combination of risk and return as in a no-tax situation. The reason is that the capital income tax provides insurance that allows agents to increase the risk of their portfolios, mitigating the effect of the tax on the after-tax return.

It is a difficult but important empirical exercise to determine to which extent the taxation of excess returns represents taxation of economic rents and to which extent it represents distortionary punishment of highly skilled investors. Most economists would probably agree that it is desirable to tax excess returns, and the academic discussion has mostly centered on whether or not to tax the normal return to savings. The Mirrlees Review (Mirrlees *et al.*, 2011) recommends taxing excess returns but not taxing the normal return to savings. Notably, this policy advice goes against their background report, Banks and Diamond (2010). The main argument in Mirrlees *et al.* (2011) is that the taxation of the normal rate of return violates principles of neutrality in the tax system.²⁵ However, the purpose of the tax system is not to achieve neutrality, but to maximize social welfare. Thus, capital income taxation must be judged by how it interacts with the desire to redistribute income at the lowest efficiency cost. Few studies, however, have analyzed the optimal taxation of capital income in models featuring idiosyncratic investment risk and ex ante heterogeneous individuals. An exception is Spiritus and Boadway (2017). These authors build upon the works of Gordon (1985), Christiansen (1993), and Schindler (2008), and develop a general framework to analyze the question whether the exemption of the risk-free component of capital income

(normal rate of return), as recommended by the Mirrlees Review, continues to hold when some assets earn excess returns. In the standard mean-variance portfolio framework, where returns to private investment satisfy constant returns to scale (and hence, do not include rents), taxing excess returns and exempting normal returns (as in the Mirrlees review) is optimal. If, on the other hand, there are returns to scale in private investments, the normal return to capital should be taxed when returns to scale in investment are decreasing, and subsidized when they are increasing. Note that these results apply in a model where all other arguments for positive capital taxation discussed in this section explicitly have been ruled out.

5.2.3 *Correcting Capital Market Failures*

Atkinson and Sandmo (1980) is a seminal study of capital taxation in an Overlapping Generations (OLG) framework where the government cares about the well-being of different generations, that each live for two periods, working in the first, and being retired in the second. In this setting, a well-known result is that if the government is free to issue public debt or is allowed to use age-dependent lump-sum transfers, the first-best level of capital accumulation is achieved. However, when there are restrictions on the use of such instruments, the capital stock typically falls short of the first-best level. In this situation, Atkinson and Sandmo demonstrated that a positive tax on capital income can, somewhat paradoxically, be used to induce agents to save more if the income effect on savings is sufficiently strong. Moreover, a positive capital tax can finance tax reductions on labor, which can be a way to make younger generations save more. A limitation of the analysis is the assumption of a representative agent. Later studies have analyzed OLG models with redistribution motives both between and within generations (due to skill heterogeneity), which can introduce conflicting motives between intra and interhousehold redistribution.²⁶ At the end of the day, it is, however, unclear how large of a role intergenerational redistribution issues should play when designing taxes on labor and capital. There are other ways to redistribute between generations that are more effective, for example, by adjusting the pension system.

5.2.4 *Correcting Insurance Market Failures*

A well-known situation, in which the models of Atkinson–Stiglitz and Chamley–Judd lead to a positive capital income tax is when future earnings are uncertain. In a perfect market, individuals would be able to handle the prospect of an uncertain income by borrowing in periods with low income and pay back these loans when incomes have recovered. The problem is that the market is not perfect, individuals cannot always borrow, and there are many risks that are difficult or impossible for individuals to insure themselves against. This can give rise to precautionary savings, where individuals save in periods with high income to secure their consumption in periods with (unexpected) low incomes.

Aiyagari (1995) considered an infinite-horizon model where individuals are borrowing-constrained, face uninsurable uncertainty about their future wages, and only decide about how much to consume in each time period. The borrowing constraints prevent individuals from insuring against idiosyncratic shocks, implying precautionary savings. In this setting, Aiyagari showed that the incompleteness of markets could lead to an overaccumulation of capital, which motivates positive capital income taxation to reduce this overaccumulation and move the capital stock closer to the level prevailing with complete markets.²⁷ However, in the Aiyagari economy, the government cannot use public debt to correct the market failure and move the economy to the optimal level of capital accumulation. In general, however, that there could be aggregate welfare gains from reducing the capital stock, seems, however, to be somewhat implausible.

The distinction whether or not individuals face deterministic or stochastic productivity profiles over their life cycle also matters for the desirability to tax savings in models analyzing *nonlinear* income tax systems. If individuals face uncertainty regarding their future productivity, individuals might self-insure

through their savings. This motive to save implies a negative impact on labor supply. The reason is that individuals tend to save too much and will bring the same amount of savings into the future, irrespectively of if they realize a high or a low productivity in the future, which has a negative income effect on labor supply in both states (if leisure is a normal good). The provision of insurance over the life cycle in response to uncertain productivity is the focus of the so-called *New Dynamic Public Finance* literature (see Golosov *et al.*, 2006).²⁸ Uncertainty about labor productivity seems, however, to be of secondary importance to the taxation of capital income, as suggested by Farhi and Werning (2013b) and Bastani *et al.* (2013).²⁹

The above discussion has considered how stochastic labor productivity can justify taxes on capital income. However, a more straightforward argument for taxes on capital income arises if the income from capital itself is affected by idiosyncratic risk (and private insurance is lacking). Varian (1980) considers a simple model where an individual lives for two periods and has some wealth in the first period of life that he/she wishes to transfer to the second period. The key element of the model is that taxable wealth in the second period is equal to the sum of the saved amount and an idiosyncratic error term. In this case, Varian shows that optimal taxation of taxable wealth in the second period is positive, and is in general progressive, as it provides social insurance against wealth (income) fluctuations. Even though Varian did not consider the incentive effect of taxation on labor supply, and income fluctuations only reflect good or bad luck, the model illustrates in a nice way a common rationale for positive taxation of capital income in the presence of idiosyncratic investment risk.

5.2.5 Reducing Distortions on Labor Supply

In early life cycle models of optimal capital taxation, it was common to analyze models where individuals only work in the first period of life. The subsequent literature has analyzed the optimal taxation of capital income in lifecycle models where workers work in multiple periods.³⁰ In such settings, novel reasons to tax capital income arise.

Erosa and Gervais (2002) is one of the most well-known studies analyzing (Ramsey) optimal taxation in a life cycle economy with a representative agent. They show that in a life cycle economy, labor supply behavior is different at different ages, which motives age-dependent taxation labor income taxation. If it is not feasible to levy age-dependent taxes, they show that capital income taxation can serve as an (imperfect) substitute. Since capital income taxation imposes a greater burden on labor supplied at younger ages relative to labor supplied at older ages, a positive capital tax is desirable if such a tax causes an increase in the labor supply of the old that more than compensates for the reduction in the labor supply of the young.³¹ Notably, this role for positive capital taxation arises even if the utility function is weakly separable between consumption and leisure.

