Wealth and wealth transfer taxation: a survey.[1]

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Abstract

This paper provides a survey of the theoretical literature on wealth and wealth transfer taxation. Both forms of taxation are highly controversial and we present arguments in favor and against them. We adopt a theoretical and normative perspective. Our approach is comprehensive in the sense that wealth taxation is discussed as part of an overall tax system, dominated by income and commodity taxation.We show that a crucial factor in designing the tax structure is the motive underlying wealth accumulation and transfers.

Keywords: wealth taxation, inheritance taxation, capital income taxation

JEL code: H21

1 Introduction

Taxes are rarely popular but those on wealth and wealth transfers are particularly controversial. Opponents claim that they are unfair and immoral. Because of many loopholes, people of equivalent wealth pay different amounts of tax depending on their acumen at tax avoidance. They penalize the frugal and the loving parents who accumulate wealth for their children, reducing incentive to save and to invest. Concerning the wealth transfer taxes per se, they allegedly hit families that are surprised by death (hence they are sometimes called a tax on sudden death or even a death tax)

Supporters of these taxes, in contrast, retort that they are of all taxes the most efficient and the most equitable. They assert that they are highly progressive and counterweight existing wealth concentration. They also argue that they have less disincentive effects than other taxes. For a number of social philosophers and classical economists, estate or inheritance taxation is even the "ideal tax".

Clearly, wealth taxation more than any other generates controversy at all levels: political philosophy, economic theory, political debate and public opinion. The truth probably lies between these two opposite camps. For economists these taxes like all taxes should be judged against the two criteria of equity and efficiency to which one could add that of simplicity and compliance.

In this survey we study the two major types of taxes levied on wealth: those applied sporadically or periodically on a person's wealth (net wealth taxes), and those applied on a transfer of wealth (transfer taxes). In surveying these taxes, we focus on the criteria of equity and efficiency. Equity is hard to gauge. It has inter- and intragenerational aspects which can only be measured by relying on some normative criterion. Efficiency implies minimizing distortions to economic activity with an important dynamic dimension. We shall stress two important features. First, these two types of taxation cannot be analyzed separately from other taxes; they have to be considered as part of the overall tax system. Second, their implications in terms of efficiency and equity depend on why people hold or transfer wealth.

Besides the distinction between the two types of wealth taxation, it is interesting to

distinguish among the motivations for accumulating wealth. Motivations are important because they determine the way individuals react to taxation. Among the traditional motivations, one has consumption smoothing (retirement, children's education, precaution against life risks), prestige or status, intergenerational transfers. Those transfers can be triggered by pure altruism, imperfect altruism (joy of giving) or by exchange motives (e.g., the so-called strategic bequests). As a benchmark, we consider a dynamic model in which the only motive for holding wealth is consumption smoothing through the individual's life-cycle. In other words, wealth is not held for the status it may bring nor for bequest reasons. Then, we introduce these additional motives for accumulating wealth. As it will appear, the resulting tax structure depends on the motive(s) underlying capital accumulation.

The survey deliberately adopts a theoretical and normative view. It studies how wealth or wealth transfers ought to be taxed along with other tax tools and according to some welfare criterion. The tax structure thus obtained does not necessarily correspond to existing taxes.

The rest of this paper is organized as follows. Section 2 presents a brief overview of actual wealth taxation. Section 4 develops the optimal tax structure when the only motive for saving is life-cycle consumption smoothing. We proceed in steps. We first assume that individuals' horizon is finite and then that it is infinite. Section 5 looks at a number of additional motives for wealth accumulation and for each of them analyses the optimal tax structure. Section 6 considers the possibility that the same individuals have a mix of motives for accumulating wealth and the case where society comprises individuals having different motives. A final section concludes.

2 Facts on wealth and inheritance taxation

2.1 Evolution and importance

In this survey we study the two major types of taxes levied on wealth: those applied sporadically or periodically on a person's wealth (net wealth taxes), and those applied on a transfer of wealth (transfer taxes). They are presented on Table 1.

Form	Examples
Net Wealth Tax	Periodic
	Sporadic (capital levy)
Transfer Tax	
Transferor-based	Estate tax, gift tax, unified tax
Recipient-based	Inheritance tax, gift tax, accessions tax

Table 1. Wealth Taxes

We ignore the taxes on immovable property (called, in the US, property taxation) which in most countries are local. They are often viewed as the price residents have to pay for local schools, as well as other local services and infrastructure of various kinds. Net wealth taxes are typically assessed on the net value of the taxpayer's taxable assets (i.e., value of assets minus any related liability), either sporadically (often known as "capital levies") or on an annual or other periodic basis. Transfer taxes, which are typically assessed on the net value of the taxable assets transferred, fall into two basic categories: those levied on the donor, more precisely on his estate (typical in common law countries), and those levied on the recipient, namely the heir.

Donor-based taxes can be levied separately on inter vivos transfers (gift tax) and on transfers at death (estate tax), or together in a single integrated tax. Recipient-based taxes can also be levied on inter vivos transfers (gift tax), on transfers at death (inheritance tax), and on an integrated basis (accessions tax).

OECD (2008) provides data on taxation for the period 1965–2006. We will restrict our presentation to EU15, the US and Japan. Under the label of taxes on property we find both net wealth and transfer taxes but also many other taxes. This aggregate represented 5.6% of total taxation and 2.2% of GDP for EU15 in 2005. In 1965, these figures were respectively 6.7. and 1.8. See Tables A1 and A2 in the appendix.

As mentioned this aggregate is too heterogeneous to be informative. We thus focus on wealth and wealth transfer taxes. At the present time, in EU15, Japan and the US, only a single country, namely France, has a wealth tax. Luxembourg, Greece, Finland, Sweden and Spain have only recently abolished their wealth tax. (Note that Norway and Switzerland are the two other Western European countries with an annual wealth tax.) The French annual direct wealth tax, called "solidarity tax on wealth" concerns

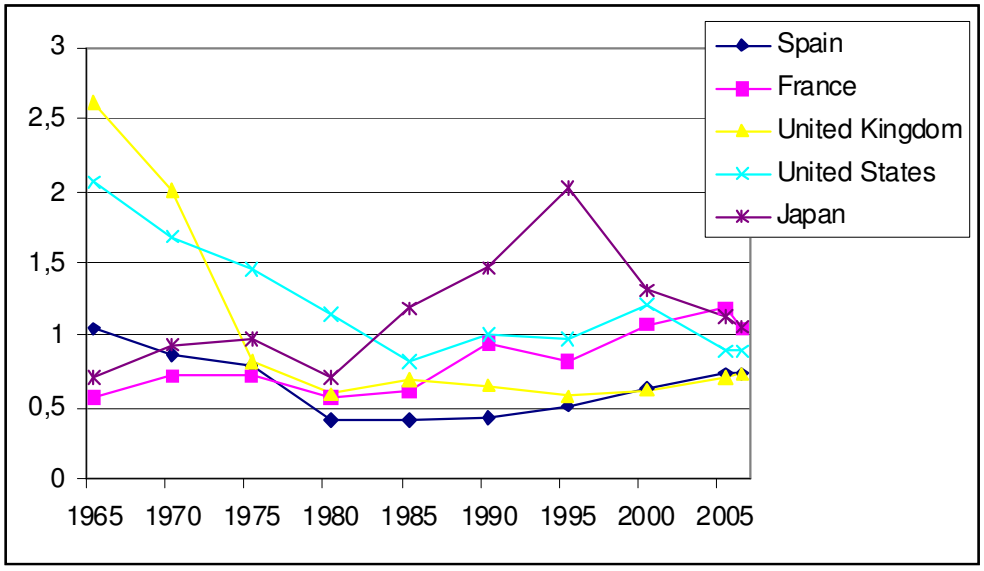

Figure 1: Wealth transfer taxes as a percentage of GDP (source: OECD 2008)

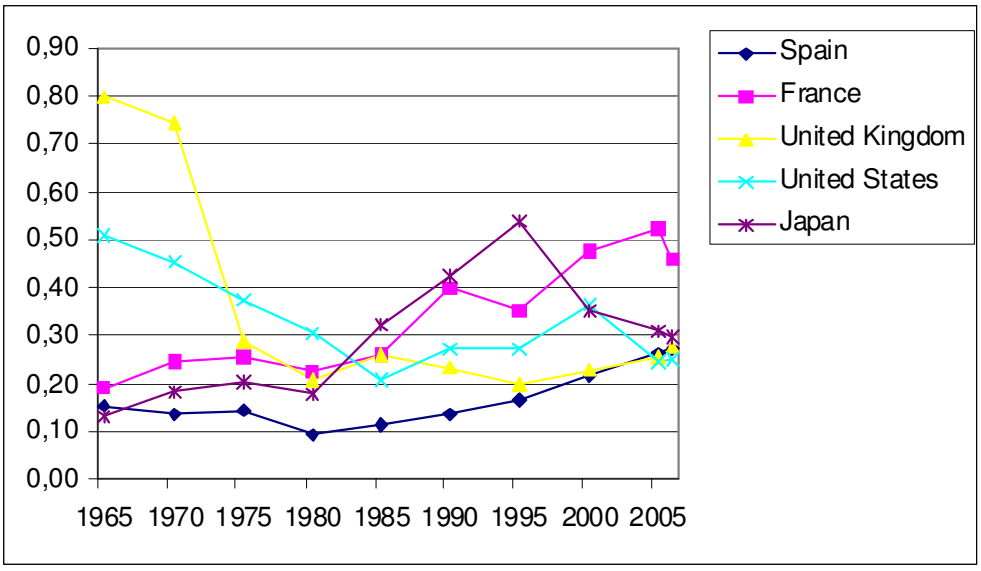

Figure 2: Wealth transfer taxes as a percentage of total tax revenues (source: OECD 2008)

those having assets in excess of €770,000 (as of 1 January 2008). It yielded in 2006 about 0.4% of total tax revenue. One can really talk of an endangered tax species.

In contrast, of these 17 countries only Sweden and Italy do not have a wealth transfer tax. The UK and the US have an estate tax and all the other countries have some sort of inheritance tax. Figures 1 and 2 and Tables 2 and 3 give the size and the evolution of the wealth transfer tax over the period 1965–2006 in EU15, in the US and in Japan.

Estate. inheritance and gift taxes as a percentage of total taxation										
	1965	1970	1975	1980	1985	1990	1995	2000	2005	2006
Belgium	1.17	1.06	0.76	0.82	0.59	0.71	0.76	0.97	1.30	1.39
Denmark	0.65	0.36	0.38	0.44	0.47	0.56	0.47	0.45	0.40	0.43
Germany	0.22	0.23	0.14	0.18	0.22	0.34	0.26	0.39	0.53	0.46
Ireland	1.89	1.25	1.12	0.35	0.30	0.39	0.44	0.67	0.50	0.62
Greece	0.86	1.35	1.00	1.22	0.95	1.23	0.97	0.80	0.42	0.34
Spain	1.05	0.86	0.79	0.41	0.41	0.42	0.51	0.63	0.74	0.74
France	0.56	0.72	0.72	0.57	0.61	0.95	0.82	1.07	1.19	1.04
Italy	0.85	0.64	0.21	0.21	0.23	0.14	0.15	0.20	0.01	0.01
Luxembourg	0.38	0.48	0.32	0.32	0.27	0.29	0.27	0.27	0.39	0.39
Netherlands	1.08	0.59	0.37	0.48	0.44	0.50	0.61	0.90	0.86	0.86
Austria	0.26	0.23	0.19	0.17	0.17	0.14	0.11	0.01	0.14	0.12
Portugal	2.02	1.47	0.86	0.22	0.83	0.50	0.21	0.25	0.08	0.01
Finland	0.22	0.24	0.21	0.22	0.27	0.37	0.38	0.59	0.70	0.70
Sweden	0.39	0.36	0.25	0.21	0.26	0.19	0.16	0.22	0.07	0.01
United Kingdom	2.62	2.01	0.82	0.59	0.69	0.65	0.58	0.62	0.70	0.74
United States	2.06	1.68	1.45	1.15	0.82	1.00	0.98	1.22	0.90	0.89
Japan	0.71	0.94	0.97	0.71	1.18	1.47	2.02	1.31	1.14	1.06

Tables 2 Estate. inheritance and gift taxes as a percentage of total taxation

Estate. inheritance and gift taxes as a percentage of GDP										
	1965	1970	1975	1980	1985	1990	1995	2000	2005	2006
Belgium	0.36	0.36	0.30	0.34	0.26	0.30	0.33	0.44	0.58	0.62
Denmark	0.19	0.14	0.15	0.19	0.22	0.26	0.23	0.22	0.20	0.21
Germany	0.07	0.07	0.05	0.07	0.08	0.12	0.10	0.14	0.18	0.16
Ireland	0.47	0.35	0.32	0.11	0.10	0.13	0.14	0.21	0.15	0.20
Greece	0.15	0.27	0.19	0.44	0.24	0.32	0.28	0.27	0.13	0.11
Spain	0.15	0.14	0.15	0.09	0.11	0.14	0.16	0.22	0.26	0.27
France	0.19	0.24	0.25	0.23	0.26	0.40	0.35	0.48	0.52	0.46
Italy	0.22	0.16	0.05	0.06	0.08	0.05	0.06	0.08	0.00	0.00
Luxembourg	0.10	0.11	0.11	0.12	0.10	0.10	0.10	0.10	0.15	0.14
Netherlands	0.35	0.21	0.15	0.21	0.19	0.21	0.25	0.36	0.34	0.34
Austria	0.09	0.08	0.07	0.07	0.07	0.06	0.05	0.01	0.06	0.05
Portugal	0.32	0.27	0.17	0.05	0.21	0.14	0.07	0.08	0.03	0.00
Finland	0.07	0.08	0.08	0.08	0.11	0.16	0.17	0.28	0.31	0.30
Sweden	0.14	0.14	0.10	0.10	0.12	0.10	0.08	0.11	0.03	0.00
United Kingdom	0.80	0.74	0.29	0.21	0.26	0.24	0.20	0.23	0.26	0.27
United States	0.51	0.45	0.37	0.30	0.21	0.27	0.27	0.37	0.25	0.25
Japan	0.13	0.18	0.20	0.18	0.32	0.43	0.54	0.35	0.31	0.30