If the utility function is nonseparable between consumption and leisure, an additional reason to tax capital income arises. In Erosa and Gervais, the reason the government must employ distortionary taxation is the inability to tax leisure. Since leisure and consumption tend to rise over the life cycle, consumption later in life is more strongly associated with leisure than consumption earlier in life. This implies that consumption tomorrow should be taxed higher than consumption today, which is achieved by a positive tax on capital income. This is essentially a dynamic variant of the classic Corlett and Hague (1953) result on the desirability to tax goods that are complements to leisure.

The above life cycle elements of labor supply studied by Erosa and Gervais (2002) are key features of the economy analyzed by Conesa *et al.* (2009), who find a positive and sizable optimal tax on capital income in their simulations calibrated to fit the US economy.

The early literature analyzing capital income taxation in dynamic frameworks considered economies with a representative individual and focused on linear (proportional) tax instruments (and in the case of OLG models, a representative individual within each generation).³² The subsequent literature has

analyzed richer dynamic models where agents are heterogeneous in skills, work in multiple periods, and potentially face stochastic productivity profiles over their life cycles.³³ The goal of the social planner in these settings is to achieve redistribution (or insurance) at the lowest efficiency cost. A common result in these models is that it is desirable to tax savings since this punishes people who reduce their labor supply in response to progressive labor income taxation (referred to as “mimickers” in the optimal tax literature) since they tend to save more. To understand the intuition behind this result, consider a setting with two agents who work in two periods, can save between periods, and share the same wage rate when young, but with a certain probability obtain a higher wage rate when middle-aged. The government wishes to redistribute from high-wage to low-wage middle aged agents. In this case, redistribution must be carried out under the threat that high-wage agents reduce their labor supply and claim to be low-wage agents in the second period (thereby reducing their tax burden). The key observation is that young agents planning to engage in such mimicking behavior when middle-aged (if they are lucky and obtain the higher wage rate) will save more than those who do not plan to reduce their labor supply in this way. Hence, taxing savings makes it less attractive for high wage individuals to reduce their labor supply in response to progressive income taxation, thereby enabling enhanced redistribution.³⁴ In the context of this simple example, the taxation of savings enables to obtain a Pareto-improvement.

5.2.6 *Capital Taxation Can Affect the Market Remuneration of Different Skill Groups*

Another reason to tax capital income can arise when investment affects the remuneration of low- and high-skill labor differently. Pirttilä and Tuomala (2001) show that if an increase in investment leads to a decrease in the relative wage of low-income households, then a positive tax on capital income is desirable as it provides indirect redistribution through the wage channel.³⁵ The reason is that discouraging savings through capital income taxation reduces wage dispersion, which in turn makes it easier to redistribute income.³⁶ Gahvari (2014) provides further insights on this result and uses a pedagogically useful model to relate it to the breakdown of Diamond and Mirrlees (1971) production efficiency result.³⁷ Scheuer (2014) analyzes a model where individuals differ in their income earnings abilities and their cost of setting up a firm that produces inequality in investment opportunities. In this setting, he shows that a positive corporate income tax (a sector specific tax on capital income) can be desirable as an indirect way to redistribute through general equilibrium effects on wages. These studies point to the importance of recognizing the interaction between capital taxation, wage dispersion, and the government’s ability to redistribute.

5.2.7 *Capital Income Partly Reflects Labor Income*

An important argument for positive capital income taxation is that it is often difficult to distinguish between labor and capital income. Intuitively, if capital income partly reflects labor income, then it should be taxed for the same reason as we tax labor income. For example, individuals can increase their capital income and decrease their labor income by devoting some of their time available for working into securing a high return on their investments (see also Section 5.1.1). Owners of small businesses can also decide, to some extent, how much of the return to their labor effort that should be realized as profits (capital income) and how much that should be realized as labor income. Christiansen and Tuomala (2008) find that the possibility for income shifting can provide a rationale for positive taxation of capital income even though the government redistributes through an optimal nonlinear income tax and preferences are such that zero taxation of capital income would otherwise be optimal. We return to the issue of income shifting in Section 6.2.

6. Specific Capital Taxes: Theoretical and Empirical Considerations

As evident from the studies surveyed above, most theoretical research on optimal capital taxation considers models where a single asset is used to transfer resources across time and to fuel investments in the economy. In practice, individuals invest in a variety of different assets. These assets have different properties, and the motivations for taxing them are different. In this section, we provide a more detailed discussion of specific types of capital taxes, focusing on wealth taxation, taxes on personal capital income, property taxation, and inheritance taxation. We also briefly discuss corporate taxation.

6.1 Wealth Taxation

The wealth tax base is not easy to define. According to the official wealth definition in the UN System of National Accounts, private wealth includes not only real estate, bank deposits, bonds, corporate equity, etc., but also all funded insurance savings in life insurance and occupational pension schemes.

One major challenge for wealth taxation is the valuation of business assets. In the absence of secondary market prices, valuation has to be based on accounting information. This introduces errors in the valuation, creating uncertainty regarding the size of the tax burden. Moreover, wealth taxation can give rise to liquidity problems when a tax has to be paid on an asset that does not generate an income stream. It can also be questioned whether the liquidity of the firm should be drained by taxation, when such liquidity can be used to finance new investments. Attempting to respond to such problems, several countries adopting wealth taxes introduced reliefs, or even total exemptions, on business assets. These measures hurt the legitimacy of the tax and also represented departures from the conceptually advantageous broad-based feature of the wealth tax.

The relevant question is whether a separate tax on wealth is motivated given the existence of other forms of capital taxes (such as property and inheritance taxes) and taxes on capital income. This issue has recently been discussed by Boadway and Pestieau (2019), Saez and Zucman (2019), and Kopczuk (2019). The overall conclusion of the latter two contributions is that the administrative problems associated with introducing a wealth tax outweigh the benefits, provided that other instruments, such as capital income taxation and inheritance taxation can be employed optimally. We tend to concur with this view.

To motivate wealth taxation, there has to be something that the wealth tax can achieve that other taxes cannot achieve. One such motivation for a wealth tax arises if there are negative externalities associated with a skewed wealth distribution. The shape of the wealth distribution is a function of not only the present design of the tax system, but also the design of the tax system in the past. The wealth distribution also reflects present and past opportunities for tax evasion, tax arbitrage, and tax planning. Thus, wealth taxation can be viewed as an instrument to compensate for the failure to tax labor or capital income optimally in the past. This can be due to an inability of the government to tax certain kinds of hard-to-observe income (such as unrealized capital gains), but could also reflect political or administrative failures.

Another motivation for a wealth tax is provided by Guvenen *et al.* (2019). They analyze wealth taxes in a model where individuals have different returns to their investment and propose that there could be welfare gains associated with shifting from capital income taxation to wealth taxation. The argument is that when only capital income is being taxed, the burden of taxation falls disproportionately on high-skilled investors, whereas passive and less successful investors avoid taxation. An interesting conflict therefore arises between redistribution (those who generate high returns have a high earnings ability) and efficiency (taxing capital income can lead to reduced investment among high-skill investors). This presumes that excess returns are created by productive activities and not by luck or circumstance.