Table 3 Estate. inheritance and gift taxes as a percentage of GDP

As it appears from these figures wealth transfer taxes play only a minor role in the total tax revenues of countries. Within our sample of OECD countries in 2006, Belgium, Japan and France reach with respectively 1.39, 1.06 and 1.04 percent, the highest shares in total tax revenues. In Portugal, by contrast, the share is less than 0.2 percent and is the lowest. Sweden and Italy have abandoned it. As one sees from Figure 1, both the US and the UK experienced a huge decline, from 2.62 to 0.74 and from 2.06 to 0.89 respectively over the last four decades. France has experienced an increase with a peak in 1995. In Japan and Spain the evolution was less marked, increasing in the first and decreasing in the second.

2.2 Tax structure

A comparison of the different national systems of wealth transfer taxation would be easy if the differences were only in the average yield. However, a given yield can be obtained with totally different systems. Take the example of the US and France. In the US, the tax is on the whole estate, hence the name "estate taxation". The rates

range from 18 to 55% over 17 brackets. They are independent on the relation between the donor and the donees and on the number of donees. The threshold for exemption is close to 1.5 million Euros. France has an inheritance tax, which means that the tax base is the amount received and thus decreases with the number of donees. The tax rates vary according to the relation between the donator and the recipients: 5–40% for the descendants (46000), 5—45% for the spouse (7000) and 5–60% for the siblings (15000), with threshold for exemption in parentheses. In other words the American estate tax concerns a smaller fraction of households then the French inheritance tax for about the same yield.

2.3 Estate versus inheritance tax

In general, estate taxation gives one total freedom to bequeath one's wealth to anyone or anything. Disinheritance is possible, as long as the decedent prepares an explicit will. Inheritance taxation, on the other hand, often comes with the legal obligation to bequeath one's wealth to one's children, if any, and with an equal sharing rule for most of the estate. Donors have some freedom to allocate a small fraction of the estate, but this fraction declines with the number of children. As the relation between recipient and donor gets more distant, the inheritance tax treatment becomes less and less generous.

The relative merits of the estate-type and the inheritance-type taxation are clear. The first is simple and relatively easy to administer, leaving all discretion to donors to dispose of their wealth as they wish. This means that it is possible to compensate some children over others for differences in income or need, and that it is possible to disinherit one's children. By contrast, the inheritance tax is more equitable than the estate tax in that it lightens the tax load of large families. Yet, it does not allow for compensatory treatment of children with uneven endowments.[1]

Basically, estate taxation reflects a concept of the family and of the state that is quite different from the one that governs inheritance taxation. If one trusts parents to be fair in disposing of their estate, and if one believes that intrafamily inequality is as

[1] Cremer and Pestieau (1988) argue that tax rates that decrease with the degree of consanguinity can be redistributive.

important as interfamily inequality, then what is desirable is a combination of freedom of bequest and a very low estate tax.

2.4 Unpopular taxes

There is something paradoxical with wealth and wealth transfer taxation. Both taxes are widely discussed in Public Finance and political circles, but at the same time they are not very popular. They are hardly mentioned in public finance textbooks, they are not very well documented and their yield is negligible. Many countries have been more or less successfully struggling for the last decade with the question of whether to repeal their wealth or wealth transfer taxes (see above). As surveys show, they are not popular taxes, even though they typically hit only a minority of the population. The example of the US estate tax is typical. On the one hand, it affects fewer than 2 percent of decedents and is therefore of no direct concern to most taxpayers. One the other hand it is so unpopular that Auerbach (2006) writes, "it might make little sense at the moment to argue in favor of the estate tax in the United States". Most recent Public Finance or Public Economics textbooks do not even mention those taxes. Data are scarce with the exception of those coming from OECD. (See e.g. OECD (2008)).

On the issue of unpopularity, Frank (2005) argues that the way questions are phrased in opinion polls is of crucial importance. He shows that voters would not favor repealing the estate tax if they took into account the policy changes that such a reform would necessarily have to entail (raising other taxes, cutting government services or increasing federal borrowing). When asked just about repealing the tax without mentioning its repercussions, respondents do favor the repeal by almost three to one. When respondents are reminded that the revenue shortfall would have unpleasant repercussions, these respondents opposed repeal by almost four to one.

3 Capital accumulation motives

It is now widely agreed that to understand the allocative and distributional effects of wealth and wealth transfer taxation one needs to have a better grasp of the saver's motives. Among these motives, one has to distinguish those which are purely selfish and

those which concern intergenerational transfers (gifts and inheritance).

We examine briefly a number of motives that have been offered in the literature and sketch their implications. The first two motives are purely selfish. The last three concern bequests.[2]

3.1 Consumption smoothing

This is the most traditional motive for saving over one's life-cycle, with or without uncertainty. It includes the need of replacement income after retirement, financing of children's education, precautionary saving and self-insurance. It is well known that this kind of saving decreases with social insurance and tends to be smaller when individuals are short-sighted. In case of imperfect annuity markets and "premature" death, part of life-cycle saving is not consumed and leads to what is called accidental or unplanned bequests. This form of bequests is by its nature unaffected by estate or inheritance taxation.

3.2 Preference for wealth

It is today widely agreed upon that neither life-cycle saving nor bequests motives can explain the top tail of the wealth distribution. This brings us back to Max Weber's theory of "the spirit of capitalism" generalized by Kurz (1968): capitalists accumulate wealth for the its own sake. To cite Weber (1958, p. 53): "Man is dominated by making of money, by acquisition as the ultimate purpose of his life. Economic acquisition is no longer subordinated to man as the means for the satisfaction of his material needs. This reversal relationship, so irrational from a naive point of view, is evidently a leading principle of capitalism." As argued by Carroll (2000): "the saving behavior of the (American) richest households cannot be explained by models in which the only purpose of wealth accumulation is to finance future consumption, either their own or that of heirs." Then, to explain such a behavior one has to assume that some consumers regard accumulation as a end in itself or as channel leading to power which is equivalent to assume that wealth is intrinsically desirable, what we call here "preference for wealth".

[2] See also on this Pestieau (2000), Cox (1987).

3.3 Pure dynastic altruism: altruistic bequest[3]

Parents care about the likely lifetime utility of their children and hence about the welfare of future generations. Consequently, wealthier parents tend to make larger bequests. Conversely, holding parent's wealth constant, children with higher labor earnings will receive smaller bequests. When there are no rules restricting freedom to testate, there is also a tendency for parents to leave different amounts to different children, in order to equalize their incomes. Finally, pure altruism typically leads to the Ricardian equivalence: parents compensate any intergenerational redistribution by the government through matching bequests. In consequence, debt and pay-as-you go social security have no effect on capital accumulation.

3.4 Joy of giving: paternalistic bequest (bequest-as-last-consumption)[4]

Parents here are motivated not by "pure" altruism but by the direct utility they receive from the act of giving. This phenomenon is also referred to as "warm glow" giving. It can be explained by some internal feeling of virtue arising form sacrifice in helping one's children or by the desire of controlling their life. Formally, these bequests appear in the utility function as a consumption expenditure incurred in the last period of life. *Ceteris paribus*, they are subject to income and price effects but do not have any compensatory effect, namely they are not intended to smoothen consumption across generations. A crucial element is whether what matters to the donor is the net or the gross of tax amount.

3.5 Exchange-related motives: strategic bequests[5]

In their canonical form, exchange-related models consider children choosing a level of "attention" to provide to their parents. In exchange, parents "remunerate them" through a prospective bequest. The exchanges can involve all sorts of non-pecuniary

[3] Among the classical references, one has Barro (1974), Becker and Tomes (1979, 1986). See also Altonji *et al.* (1992).

[4] Andreoni (1990), Bevan and Stiglitz (1979), Glomm and Ravikunar (1992), Kotlikoff and Spivak (1981).

[5] Bernheim *et al.* (1985), Cremer *et al.* (1993), Cremer and Pestieau (1991, 1996, 1998).

services and they can be part of a strategic game between parents and children. Strategic bequests, as they were originally presented, imply that parents extract all the surplus from their children by playing them against each other.

Strategic or exchange bequests depend on the wealth and the needs of the donor; they are not compensatory between parents and children and they do not need to be equal across children.

4 Optimal taxation of capital income

Our theoretical discussion of wealth taxation will be organized in two stages. First of all, in this section, we assume that there are neither bequest motives nor preference for wealth. In that case, within the standard overlapping generations model there is no distinction between wealth and capital income. In the next section, bequest motives and preference for wealth are introduced. In other words, it is recognized that saving is not motivated solely by retirement concerns. We then show that these other motives may have a significant impact on the rate and on the structure of taxation.

In this section we examine two propositions that lead to zero taxation of capital income. The first one, called the Atkinson-Stigliz proposition, is discussed within the overlapping generations model. The second one, known as the Chamley-Judd theorem, is presented in a model with infinitely lived individuals.[6]

4.1 The overlapping generation model

The overlapping generations model is the conventional setting to discuss capital income taxation when saving is exclusively motivated by consumption smoothing. It considers finitely lived generations that overlap, along with an infinitely lived government. We use the two-period model, with labor supply in the first period and consumption in both the first and second periods. Saving from first-period earnings is used to finance second-period consumption, generating capital income that is taxable (in the second period). Since there is only a single period of work, the model can be viewed as shedding light on the taxation of saving for retirement. This model allows for introducing the

[6] See also Chari and Kehoe (1999).

Atkinson-Stiglitz (1976) (hereafter AS) proposition. It states that when the available tax tools include nonlinear labor income taxes, taxation of saving or of capital income is not optimal if two key conditions are satisfied: (1) preferences are (weakly) separable between consumption and labor and (2) all consumers have the same utility function. Originally the AS proposition relies on the idea that the income tax is optimal. Recently Laroque (2005) and Kaplow (2006) consider the desirability of capital income tax with any earned income tax function. They show that one can always move from taxing to not taxing capital income with an appropriate modification of the earned income tax. Such a move does generate more government revenue while leaving every consumer with the same utility and the same labour supply. The intuition of the original, as well as the revisited AS proposition, is that with separability and identical utilities taxing saving cannot relax the self-selection constraints but would have an added efficiency cost.[7]

To counter the AS result and its zero capital income taxation there are several angles of attack.[8] The first one is clearly to question the assumption of separability and that of homogeneous preferences. Dropping the assumption of separability would not necessarily result in taxing capital income. Subsidizing is as likely. Introducing heterogeneity in preferences appears to be more promising. It has been done in different ways. There are at least three potential sources of heterogeneity that can lead to a tax on capital income: time discount rates, longevity and initial endowments. Saez (2002) questions the Atkinson-Stiglitz theorem on the basis of differences in time preferences across individuals with different skills. He shows that capital income taxation becomes desirable under the plausible assumption that those with higher earnings abilities discount the future less (and thus save more out of any given income). Cremer et al. (2009) use another stylized fact, namely the positive correlation between income and longevity to reach the same conclusion. Cremer et al. (2003) introduce an endowment (inherited wealth) as second unobservable characteristic. They show that if ability and endowment are positively correlated then it is efficient to tax capital income.

[7] To relax an incentive constraint it is necessary to find a policy measure that affects the mimicker more than the mimicked individual. With identical and separable preferences, mimicker and mimicked have the same indifference curves in the produced good space. Consequently a distortion in relative prices affects them in the same way.

[8] For a survey, see Cremer (2003).

If we discuss the AS proposition in the standard OLG setting, we have to keep in mind that there is no guarantee that the optimal accumulation of capital is achieved. If the government does not have direct control of capital, it can use tax policy to affect the capital labor ratio. In that case, even with separability and identical utilities, a tax on capital income is needed. This in itself is quite intuitive. However, the design of the appropriate tax rule is more complex. For instance, a need of additional capital accumulation, because the capital stock is below the modified golden rule level, will not necessarily lead to less taxation of capital income and more taxation of labor income. What matters is aggregate saving and this may depend much more on net of tax earnings than on the rate of interest.[9]

Another variation of the standard model is to allow for uncertain earnings in the second period of life. Cremer and Gahvari (1995) have shown that if consumption decisions are to be taken before earnings uncertainties are resolved then the Atkinson-Stiglitz result fails to hold. Banks and Diamond (2009) discuss the implications of this result for capital income taxation. They argue that the case of uncertainty is similar to the situation (discussed above) where high wage individuals discount the future less. In the latter case, a high wage individual imitating someone with less skill saves more than a low wage individual. Taxing capital income is then an effective way to release an otherwise binding incentive constraint. Under uncertainty, this argument goes through. An individual who plans to earn less than the government planned amount in the event of high skill has a higher valuation of saving than the individual with the government planned income level. Consequently, a tax on savings continues to relax an incentive constraint. To illustrate this argument, Banks and Diamond (2009) point out that retirement age tends to be smaller for those with higher savings. Consequently, taxing savings discourages earlier retirement.