There is not much empirical research on the efficiency cost of wealth taxes. The main reason is the lack of adequate data and credible identification strategies. Housing wealth constitutes the bulk of most household portfolios, and is considered to be fairly insensitive to wealth taxation (apart from

capitalization effects). Entrepreneurial activity and business wealth are perhaps what economists are mostly interested in but are imperfectly covered in most wealth databases and sometimes not even part of the tax base.

Most empirical studies examining behavioral responses to the wealth tax analyze taxable wealth rather than total marketable (market-valued) wealth (see Seim, 2017; Zoutman, 2018; Brühlhart *et al.*, 2019 for recent contributions). This can be problematic when trying to learn about the real responses to wealth taxation since the responsiveness of taxable wealth is endogenous to the definition of the wealth tax base decided upon by the tax authority (see Slemrod and Kopczuk (2002) who make this point in the case of the elasticity of taxable income). Jakobsen *et al.* (2020) is the perhaps most ambitious attempt so far to identify the real effects of wealth taxation by analyzing behavioral responses of taxpayers. Using a rich Danish administrative register dataset and the gradual abolishment of the Danish wealth tax between 1989 and 1997, they find clear reduced-form effects of wealth taxes in the short and medium run, with larger effects on the very wealthy than on the moderately wealthy. Connecting these reduced-form estimates to a calibrated model, they obtain an implied long-run elasticity of taxable wealth with respect to the after-tax rate of return of 0.77 for the moderately wealthy and 1.15 for the very wealthy. The order of magnitude of the estimated effects indicate fairly notable efficiency costs of the wealth tax, although the estimates should be interpreted with some caution due to the fact that estimates capture the effect of wealth taxes on those who are already wealthy, omits wealth tax-related migration responses, and do not capture general equilibrium effects.³⁸

6.2 Taxes on Personal Capital Income

Personal capital income refers to the return on a person's capital stock, which includes interest income, dividends, realized and unrealized capital gains.

The main practical problem with the taxation of personal capital income is the taxation of unrealized capital gains. Unrealized capital gains represent capital income that should be taxed when it arises, just like other sources of capital income, such as interest and dividends. In most countries, however, capital gains are only taxed when they are realized in market transactions. The fact that the tax payment is delayed until realization implies that the effective tax rates on assets that deliver returns to the investor mainly in the form of capital gains become lower as compared to investments that primarily pay out yearly dividends, especially for longer holding periods.³⁹ It also gives rise to a lock-in effect where individuals hold on to their assets in order to not trigger a tax payment (thereby distorting portfolio choices). These issues can be mitigated by taxing assets continuously by taxing an imputed rate of return on the asset. However, similar to the problems with wealth taxation, the imputed rate of return is difficult to estimate correctly (especially in the case of nonlisted equity) and taxing a return that has not yet been realized can cause liquidity problems for the individual taxpayer.

One solution is discussed by Auerbach (1991), who proposed to tax capital gains upon realization, but charging an interest on past gains when realization finally occurs, effectively eliminating the incentives to postpone realization. In the case of capital gains pertaining to housing, an annual property tax based on assessed market values can be used to continuously tax latent capital gains, thereby reducing the need to tax everything upon realization and avoiding some of the lock-in effect. We discuss property taxation in more detail below. It is fair to say, however, that the lock-in effect is hard to avoid completely, and is often used as a pragmatic argument to keep the tax rate on capital gains relatively low.

A major argument for taxing capital income less than labor income is that capital income is more responsive than labor income. Kleven and Schultz (2014) find that the elasticity (with respect to the marginal net-of-tax rate) of capital income is two to three times as high as the elasticity of labor income using Danish data (the absolute magnitudes of the elasticities range in the interval between 0.10 and 0.14 in their preferred specifications). Rydqvist *et al.* (2014) show how postwar dividend tax policies have

been pivotal to explain the decline in individual direct stock ownership while stock holdings of financial institutions have surged, especially within the context of pension plans.⁴⁰

For both equity and efficiency reasons, the optimal taxes on labor and capital income are likely to be fully nonlinear functions of both labor and capital income. In other words, individuals with low and high labor income should face different capital income taxes and optimal capital income taxes are likely to be progressive, namely, the capital income tax rate is different for individuals with low and high levels of capital income. Although there are some important exceptions, such as asset-testing in the context of welfare programs, and progressive estate taxation, actual tax systems tend to make limited use of such interdependencies and nonlinearities. One reason is the problem of tax arbitrage. If one tried to tax savings through a nonlinear function, there would be large incentives for someone with a high marginal tax on savings to ask a friend or a relative with a lower marginal tax on savings to save for him. This is essentially the same argument that prevents the nonlinear taxation of commodities, namely, the difficulties for the government to observe and verify personal consumption levels.

The United States and many other countries adopt some form of the so-called *comprehensive income tax* where the sum of labor and capital income is taxed together according to a nonlinear tax schedule.⁴¹ A benefit of the comprehensive income tax is that it taxes all sources of income, at the margin, at the same rate, which reduces incentives for tax planning (cross-base shifting). However, according to optimal tax principles, taxing labor and capital income at the same rate is suboptimal.

A more flexible system is the Nordic *dual income taxation*, which combines the progressive taxation of labor income with the (separate) proportional taxation of capital income. From an optimal tax perspective, the dual income tax has the desirable feature that the capital income and labor income tax rates can be made different for high-income earners. At the same time, an optimal dual income tax must consider the possibility for individuals to shift between the labor and capital income tax bases.⁴² The latter is usually presented as an argument in favor of not making the difference between the top marginal labor income tax rate and the proportional capital income tax rate too large. In particular, it is an argument for a positive tax on capital income.

Variants of the dual income tax have been used in the four Nordic countries for about 30 years.⁴³ It should be recognized that several of the arguments for dual taxation are pragmatic in nature. Sørensen (1994) describes the historical background for the introduction of dual income taxation in the Nordic countries and discusses a number of practical and administrative arguments for such a system. The most important arguments are the fact that the capital income tax is levied on nominal rather than real income (implying that the effective tax rate is higher than the statutory rate when the inflation rate is positive) and the point that a relatively low capital income tax rate makes it easier to subject all forms of capital income (including capital gains) to a uniform tax. The idea with this “uniformity” or “neutrality” of the capital income tax was that a uniform proportional tax rate would apply to all asset types and holding periods, allowing deductions for capital losses and capital expenses, thereby minimizing incentives for tax planning, tax arbitrage, and other distortionary activities.

However, the uniformity turned out to be difficult to uphold due to political pressures from special interest groups to implement tax changes catered to specific groups in society. In Sweden, for example, differentiated tax rates and changes in the method used to calculate taxable returns implied that the effective tax rate could differ across types of capital incomes.⁴⁴ Policymakers have motivated the departure from uniformity in different ways, mainly by pointing to the need for special exemptions to promote business activity among small and middle-sized firms.