Uncertain earnings are a central element of what is known as the *New Dynamic Public Finance*[10]. This literature is quite complex and leads to a number of interesting insights. However, the basic case for taxation of capital income is based the same

[9] With log-linear preferences the interest rate it does not depend on the interest rate (and thus on captital income taxation).

[10] See. e.g. Golosov, Tsyvinski and Werning (2007)

argument as in Cremer and Gahvari (1995).

We can also look at simulation results to see how important and how large the capital income tax might be. Conesa et al. (2007) have done a complex simulation of the asymptotic position of an empirically calibrated overlapping generations (OLG) model with uncertain individual wages and lengths of life. They have a three-parameter earnings tax (the same for each age), a 100 percent estate tax financing poll subsidies, a pay-as-you-go social security system, a linear tax on capital income and no government debt or assets. They choose taxes to optimize the long-run position of the economy and find a capital income tax rate of 36 percent, while the tax on labour income is nearly linear at 23 percent.

Erosa and Gervais (2002) have examined the most efficient taxation of a representative consumer within an OLG setting. If the utility discount rate differs from the real discount rate, individuals will choose non-constant age profiles in both consumption and earnings, even if annual utilities are additive and the same over time, while the wage rate is also constant over time. Consequently, the optimal age-dependent taxes on consumption and earnings are not uniform over time, resulting in nonzero implicit taxation of savings. Interestingly, taxation or subsidization of savings remains optimal when taxes are constrained to be uniform for workers of different ages.

4.2 Infinite horizon

In the above models there is a contrast between finitely lived individuals, who are intergenerationally disconnected, and the government which has an infinite horizon and a different time preference. Let us now look at another class of models wherein individuals are infinitely lived and have the same discount rate as the central planner. For the purpose at hand the central finding of this literature, due to Chamley (1986) and Judd (1985), is the optimality of zero capital income taxation in the long term.

The intuition behind this result can be understood by looking at the wedge that a capital income tax introduces between the intertemporal marginal rate of substitution (MRS) and the intertemporal marginal rate of transformation (MRT). Let us illustrate

this through a simple example.[11] Take a tax rate of 30% and a rate of return of 10%. In a year, the wedge between MRS ($= 1+0.1(1-0.3) = 1.07$) and MRT ($= (1+0.1) = 1.1$) is small and the distortion on the saving choice is negligible. After 40 years, the capital income tax generates a 67% wedge between consumption today and consumption in 40 years. As a matter of fact, as the time horizon T goes to infinity, the ratio between MRS ($= [1+0.1(1-0.3)]^T$) and MRT ($=[1+0.1]^T$) tends to zero. Consequently, when the investor has a very long time horizon the capital income tax becomes extremely inefficient.

The Chamley-Judd no capital income taxation conclusion has become the standard rule for a number of public economists and particularly macroeconomists; see e.g., Chari and Kehoe (1999). It has also be challenged on various grounds. It relies on a set of strong assumptions. As with the Atkinson-Stiglitz result, a key question is how robust their theorem is to realistic changes in the model. There is first the steady-state assumption; we know that during the transition capital income is subject to taxation. There is also the assumed equality between the private and the social discount rate and the absence of liquidity constraints. If one departs from these assumptions the tax is not any more equal to zero even in the steady state. Their model assumes also that there are no constraints on the tax tools. As shown by Coleman (2000) and Correia (1996) as soon as some taxes are constrained the zero tax result ceases to hold.

Uncertainty about earnings, along with borrowing constraints is shown to lead to a positive tax. See on this Chamley (2001) and Golosov et al. (2003). Finally let us mention a paper by Saez (2002) who introduces a progressive tax on capital income into the Chamley-Judd model. Under some plausible assumptions, he shows that such a tax is desirable; it drives all the large estates down to a finite level thus generating a truncated long-run wealth distribution.

To conclude this section, it seems that the case for a zero-tax on capital income when the only motive for saving is life-cycle consumption smoothing is rather weak. While Atkinson-Stiglitz, on the one hand, and Chamley-Judd, on the other hand, are often

[11] This example is borrowed from Banks and Diamond (2009) who provide a more detailed discussion of this intuition.

invoked to advocate a tax exemption on capital income, there appears to be a striking discrepancy between common beliefs and actual results. Under closer scrutiny, it is clear that either of these zero tax results does not apply under "plausible" circumstances.

We shall now turn to the other motives for saving.

5 Wealth taxation with alternative motives for saving

We now consider the case where besides life-cycle considerations individuals may have motives for accumulating wealth. We start by presenting the general model from which all the subsequent special cases are derived.

5.1 The canonical model

Identical individuals live for two periods, consuming in both while working only in the first one.[12] Population is increasing at the rate n. The government has an exogenously given revenue requirement, to be financed through taxes on income from labor and capital and on estate transfers, if any. Individuals may derive some utility from transferring resources to their offspring.

The problem of the representative consumer is to maximize utility subject to the budget constraint

$$b_t + \omega_t \ell_t = c_t + \frac{d_{t+1} + x_{t+1}}{1 + \varrho_{t+1}}, \tag{1}$$

where b_t is inherited wealth, x_{t+1} is the amount of bequests, ω_t is the consumer wage (net of tax wage), ϱ_{t+1} the consumer rate of interest (after tax interest rate), c_t, first period consumption, ℓ_t, labor supply and d_{t+1}, second period consumption. Preferences are represented by the following utility function:

$$u_t = u(c_t) + \beta u(d_{t+1}) - H(\ell_t) + \gamma B_{t+1} \tag{2}$$

where B_{t+1} is the utility derived from bequeathing if any, β and γ are positive parameters, $u(\cdot)$ is strictly concave and $H(\cdot)$ strictly convex. The additive specification is used for the sake of simplicity. When there is just a life-cycle motive for saving as in the previous section, one has $\gamma = 0$, $b = x = 0$.

[12] Diamond (1965).

5.2 Altruistic bequests

In this subsection we consider the case where individuals save for their own retirement consumption needs and for making sure that their children's welfare is sufficiently high. The standard way of dealing with this problem is to adopt the infinitely lived individuals model. Instead of considering an infinite series of years of one individual life we consider an infinite series of generations (a dynasty), which are linked by bequests. Using the above canonical model, we posit $B_{t+1} = u_{t+1}$.To keep things relatively simple, we assume that $\beta = 0$ so that $d = 0$. In other words, people live only one period and only save for bequeathing. This assumption implies that the tax on saving is also the tax on wealth transfer.[13] Then, by recursion, the problem of the individual at time 0, which is also that of the the social planner, it is to maximize

$$\sum_{t=0}^{\infty} \gamma^t u\left(c_t, \ell_t\right),$$

with $b_{t+1} = x_{t+1}/(1+n)$.We assume non negative bequests, which corresponds to the liquidity constraint in the infinitely lived individuals model, and the equality between the social and the individual discount factor (γ). Then, one has the Ricardian equivalence implying the neutrality of the debt. One also has the Chamley-Judd result[14]: *(i)* initially a tax on both earnings and saving (that is bequests); *(ii)* in the long run the tax on saving tends to 0; but as we have seen it is not very robust.

5.3 Paternalistic bequests

These bequests are also called "bequests as last consumption" or "joy of giving" bequests. We now have $B_{t+1} = h\left(x_{t+1}\right)$ and $b_{t+1} = x_{t+1}/(1+n)$. Unlike in the case of pure altruism, the objective of individuals and that of the social planner may now diverge. Each individual maximizes

$$u\left(c_t, d_{t+1}, \ell_t\right) + \gamma v\left(x_{t+1}\right).$$

[13] We have the following equality between saving and bequest:

$$s_t = x_{t+1} = (1+n)k_{t+1}.$$

[14] Another result of Chamlety-Judd is that initial wealth should be taxes as much as possible. Such a "one shot capital levy" would not be distortionary.

To obtain the social optimum, there is the issue of whether or not individual utilities should be "laundered". Harsanyi (1995) and Hammond (1988) have advocated "excluding all external preferences, even benevolent ones, from our social utility function". Advocates of a utilitarian approach, on the other hand, argue that the social planner cannot paternalistically modify individuals' preferences.

Bequests are potentially subject to a double tax: first, the tax on savings, τ^r, and then the specific tax on transfers τ^x. This latter tax depends on the extent of laundering. When there is laundering, bequests lose their direct social utility and are thus subject to a relatively higher tax. In the absence of laundering it is not impossible to have a negative marginal tax. For example, Fahri and Werning (2009, who do not launder their utilities, study efficient allocations in a model with altruistic parents and focus on the implications for estate taxation. They show that optimal estate taxes have two important features. First, taxation should be progressive, so that more productive parents face a lower net return on bequests. Second, marginal taxes should be negative, so that parents face a marginal subsidy on bequests. They show that these features can be implemented using a simple nonlinear estate tax schedule, independent of income taxation.[15]

5.4 Exchange-based bequests

To deal with exchange-based bequests, we modify the canonical model as follows:

$$B_{t+1} = h\left(a_{t+1}\right) \text{ and } u_t = u\left[c_t - v\left(a_t^g\right), \ell_t, a_{t+1}\right] + \beta u\left(d_{t+1}\right) - h(\ell_t),$$

where a_{t+1} is attention received, a_t^g is attention given representing a monetary cost of $v\left(a_t^g\right)$ that is paid by a bequest b_t. In the strategic bequest vein, we assume that $b_t = v\left(a_t^g\right)$ (parents extract all the surplus from their children who are just paid for the disutility of their effort).

We now have three tax instruments: a proportional tax on earnings, interest income and inherited wealth with rates τ^w, τ^r and τ^x. The overall tax on bequests, $\tau^r + \tau^x\left(1+r\right)$, may or may not be higher than that on future consumption. In other words,

[15] On the question of altruism in the design of estate tax see Kaplow (2000, 2008) and Boadway et al. (2009).

there is no particular reason to believe that the wealth transfer tax τ^x is positive. This will depend on the relative magnitude of the compensated derivatives which determine the overall tax on bequests and the tax on future consumption. For example if the demand for attention is much more elastic than that for future consumption, the tax on inheritance, τ^x, is negative.

5.5 Accidental bequests

To deal with accidental bequests, we posit $\gamma = 0$, $\beta = \tilde{\beta}\,\theta$, where $\tilde{\beta}$ is the factor of time preference and θ is the survival probability. There is a probability θ that the individual will live until the end of the second period and $(1-\theta)$ that he will die at the end of the first period. In the latter case, $b_{t+1} = d_{t+1}/(1+n)$ for a fraction $(1-\theta)$ of children whose parents decease prematurely. The accidental bequest case is not much different from the case without bequest. Saving is affected by survival probabilities. Accidental transfers are taxed at 100%, without affecting the supply of saving. The part of public spending (if any) which exceeds the proceeds of the transfer tax is financed through labor and capital income taxes.

5.6 Preference for wealth

The case with preferences for wealth is close to that of paternalistic bequests with one exception: here individuals obtain the same utility from saving for retirement and for bequests: $B_{t+1} = h\,(d_{t+1} + x_{t+1})$ and $b_{t+1} = x_{t+1}/(1+n)$. As in the case of paternalistic bequests, wealth can be viewed as a consumption good and be taxed accordingly. The issue of laundering does also play an important role here.

6 Heterogeneity

The theoretical literature on wealth transfer taxation tends to assume that individual have only one type of bequest motive. This section examines through some examples how the results are affected when society consists of individuals with different motives. We first turn to a society consisting of individuals who combine different motives, namely who leave both altruistic and accidental bequests. Then we consider a society where

individuals are either altruistic, pure "life-cyclers" or with preference for wealth.

6.1 Mixed motives

It is widely believed that bequests are in reality an hybrid of canonical types analyzed above, in particular of accidental bequests (related to imperfect annuity markets) and of paternalistic bequests (related to some joy of giving). In such a case, the estate consists of two components: a certain amount planned by altruistic parents and another part which results from the "premature" death of parents. More specifically, this second part represents intended second period consumption in an overlapping generations framework. We have seen that these two types of bequests have totally different implications. Determining the relative importance of either one is thus crucial to design an optimal estate tax.

To illustrate this, we use an additive utility function:

$$u_t = \quad u\left(c_t\right) + \tilde{\beta}\,\theta u\left(d_{t+1}\right) - H\left(\ell_t\right) + \gamma h(x_{t+1})$$

where $\tilde{\beta}$ is the factor of time preference and θ is the survival probability. Michel and Pestieau (2002) show that the optimal value of the estate tax rate represents a compromise between the equity objective and the desire of not discouraging wealth accumulation. With $\gamma = 0$, the tax is 1; with $\theta = 1$, the tax can be low.

In this very simple model the only source of inequality is longevity θ. Introducing a second source of heterogeneity, e.g., different productivities, is surely more realistic. Pestieau and Sato (2008) extend the Michel-Pestieau (2002) model to include wage differences and education. They reach the same though richer results. They use linear tax tools. With non linear taxation, as shown by Blumkin and Sadka (2002) and Cremer et al. (2009), a 100 % tax is not necessarily desirableeven when $\gamma = 0$. The reason is that accidental bequests can bring some information on non observable characteristics.

6.2 Altruists and life-cyclers: savers and spenders

For long economists have rejected the idea of heterogeneous preferences. Differences in behavior had to be explained by differences in ability, inherited wealth or random

shocks. The last years have seen an increasing awareness that it is important to account for differences in preferences pertaining to altruism or time preference. In his celebrated paper, Ramsey (1928) already indicated that within a society consisting of individuals differing in time preferences, the most patient would end up with all the wealth in the long run.