Appropriately calibrating marginal tax rates on labor and capital income in the dual income tax system is an important task. As discussed above, optimal marginal tax rates on labor and capital income are not necessarily the same. The appropriate calibration of these tax rates depends on both equity and efficiency factors. The efficiency considerations are governed by the elasticities of the labor and capital income tax bases as well as the elasticities of cross-base income shifting. From an equity point of view, the calibration of optimal tax rates depends on the correlation between the labor and capital income tax bases

and the welfare of individuals. Saez and Stantcheva (2018) make an attempt to calibrate these optimal tax rates. In the case where they allow for nonlinear taxes on labor and capital income, and the elasticity of capital income is higher than the elasticity of labor income, the structure of capital income tax rates appear relatively flat, and are lower than labor income tax rates. This suggests that the dual income tax system, with a proportional tax on capital income, at a lower rate than the marginal tax rate on labor income, might not be that very far from optimal. However, further research is needed to quantify the welfare losses associated with adopting simple tax systems, such as the dual income tax system, using realistic measures of cross-base income shifting.

6.3 *Taxation of Property*

A specific type of investment is property, either in the form of land, buildings, or a combination of the two. There are different types of property and it can be motivated to tax these in different ways. For example, the case for taxing business property is weak as it is an intermediate input therefore should not be taxed to avoid distortions in production (Diamond and Mirrlees, 1971). It is also important to distinguish between the value of buildings and the value of the land upon which they are built. It is often argued that property taxation is desirable because it is an efficient tax. This is mainly due to the extent that the value of a property reflects the value of (unimproved) land. A special tax on land values is most desirable from an efficiency point of view. Land is immobile and is the canonical example of a tax base for which price appreciation is independent of personal effort and almost exclusively determined by demand and supply forces.

An investment in a property can be compared to an investment in a business asset. If a person owns a house and rents it out to another person, he/she receives rental income. Deducting any costs associated with obtaining that rental income yields a profit that typically is taxed as capital income. If the owner instead uses the house as a personal accommodation, the property generates a nonmonetary benefit to the owner in the form of housing services. Since no market transaction has taken place, the benefit cannot be directly observed for tax purposes, but must instead be estimated or “imputed.” It is therefore referred to as an “imputed rent.” To achieve the same tax treatment independently of whether the property is used as a source of rental income, or as a source of housing services for its owner, the imputed rent should be taxed as capital income. In addition, if capital gains taxation is imposed on other investments, it should also be imposed on property investments to not distort choices between different investments.

A complicating factor is that property is not only an investment, but also a consumption good due to the housing services it delivers. From this perspective, housing should be taxed in the same way as other consumption goods in order not to distort consumption choices (Atkinson and Stiglitz). This applies independently of whether a property is rented out to another person or if it is used as personal accommodation by its owner. If rental transactions are subject to VAT, so should the imputed rent, which is a motivation for a higher tax on imputed rent (above and beyond what is motivated based on the fact that imputed rent represents capital income).⁴⁵ In many countries, neither rental transactions nor imputed rent is subject to VAT, which means that housing services are typically subsidized in relation to other goods. One possibility is to impose VAT on all newly produced property (similar to the fact that VAT is imposed on other newly produced durable goods, such as washing machines). This can, however, cause severe transition problems as the bulk of the housing stock is not newly produced, and it is also impractical considering the lifetime of a property can be of the order of magnitude of 100 years. Stamp duty (which is a special tax imposed on the purchase of property) is one way to impose consumption taxation on housing services. However, it implies greater taxation of properties that change owners more often, which has a very weak economic rationale.

If one adopts the view that the imputed rent from owned-occupied housing is consumption, it should be taxed in the same way as other consumption goods according to the Atkinson–Stiglitz theorem.

However, there are important cases relating to housing consumption where the Atkinson–Stiglitz result does not hold.⁴⁶ For example, if high-skill individuals reduce their labor supply in order to perform home improvements that raise the value of the property, extra housing taxation becomes desirable as an indirect way of taxing leisure, increasing the attractiveness of work, mitigating the distortionary costs associated with progressive income taxation.⁴⁷ Another reason why one would like to deviate from taxing properties in accordance with other goods would of course be if there are externalities. Some have argued that there are positive externalities if people take good care of their houses, as it provides a benefit to other people, and may result in better neighborhoods. Others argue that marginal quality improvements in housing produce negative externalities if individuals compare their housing consumption with others (i.e., status-effects or envy, see Alpizar *et al.*, 2005; Aronsson and Mannberg, 2015).⁴⁸

A common feature in many countries is that housing is subsidized in different ways. Poterba (1992) discusses these issues in the United States and calculates the net-of-tax income from owning a house, considering it a business asset generating real economic profits, and discusses how these profits should be taxed in order to avoid efficiency costs (see also Poterba and Sinai, 2008). Gervais (2002) quantifies the welfare losses associated with the preferential tax treatment of housing in the United States using a calibrated life cycle model and finds that individuals at all income levels would gain by the proper taxation of imputed rents and a restriction of the deductibility of mortgage interest.

In Section 3, we argued that a major reason for taxing capital income is the fact that there is substantial heterogeneity in capital income conditional on labor income. Housing wealth is an important (if not the most important) source of wealth and capital income for the majority of households. Moreover, there is substantial heterogeneity in housing wealth conditional on labor income. Hence, there is a clear equity rationale for taxing housing wealth, even if the government redistributes via nonlinear income taxation. Since there often are political constraints on the amount of redistribution that can be achieved using nonlinear labor income taxation, the general, well-established, empirical correlation between labor income and housing wealth can also be seen as a motivation for property taxation. In particular, the strong concentration of real estate capital in the upper part of the income distribution can be a motivation for a progressive property tax.⁴⁹ In particular, a progressive property tax can be an efficient way to achieve a desired overall degree of progressivity in the tax system when considering the combined impact of all taxes facing an individual. Another factor that could motivate a progressive tax on real estate would be if an egalitarian distribution of housing wealth is important for society per se, for example, due to the relationship between housing and equality of opportunity, assignment of school districts, and the geographic scope of an individual's labor market. These are largely unexplored areas of the optimal tax literature.

In the public debate, the property tax is a recurrent theme. Economists embrace it because it is efficient, while the public usually is less enthusiastic. In the United States, so-called “property tax revolts” have erupted recurrently since the 1970s, often associated with middle-class homeowners protesting against the tax and many times successfully convincing policymakers to amend policies (Martin, 2008). The salience of the property tax is a potentially important determinant of the support for property taxation.⁵⁰ Cabral and Hoxby (2012) study the relationship between tax salience and the level of property taxation in the United States by comparing US states where the degree of salience varies as a function of technical features of tax collection, providing support for this argument. Individual homeowners themselves often have the responsibility to pay the tax to the tax authority, in contrast to other taxes, such as income taxes, which often are withheld at source, and therefore less visible to taxpayers.

Liquidity problems are another possible explanation for the low popularity of property taxation, but one that has received less attention in the academic literature. There are practical tools that can deal with such issues. A *limitation rule* that reduces the property tax burden for people with low income is one solution, even though it introduces adverse labor supply incentives for those affected. A *dampening rule*, that smoothly adjusts the tax burden when the values of properties that are used for tax purposes change,

can also be a useful tool, especially in periods with soaring real estate prices. Another possibility is to allow *postponement* of (some of) the property tax bill until the time the property is sold while adding a market interest rate to the postponed tax liability to maintain the present value of the tax payment, thereby avoiding lock-in effects.