In this section we address the question of wealth transfer tax in a society with two types of individuals, pure life-cyclers and altruistic savers.[16] Mankiw (2000) calls them spenders and savers. Formally, their utility function is:

$$u_t^i = u\left(c_t^i, d_{t+1}^i\right) + \gamma^i u_{t+1}^i$$

with $i = L$ for life-cyclers and thus $\gamma^L = 0$ and $i = A$ for altruists and thus $\gamma^A = \gamma > 0$. Preferences are dynastic and there is a fixed fraction π of altruistic dynasties and a fraction $(1 - \pi)$ of non-altruistic dynasties.

Within this setting, government debt does not affect the steady-state capital stock and national income. As in Ramsey, the altruistic (the more patient) households hold the entire capital stock. Moreover, government debt though neutral in aggregate terms increases steady-state inequality. A higher level of debt means a higher level of taxation to pay for the interest payments. The taxes fall on both life-cyclers and altruists but the interest payments go entirely to the altruist. Consequently, a higher level of debt, or alternatively of pay-as-you-go social security, raises the steady-state consumption and income of the altruists and lower the steady-state consumption and income of the life-cyclers.

For the purpose at hand we are interested by the incidence of a wealth transfer tax which in the present setting is only paid by altruistic dynasties. Assuming that the proceeds of the tax are redistributed uniformly to everyone, it can be shown that the tax may lower the utility of not only the altruists but also that of the life-cyclers. This paradoxical result was already obtained by Stiglitz (1978) in a slightly different setting.[17] When capital is taxed its quantity falls which, in turn, may depress the real wage. This effect may be large enough to make any tax on wealth transfer undesirable

[16] See Michel and Pestieau (1998, 1999, 2000, 2004).
[17] See also Stiglitz (1977).

even from the standpoint of people who own no wealth, pay no tax and indeed benefit from a transfer.

One should recall that this result is obtained in the steady-state. In the short run life-cyclers could be tempted to tax inheritance and enjoy a utility boost. If they have to vote they will vote for such a tax without being concerned by the fate of their descendance. The political economy of wealth transfer thus yields a result different from steady-state social welfare maximization. It explains why a tax that would be undesirable from the steady-state standpoint can be voted on when life-cyclers hold a majority.

6.3 Savers, spenders and hoarders.

Pestieau and Thibault (2008) extend the above model by including a third type, the hoarders, those who like wealth for its own sake. Their paper proposes a simple OLG model which is consistent with the essential facts of consumer behavior, capital accumulation and wealth distribution, and yields some new and surprising conclusions about fiscal policy. By considering a society in which individuals are distinguished according to two characteristics, altruism and wealth preference, they show that those who in the long run hold the bulk of private capital are not so much motivated by dynastic altruism as by preference for wealth. Two types of social segmentation can result with different wealth distribution. To a large extent their results seem to fit reality better than those obtained with standard optimal growth models in which dynastic altruism (or rate of impatience) is the only source of heterogeneity: overaccumulation can appear, public debt and unfunded pensions are not neutral, estate taxation can improve the welfare of the top wealthy and hurt that of those without wealth. In the equilibrium wherein spenders, savers (altruists) and hoarders (preference for wealth) coexist, they show that estate taxation worsens the welfare of both spenders and savers but increases (decreases) that of the hoarders if their preference for wealth is sufficiently high (low).

7 Conclusion

Let us now return to some practical questions under the light of the theory just surveyed. Recurrent questions in the debate are *(i)* do we need an annual wealth tax, *(ii)* do

we need a wealth transfer tax and if so of what type should it be, and *(iii)*, how serious are the threats of tax "avoision" (evasion/avoidance) and tax competition on the sustainability of wealth taxation?

Most EU member countries do not have an annual wealth taxation. This is to some extent consistent with the theory which shows that it is redundant with a capital income tax granted that the tax base is the same and that realized capital gains are correctly taxed.

As to a wealth transfer tax, whether or not it is desirable depends on the underlying motives of bequests. We have seen that accidental bequests can be heavily taxed without generating distortions, nor having a clear regressive effect. At the same time empirical work indicates that a non negligible share of inheritance can be considered as accidental[18]. Naturally there are other types of bequests that do not imply a 100% tax. One can thus reasonably expect that on the basis of efficiency and equity considerations the taxed should not be zero nor 100%.

Should we have an estate or an inheritance tax with their implications in terms of tax rates and estate sharing? A good reason to advocate inheritance taxation with lower rates for children than for any other donees is that the likelihood of accidental bequests is lower for the first than for the second. Compared to estate taxation inheritance taxation seems to favor large rather than small families**.** Keeping lower rates for inter vivos gifts particularly when they are early seems also desirable given that children often need resources at the start of their active life and not when their parents pass away, which generally occurs at the verge of their own retirement. In any event, gifts are by definition intended, which also pleads for a lower tax then on bequests (which are in part accidental).

There are two non normative arguments that are often used to justify the decrease or even the abandonment of any kind of wealth taxation. These are tax evasion/avoidance and tax competition. Accordingly even though wealth or wealth transfer tax would be shown to be highly desirable in a closed economy and in a setting of full compliance, some people maintain that they should me dismantled because of tax competition and

[18] Arrondel et al. (1991)

tax avoision. These are threats that have to be taken seriously but within reasonable limits. International coordination and cooperation can temperate tax competition as well as limit "avoision". Observe that avoidance and evasion not only leads to poor tax yields but also leads to strong departures from both vertical and horizontal equality. This may explain at least in part, why wealth taxation is today so unpopular that in some countries the political system is considering abolishing it. Those issues have a real political impact and yet there is little evidence on how important is their effect. What is sure is that they can be dealt with by reforming the tax and not by repealing it.