6.4 *Inheritance Taxation*

An estate tax is a tax on the net value of all property owned by a person who dies. An inheritance tax is a tax on the beneficiaries who receive bequests from a deceased person's estate. In the economic literature, the words inheritance tax and estate tax are often used interchangeably, since the main difference is who has the legal obligation to pay the tax. Inheritance taxes are often accompanied by taxes on gifts in order to appropriately tax transfers made during one's lifetime. A large share of total wealth represents inherited wealth (see Section 2.2). Therefore, if inheritance should be taxed, it probably means that wealth should be taxed as well, in particular if there are information constraints or political constraints that prevent the optimal use of inheritance taxation.⁵¹

Farhi and Werning (2010) analyze the properties of an optimal estate tax. They focus on two generations where all capital (and inheritance) derives from the work efforts of the first generation and individuals in the second generation are heterogeneous in terms of the bequests they receive depending on who their parents are. In such a framework, Farhi and Werning show that if one considers the welfare of the parents (those who give bequests) but not the welfare of the children (those who receive bequests) then the inheritance tax should be zero, in line with the Atkinson-Stiglitz theorem. When also considering the welfare of those who receive bequests, then they find that it is optimal to subsidize bequests. The rationale for subsidies is well-known, and relates to the fact that bequests by the parent generation impose a positive externality on the child generation, also called the double benefit of giving (see, e.g., Kaplow, 2001). However, Farhi and Werning find that it is optimal to employ a progressive (negative) inheritance tax that subsidizes inheritances, but with a degree of subsidization that decreases in the size of the inheritance. If it is not possible to subsidize inheritance for some exogenous reason, the degree of subsidization will be zero for all but the largest inheritances, which should be taxed. The usefulness of the progressive estate tax is that it has an equalizing effect on the bequests that people receive, which raises the welfare of the second generation.

Farhi and Werning (2013a) build upon Farhi and Werning (2010) and highlight the fact that parents differ in terms of how altruistic they are toward their children. This creates inequality between children depending on the preferences of their parents to bequeath wealth, even conditional on the earnings abilities of the parents. The optimal estate tax considers that inheritance taxation discourages the labor supply activity of parents, while it levels the playing field of the child generation. In comparison to their earlier study, Farhi and Werning (2013a) find it can be optimal to tax inheritance if the principle of equality of opportunity carries sufficient weight in the objective function of the tax designer, which they argue could be an explanation why inheritance taxation exists in many countries.

A restrictive assumption in the analysis of Farhi and Werning (2010, 2013a) is that they examine a two-period model, with one generation of parents who give bequests and one generation of children who only consume. Piketty and Saez (2013) study a more realistic setup where each generation both gives and receives bequests. This implies that those who bequeath to a greater extent are those who have inherited in the past. In addition, their analysis considers a correlation in earnings abilities across generations, which implies that those who receive large inheritances are more likely to also be individuals with a high earnings ability. Both these aspects work toward a positive optimal tax on inheritance. Piketty and Saez find that the optimal tax rate is positive and quantitatively large if the elasticity of bequests is low, bequests are relatively concentrated, and those who receive small inheritances carry a large weight in the social welfare function.⁵²

De Nardi and Yang (2016) quantitatively analyze inheritance taxation in the United States. In their model, individuals are born with different circumstances, both with respect to inheritance and in terms of how much their parents have invested in their human capital (alternatively, allowing for a genetic correlation in ability across generations). They find that in the long-run equilibrium, estate taxes of inheritances over a certain threshold have small or insignificant effects on the capital accumulation of the economy, but can deliver large welfare gains for newborns who do not know in which economic environment they will grow up, while generating large welfare losses for the very rich.

To sum up the insights from the above-mentioned papers, we can conclude that a positive correlation between earnings ability and inheritances received, as well as the circumstantial nature of inheritance due to (for example) parental altruism heterogeneity, are arguments in favor of inheritance taxation. However, the “double-dividend” of giving (referring to the fact that inheritance provides utility not only to the donor but also to the recipient) represents a serious challenge in assessing the welfare effects of inheritance taxes that has not yet been resolved. The benefit to the recipient is an externality, and therefore motivates to tax bequests less than other consumption goods.⁵³

In policy discussions about inheritance taxation, several efficiency considerations are often heard. First, inheritance can have negative effects on government revenue if those who receive an inheritance work less (an income effect).⁵⁴ From this perspective, inheritance taxation can provide additional positive effects on government revenue beyond the direct mechanical effect (this is sometimes labeled a positive “fiscal externality”). Second, taxing inheritance may make it less attractive for parents to work if a motivation for working is the possibility to transfer resources to the next generation. Third, to the extent that bequests are accidental, taxing them is efficient.⁵⁵ The literature on optimal inheritance taxation is not conclusive, and further work is needed to understand how these aspects affect optimal tax analysis. Moreover, further research is needed in order to understand why individuals bequeath their wealth. This is relevant both when assessing welfare effects and when assessing the effects on labor supply. Finally, we may note that there are other transfers to children that are not taxed, such as human capital investment. This means that inheritance taxation might distort parent’s decisions about how to invest in their children.

A recurrent issue with the inheritance and gift tax is how business assets should be treated, in particular those relating to the intergenerational succession of family firms. Many countries have introduced reliefs for such assets, arguing that they are necessary due to liquidity problems that may arise since such liquidity problems might require heirs to sell their shares to finance the payment of the tax. Valuation problems represent another common motivation for implementing special reliefs for inherited business assets.

To empirically analyze the economic consequences of inheritance taxation is difficult and there are few studies available. One of the major challenges is to distinguish actual capital accumulation effects from tax planning (reporting effects). In a survey of the literature, Kopczuk (2013) concludes that the effects of inheritance taxation on taxable inheritance appear to be relatively small. An early influential study is Kopczuk (2007), who examined estate tax planning in the United States, exploiting the timing of receipt of news about terminal illness. The results show that the estates of individuals who received the news substantially decreased in value, primarily due to tax planning. Goupille-Lebret and Infante (2018) examine the effects of changes in the French inheritance tax on private savings in life insurance funds. Using discontinuities in the tax code with respect to time and age, the authors make an attempt to disentangle real accumulation effects from avoidance responses and find modest effects on real capital accumulation.

Another strand of the literature has studied the efficiency implications of inheriting wealth in the context of entrepreneurial activity and family-firm succession. In an unpublished study of Swedish administrative register data on inheritances and firm performance, Escobar (2017) finds that firms whose owners inherit significant amounts tend to survive longer than other, comparable firms do. However, this survival does not seem to be driven by higher productivity, measured as firm profits or owners’ incomes, but instead by enabling small business owners of lower ability to survive. A similar conclusion regarding

the effects of inheritance on entrepreneurial performance is presented by Bennedsen *et al.* (2007) using a large Danish micro dataset on family firms. They use the sex of the first-born child as an instrument for whether the firm is taken over by the first-born son or an external CEO and find a large negative impact of sons inheriting the firm leadership on the firm's subsequent performance.

When assessing the distributional implications of inheritance taxation, it is necessary to take into account the distribution of inheritances as well as the economic position of those who receive intergenerational transfers. The empirical literature has generally found an equalizing role of inheritances because the distribution of wealth among the decedents tends to be more equal than the distribution of wealth among the heirs (see, e.g., Elinder *et al.*, 2018). However, as argued by Nekoei and Seim (2019), this result is likely only to hold in the short run due to the consumption and labor supply responses of heirs. Regardless of these issues, it is always the case that sufficiently progressive inheritance taxation combined with appropriate adjustments of taxes and transfers achieves enhanced redistribution.

6.5 Corporate Taxation

The corporate income tax is a special tax on the profits accruing to private firms. Since all taxes are born by individuals, the corporate income tax is thus a tax on the shareholders of the company above and beyond any taxes paid on dividends and capital gains.

A classic question in public finance is whether or not the government should tax corporate capital for redistributive reasons because it is concentrated in the upper end of the income distribution. The answer to this question is not clear because a tax on corporate capital may lead to less investment, a lower stock of capital, a higher return to capital, and lower wages. Harberger (1962) studied a closed economy and found that the corporate income tax mainly affects the owners of capital with only small effects on wage earners. However, in an open economy, the free mobility of capital changes this result, making it much more likely that wage earners bear a substantial part of the tax burden. The major constraint on the corporation tax is the possibility for firms to relocate their activities abroad. For this reason, a small open economy must calibrate their corporation tax in accordance with the levels of other similar countries. To identify the extent to which corporate taxation affects wages is a difficult task, both theoretically and empirically, as it represents an exercise in general equilibrium analysis.

Three practical arguments in favor of a corporate income tax are often heard. First, and most importantly, the corporate income tax is a complement to the income tax as it is in practice difficult to tax individuals with low labor income and large fortunes derived from inventions, patents, or other intellectual property. Income from such activities is taxed only when it accrues to shareholders in the form of dividends or capital gains. Thus, the corporate income tax is a way of taxing profits that otherwise would avoid taxation by being kept inside corporations. In addition, in a dual income tax system, the corporate income tax serves to make it less attractive to shift income from the personal to the corporate income tax base.⁵⁶ Second, the corporate income tax is a way to tax foreign investors that do not pay capital income taxes in the host country. The third argument is that the corporation tax can be viewed as a payment for infrastructure that the government provides, such as roads, airports, bankruptcy management, or the value of a stable and secure democracy. The relevance of this argument can, however, be questioned, as the marginal cost of providing these services are often close to zero and firms contribute to tax revenue through other tax bases by hiring workers.

7. Capital Taxation in Light of Automation

How taxes should be designed in light of an increasing automation of the workforce is a question that is currently receiving substantial scholarly attention. Automation refers to a process whereby machines gradually replace human workers in the production of goods and services. Such a development has been

going on for quite some time, but certain indicators suggest that it has intensified in recent years. Capital taxes are therefore likely to become more important in the future. Taken to its extreme, if machines would completely replace human labor, redistribution could only be achieved by taxing capital. Some recent studies argue that automation has resulted in falling wage shares (e.g., Autor *et al.*, 2017). However, several Western countries have not experienced falling wage shares, despite rising automation.

One way to view automation is that it increases the importance of capital in the economy. In this case, the various rationales for capital taxation that we have analyzed still apply, but are likely to be strengthened. Particularly relevant are the studies mentioned above showing that positive capital income taxation is desirable if capital is a stronger complement to skilled labor than unskilled labor, as it enables indirect redistribution through wages.

Automation can also be viewed as introducing a new factor of production (which we may call “robots”) that complements traditional capital, skilled and unskilled labor in different ways. In this case, a new question arises, namely, whether robots should be taxed in a different way than other capital. This is related to the general question of whether certain types of capital should be taxed differently than other types of capital (see the discussion in Sections 3 and 6.5). Slavík and Yazici (2014) consider a dynamic model of optimal labor income and capital taxation with two types of capital, equipment capital and structures. They find that equipment capital should be taxed higher than structures since this depresses the accumulation of equipment capital, thereby lowering the skill premium and causing redistribution through the wage channel.⁵⁷

The traditional view holds that, even though wealth is concentrated in the upper end of the distribution (and should be taxed from an equity perspective), taxing wealth can end up hurting low-skill workers if their wages (or jobs) are adversely affected. These adverse effects of capital taxation might need to be re-assessed if it is the case that economic growth mainly benefits capital owners and highly skilled workers. Here, it should be mentioned that tax policy is not the only instrument to tackle the challenges associated with increased inequality due to automation as other areas of policy, such as education policy, also has an important role to play.

8. Concluding Discussion

The academic economic literature on capital taxation has for decades relied on a few canonical optimal tax models that forcefully argued that capital taxes play a minor role in an optimal tax system. In recent years, however, scholars have started to recognize that these models do a rather poor job of explaining actual inequality in wealth and capital income, and new theoretical perspectives and empirical observations are challenging the established conventional wisdom.

This survey has asked whether capital should be taxed, what specific capital taxes one should use, and how they should be designed. We have reviewed both early and recent theoretical literatures on optimal taxation, as well as empirical studies on the distribution of capital and the distortionary costs of capital taxation.

Our main conclusion is that capital taxation can be motivated on both equity and efficiency grounds. Individuals with higher earnings capacities are often those who have high capital income, or have inherited wealth, which makes capital income taxation an efficient complement to progressive labor income taxation. The simple logic is that taxing both labor income and capital income enables more redistribution than if only labor income would be taxed. The efficiency costs of capital taxation vary greatly across capital tax bases depending on how these assets are generated and how mobile they are. At the same time, different capital tax bases are distributed differently in the population. For these reasons, it could be motivated to tax different assets in different ways. However, differential taxation of assets can lead to distorted investment choices and having too many tax rates can lead to rent-seeking activities by special interest groups, pressuring politicians to differentiate taxes in inefficient or inequitable ways.

There are strong reasons to tax property. Land is inelastically supplied, housing provides consumption benefits and is also an investment with the same properties as a business asset. In addition, expensive real estate is concentrated in the top of the income distribution. Inheritance taxation is also motivated, mainly for equity reasons, as it equalizes the life chances of the next generation, but probably also for efficiency reasons, due to the adverse effects of inheritance on the work efforts of heirs. Wealth taxation, by which we mean a tax on net household wealth, is associated with too many practical problems to be feasible in practice. In principle, a wealth tax would not be needed if capital income and inheritance taxes would be set optimally, but even when that is not the case, the administrative costs and hurdles for businesses appear insurmountable.

Progressive capital income taxation is desirable on equity grounds, but is often associated with tax avoidance and tax arbitrage. The Nordic dual income tax, which taxes labor income according to a nonlinear progressive tax schedule and capital income at a proportional rate, appears to be a constructive way to strike a balance between an optimal and administratively feasible tax system. The desired overall progressivity of the tax system can be achieved by combining the dual income tax with (potentially progressive) taxes on property and inheritance.

We have also discussed the optimal relative tax burden on labor and capital income. Empirical studies tend to find that capital income is more responsive to taxation than labor income, which suggests that capital income should be taxed less than labor income. Equity considerations, on the other hand, call for taxing capital income at a higher rate than labor income. At the same time, the difference between the marginal tax rates on labor and capital income should not be too large due to the possibility for income shifting. More research is needed to quantitatively assess the welfare gains of taxing labor and capital income in different ways, for example comparing comprehensive and dual income tax systems.

There are certain angles and questions that we have not been able to cover. One of these is that governments can facilitate an egalitarian income and wealth distribution in other ways than through taxation, for example, by providing individuals better opportunities to create wealth, either through the subsidization of education, reducing transaction costs in credit markets, or by lowering labor income taxes. Another issue that we have only touched lightly upon is the political economy of capital taxation. From a theory perspective, Scheuer and Wolitzky (2016) highlight the importance of political constraints by analyzing optimal capital taxation under the threat of a radical political reform that could entail a significant redistribution of wealth. From an empirical perspective, the political economy of capital taxation has recently been analyzed by Alesina *et al.* (2018), Fisman *et al.* (2019), and Bastani and Waldenström (2019). These are relevant and interesting topics that we hope will generate more research in the future.

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Notes

1. If the common rate of return is r and the stock of wealth is denoted by W , then a tax of rate t on capital income rW is equivalent to a tax at rate t times r on W itself. If returns r differ across individuals, the equivalence would only hold if the government could levy individual-specific wealth taxes, which is not possible in practice.

2. Among these initiatives are OECD's Base Erosion and Profit Shifting (BEPS), EU's Anti-Tax Avoidance Package (ATAP), and the US Foreign Account Tax Compliance Act (FATCA).
3. See, for example, Piketty and Zucman (2014, 2015) and for Sweden also Waldenström (2016, 2017). Note that we define capital as the sum of asset values less the value of liabilities, and thereby use the terms capital and wealth interchangeably.
4. Alstadsæter *et al.* (2019) link some of the named individuals in the renowned "Swiss leaks" and "Panama papers" to Nordic administrative registers and show that they belong to the top percentile of the wealth distribution. Roine and Waldenström (2008, 2009) examine the case of Sweden and estimate the impact of hidden wealth on top income and wealth shares and find that even though the effects are significant, they are not large enough to change overall trends in inequality.
5. This finding is in line with a study by Boserup *et al.* (2018), who document that intergenerational wealth correlations are higher for Danish children and young adults with deceased parents or grandparents.
6. The share of wealth that is inherited varies between 30% and 60% in Western countries (Wolff, 2015; Piketty and Zucman, 2015; Ohlsson *et al.*, 2020).
7. Throughout this text, we will use the terms "skills," "abilities," and "capacities to earn income" interchangeably.
8. This is one way of describing that there is a positive labor supply elasticity.
9. There is also empirical research that attempts to recover what type of social welfare weights underlie actual policies, assuming these policies have been set optimally, based on an idea by Bourguignon and Spadaro (2012). See Lockwood and Weinzierl (2016) and Bastani and Lundberg (2017) for two recent applications to the United States and Sweden, respectively.
10. The underlying reasons for why skills differ matter for the interpretation of government interventions to reduce inequality. The extent progressive income taxation can be regarded as redistribution and the extent it can be regarded as insurance particularly carry weight in political discussions about the design of the tax system. In practice, making a distinction between redistribution and social insurance is difficult as it is hard for an empirical researcher to assess whether the inequality in outcomes that is observed in the data is the result of choices, predetermined characteristics, or chance (good or bad luck).
11. The fact that a vast majority of studies of optimal capital taxation consider models with a single dimension of heterogeneity is not because scholars consider this to be the most appropriate assumption, but rather that there are severe mathematical difficulties involved in solving for optimal income taxes in economies with multidimensional taxpayer heterogeneity. The literature on optimal nonlinear taxation in the presence of multidimensional heterogeneity and multiple tax bases has been greatly advanced in recent years; see Golosov *et al.* (2014) and Lehmann *et al.* (2020). See also Hermle and Peichl (2018), who analyze optimal linear taxation of multiple tax bases.
12. If there is no heterogeneity in capital income conditional on labor income, then labor income perfectly predicts capital income and there is no equity reason to tax capital provided that labor income can be taxed in a flexible nonlinear way.
13. Another type of heterogeneity stems from life cycle considerations in overlapping generations models, as individuals in different ages have different capital income (even conditional on having the same labor income). In these models, capital income taxation becomes a substitute for age dependent taxation. We discuss this below.
14. Uniform taxation of assets also avoids distortions in consumer choices, to the extent that assets provide consumption benefits (as in the case of housing).
15. Sørensen (2007) provides a more elaborate discussion of capital tax neutrality and open-economy issues.
16. The infinite horizon of the representative individual can be interpreted as an infinite dynasty where different generations are perfectly linked through inheritance.

17. Diamond (2009) presents an illustrative example highlighting that a 30% tax on capital income only imposes a wedge of 3% between consumption today and consumption tomorrow (if the return is 10%) but that the tax wedge becomes 67% between consumption today and 40 years into the future. This should be compared with a 30% income tax, which implies a wedge of 30% between income today and consumption today.
18. See also Jacobs and Rusu (2018). The main message of Chamley–Judd should, however, not be completely dismissed, since even for modest planning horizons, the compounding effect of capital income taxation can become quite strong. This is considered by some as a reason to tax pension savings and other long-term investments more leniently.
19. However, if Engel curves are linear, then the optimal tax on capital income is zero even under an optimal linear income tax (see Deaton, 1979).
20. Banks and Diamond (2010), one of the background chapters to the Mirrlees Review, considers this to be one of the most compelling reasons to tax savings. This issue has been empirically investigated by Gordon and Kopczuk (2014).
21. See Bach, Calvet and Sodini (2019) and Fagereng *et al.* (2020) for two recent contributions. See also De Nardi and Fella (2017, Section 8) for a survey of the earlier literature on this topic.
22. The discussion here complements earlier surveys on the topic, such as Cremer and Pestieau (2011). In this section, we focus on the consequences of the taxpayer heterogeneity caused by inheritance for optimal tax analysis. Inheritance taxation is further discussed in Section 6.4.
23. See also Brunner and Pech (2012) for an extension.
24. See also Atkinson and Stiglitz (1980).
25. Norway allows, since 2006, a tax-free normal rate of return on investments in stocks. According to Sørensen (2005), this system does not distort firm's marginal investment decisions and how these investments are financed within the firms. This conclusion has been criticized by Lindhe and Södersten (2012), who suggest that neutrality of this kind is not fulfilled when returns to investments largely are determined by international capital markets.
26. See Conesa, Kitao and Krueger (2009) and Bastani, Blomquist and Micheletto (2013).
27. Borrowing constraints are common components of modern models used to analyze capital income taxation, such as Conesa *et al.* (2009).
28. Two of the most important papers in this literature are Albanesi and Sleet (2006) and Golosov *et al.* (2016).
29. Sometimes scholars refer to the result that capital taxes should be “zero in expectation.” This result, shown by Kocherlakota (2005), refers to the fact that in these models, capital taxation over the total population in each time period balance out, but there will be positive capital taxes on those who have an incentive to overaccumulate capital. An interesting observation in this context is that it is typically the poor who find insurance valuable and tend to “save too much” and therefore should have their savings discouraged by the tax system. In this context, capital taxes are only used to deter shirking, and not to perform any actual redistribution.
30. The seminal contribution of Atkinson and Sandmo (1980) studies optimal taxation in a life cycle economy. However, in their model labor is supplied only in one period. Hence, the dynamic labor supply considerations that are discussed in this section are not applicable.
31. See Jacobs and Schindler (2012, Section 6). See also Peterman (2013), who shows that the specific structure of preferences in Erosa and Gervais (2002) (nonhomothetic utility from leisure) causes the Frisch elasticity of labor supply (the labor supply elasticity holding the marginal utility of wealth constant, measuring intertemporal substitution of leisure) to rise over an individual's lifetime. Since less elastic labor should be taxed more heavily for efficiency reasons, younger workers should therefore face (relatively) higher labor income tax rates. In the absence of age-dependent labor income taxes, this can be achieved indirectly by imposing positive capital income taxation.

32. There are some exceptions, such as the paper by Ordober and Phelps (1979), that considered the optimal nonlinear taxation of labor and capital income in an OLG model where agents are heterogeneous in skills, as in Mirrlees (1971). However, in similarity to other papers written at this time, individuals typically supplied labor in the first period and were retired in the second.
33. Farhi and Werning (2013b) and Bastani *et al.* (2013) are two early contributions.
34. See Blomquist and Micheletto (2008) and Bastani *et al.* (2013, Section 5.4) for an extended discussion. In contrast to the analysis of optimal capital taxation in representative agent models, the presence of within-generation heterogeneity makes it desirable to tax capital income even if the labor income tax is allowed to be age dependent (Bastani *et al.*, 2013; Farhi and Werning, 2013b). However, if the income tax system is not only age, but also history dependent (depending on the present and past labor incomes of an individual) then the gains of taxing savings to combat labor income tax distortions are likely to be smaller or disappear completely. It is fairly straightforward to show that when wages evolve deterministically over the life cycle, and the income tax is history dependent, there should be no tax on capital income. In the above example, with a history-dependent income tax, an individual supplying a high income when young could be penalized with an arbitrarily high tax burden if he/she does not continue to earn a high income as middle-aged, removing the need to tax savings to discourage high-wage individuals to work less.
35. The wage channel for redistribution in the context of optimal nonlinear income taxation was first highlighted by Stiglitz (1982).
36. Stiglitz (1985) was the first to show that capital income taxes can be desirable in a model with endogenous wages with capital in addition to skilled and unskilled workers as factors of production.
37. See also Naito (1999).
38. See also Ring (2019) for a recent paper analyzing wealth tax responses using Norwegian data, finding evidence of a positive effect of savings in response to wealth taxation, financed mostly by increased labor earnings.
39. Investing W euros in a stock and holding this position for T periods yields a post-tax value of $\{(1+r)^T - 1\}(1-t) + 1\}W$, where r is the annual pre-tax rate of return and t is the tax rate on capital gains. In contrast, investing W euros in a bank deposit (i.e., taxed annually) with the same annual pre-tax rate of return r , produces a value of $\{r(1-t) + 1\}^T W$.
40. There is a large literature on how capital taxes matter for the composition of household portfolios. For example, Agell and Edin (1990) showed how increases in the tax on bank interest income led to an increase in the share of stock investments among Swedish households. See Poterba (2002) and Campbell (2006) for reviews of the earlier literature.
41. Such systems are based on the notion that it is the sum of all incomes that is relevant to the well-being of individuals. In addition, having individuals with the same total income pay the same income tax can be argued to respect the principle of horizontal equity. In practice, however, the comprehensive income measure that is available to tax authorities is seldom a complete account of all the sources of income that are relevant to an individuals' welfare, as there are sources of income that are not observable, such as the intrafamily transfers and unrealized capital gains.
42. Alstadsæter and Jacob (2016) found evidence of income shifting in Sweden among business owners by using a reform in 2006 in which both the tax differential and the amount eligible for reclassification increased. Pirttilä and Selin (2011) study similar questions in Finland and find evidence of income shifting, especially among the self-employed.
43. Denmark was the first to introduce the dual tax system in 1987. Thereafter, Sweden did it in 1991, Norway in 1992, and, finally, Finland in 1993.
44. Specifically, dividends and capital gains are taxed at different rates depending on whether the companies are listed on the stock exchange or not. Some investments in special "investment accounts" are taxed based their imputed, rather than actual, return, making it more like a tax on the stock of financial wealth.

45. By a similar logic, if you receive capital income in the form of interest income on a bank account, this is usually taxed as capital income, and then again when it is consumed (if there is a VAT in place).
46. The analysis of AS is not directly applicable to housing taxation as it neglects the durable aspect of housing consumption. Köhne (2018) develops a dynamic framework of optimal commodity taxation with durable goods. In an application to housing, he finds that housing investment should be taxed at a higher rate than nondurable consumption. The rationale for differential taxation in his setting arises because of adjustment frictions combined with nonseparabilities between durable and nondurable consumption, as well as general rationales for savings distortions in dynamic models of optimal income taxation.
47. However, a more efficient tool to mitigate these distortions could be to provide tax breaks for home improvement services purchased in the market, see Köhne and Sachs (2019).
48. A large literature has found that consumption goods are not only valued based on their absolute qualities, but to a large extent by how they compare to the goods consumed by others. Alpizar *et al.* (2005) found that housing is a consumption good where such “relative consumption concerns” are the strongest. For instance, it is likely that a person could achieve a higher utility living in an expensive house in an area where the average price of housing is low, as compared to living in an equally expensive house in an area where the average price of housing is high (*ceteris paribus*).
49. Progressive property taxes exist in several countries, for example, Denmark, Finland, France, Germany, and Norway. Progressivity can appear in different forms. For example, marginal tax rates can be increasing, or a basic deduction can be combined with a proportional tax rate.
50. For contributions emphasizing the importance of tax salience, see Chetty *et al.* (2009) and Finkelstein (2009).
51. Gifts transmitted during a person’s life, *inter vivos*, represent an important part of intergenerational transfers. For this reason, inheritance taxation must be accompanied by gift taxation, and such practices are common in the industrialized world.
52. Note that subsidizing bequests is a possible outcome also in their framework, but does not happen for realistic parameter values. For mathematical reasons, Piketty and Saez restrict attention to a linear inheritance tax or a two-bracket tax with an exogenous threshold. Their analysis is hence not informative about optimal progressive inheritance taxation, analyzed by Farhi and Werning.
53. See Boadway and Cuff (2015) for a recent discussion.
54. See Kindermann *et al.* (2019) for a recent contribution assessing the importance of this effect.
55. Kopczyk (2013) notes that while confiscating an accidental bequest yields no harm, it does not address the underlying market failure that causes accidental bequests. The first-best policy would be to provide facilities for complete consumption smoothing via annuities. See also Blumkin and Sadka (2004) and Cremer *et al.* (2012), who question the desirability of 100% taxation of accidental bequests.
56. An additional reason to tax corporate capital arises if the corporate tax allows to “tag” individuals with high ability.
57. There is a growing literature investigating the implications of automation in economies with nonlinear labor income taxation and capital taxation, see Thümmel (2018), Costinot and Werning (2018), and Guerreiro *et al.* (2019).

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