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A Appendix

A.1 Tables

Taxes on property as a percentage of GDP										
	1965	1970	1975	1980	1985	1990	1995	2000	2005	2006
Belgium	1.2	1.3	1.1	1.2	1.1	1.4	1.5	1.9	2.1	2.3
Denmark	2.4	2.3	2.3	2.5	2	1.9	1.7	1.6	1.9	1.9
Germany	1.8	1.6	1.2	1.3	1.1	1.2	1	0.8	0.9	0.9
Ireland	3.8	3.5	2.8	1.6	1.4	1.5	1.5	1.7	2.4	2.9
Greece	1.7	1.8	1.9	1	0.7	1.2	1.2	2.1	1.4	1.4
Spain	0.9	1	1.2	1	1.6	1.8	1.8	2.2	3.1	3.3
France	1.5	1.6	1.8	1.9	2.5	2.7	2.9	3.1	3.4	3.5
Italy	1.8	1.5	0.8	1.1	0.8	0.9	2.3	2	2	2.1
Luxembourg	1.7	1.6	1.7	2	2.2	3	2.6	4.1	3.2	3.3
Netherlands	1.4	1.2	1	1.5	1.5	1.6	1.7	2.1	2.1	1.9
Austria	1.3	1.3	1.1	1.1	1	1.1	0.6	0.6	0.6	0.6
Portugal	0.8	0.7	0.5	0.3	0.5	0.8	0.8	1.1	1.1	1.1
Finland	1.2	0.7	0.7	0.7	1.1	1.1	1	1.1	1.2	1.1
Sweden	0.6	0.5	0.5	0.4	1.1	1.8	1.3	1.8	1.5	1.4
United-Kingdom	4.4	4.6	4.5	4.2	4.5	2.9	3.5	4.3	4.4	4.6
United-States	3.9	3.8	3.6	2.8	2.7	3.1	3.1	3	3.1	3.1
Japan	1.5	1.5	1.9	2.1	2.7	2.7	3.3	2.8	2.6	2.5

Table A1 Taxes on property as a percentage of GDP

Taxes on property as a percentage of total taxation										
	1965	1970	1975	1980	1985	1990	1995	2000	2005	2006
Belgium	3.7	3.8	2.9	2.9	2.5	3.4	3.4	4.2	4.7	5.1
Denmark	8	6	6.1	5.8	4.3	4.2	3.5	3.2	3.7	3.8
Germany	5.8	4.9	3.9	3.3	3	3.4	2.8	2.3	2.5	2.5
Ireland	15.1	12.2	9.7	5.3	4	4.7	4.5	5.5	7.9	9.1
Greece	9.7	9.3	9.7	4.6	2.7	4.6	4.1	6.2	4.3	4.4
Spain	6.4	6.5	6.3	4.6	5.9	5.5	5.5	6.5	8.7	9
France	4.3	4.8	5.1	4.8	5.8	6.3	6.7	7	7.8	8
Italy	7.2	6	3.3	3.7	2.5	2.3	5.6	4.6	5	5.1
Luxembourg	6.2	6.7	5.2	5.7	5.6	8.3	7	10.6	8.5	9.3
Netherlands	4.4	3.3	2.4	3.6	3.5	3.7	4.1	5.3	5.3	4.7
Austria	4	3.7	3.1	2.9	2.4	2.7	1.5	1.3	1.3	1.4
Portugal	5	4	2.5	1.4	1.9	2.7	2.5	3.2	3.1	3.1
Finland	4	2.2	1.9	1.9	2.7	2.4	2.2	2.4	2.7	2.5
Sweden	1.8	1.5	1.1	0.9	2.3	3.5	2.7	3.4	3	3
United Kingdom	14.5	12.5	12.7	12	12	8.2	10	11.6	12.1	12.4
United States	15.9	14.2	13.9	10.7	10.7	11.5	11.1	10.1	11.3	11.1
Japan	8.1	7.6	9.1	8.2	9.7	9.4	12.2	10.5	9.7	9.1

Table A2 Taxes on property as a percentage of total taxation

B Details on the model

In this appendix we sketch the models that underly the discussion presented in this survey. We start by the basic overlapping generation model with poroduction developped by Diamond (1965).

B.1 Overlapping generation model.

In the Diamond (1965) model each generation lives for two periods, consuming in both and working in the first. There are no bequests and the lifetime budget constraint for the representative household born in period t may be written:

$$c_t + \frac{d_{t+1}}{1+\varrho_{t+1}} = \omega_t \ell_t. \tag{3}$$

It is clear that endowing the government with two instruments, taxes on labor income ($\tau^w = w - \omega$) and capital income ($\tau^r = r - \varrho$) is equivalent to allowing the government to tax first- and second-period consumption at possibly different rates. A zero-tax on

capital income—a labor income tax—would result in uniform taxation of consumption in the two periods.[19]

We now characterize the optimal steady-state taxes resulting from a utilitarian objective

$$\sum \delta^t u_t \tag{4}$$

where $0 < \delta < 1$ is the factor of social time preference and

$$u_t = u\left(c_t, d_{t+1}, \ell_t\right) \tag{5}$$

is the individual utility function. Two general results have been obtained. First with the government able to redistribute resources across generations through debt policy, pay-as-you-go social security or any other devices the marginal product of capital converges to the population growth rate divided by the factor of time preference $\left((1+n)/\delta\right)$, namely the modified golden rule. Second, optimal taxes on labor and capital should follow the standard analysis of static optimal tax theory.

Maximizing (5) subject to (1) yields the demand function for $c\left(\omega_t, \varrho_{t+1}\right)$, $d\left(\omega_t, \varrho_{t+1}\right)$ and $\ell(\omega_t, \varrho_{t+1})$ which substituted back in the utility function yields the indirect utility function:

$$v_t = v\left(\omega_t, \varrho_{t+1}\right),$$

with

$$\frac{\partial v_t}{\partial \omega_t} = \alpha_t \ell_t \quad \text{and} \quad \frac{\partial v_t}{\partial \varrho_{t+1}} = \frac{\alpha_t d_{t+1}}{\left(1+\varrho_{t+1}\right)^2} = \frac{\alpha_t s_t}{1+\varrho_{t+1}},$$

where α is the marginal utility of income $\alpha = \partial u/\partial I$ and s is saving. We use I to denote non labor income, if any.

There is a production sector represented by a CRS production function relating output Y_t to capital K_t and labor L_t:

$$Y_t = F\left(K_t, L_t\right),$$

or

$$y_t = F\left(\frac{K_t}{L_t}, 1\right) = f\left(k_t\right),$$

[19] See Atkinson and Sandmo (1980), Pestieau (1974).

with $y = Y/L$ and $k = K/L$. With perfect competition factor payments equal the value of marginal products:

$$w_t = F'_L(K_t, L_t) \quad \text{and} \quad 1 + r_t = F'_K(K_t, L_t).$$

We assume total depreciation after one period and $L_t = \ell_t N_t$ where $N_t = N_{t-1}(1+n)$ is the size of generation t.

In this simple economy, the dynamics is conducted by the capital accumulation equation:

$$K_{t+1} = N_t s_t,$$

where $s_t = \sigma\left(\omega_t, \varrho_{t+1}\right) = \omega_t - c\left(\omega_t, \varrho_{t+1}\right)$.

Under some assumptions, one can show that k_{t+1} converges to a unique steady-state market equilibrium k^* which can be compared to the steady-state optimal value $\hat{k}_\delta$ that is consistent with the modified golden rule and defined by:

$$f'\left(\hat{k}_\delta\right) = \frac{1+n}{\delta}.$$

For the time being we assume that the economy is on the modified golden rule growth path through some appropriate intergenerational transfers by the government. So doing we focus on the optimal tax structure abstracting from dynamic efficiency considerations.

The government's budget constraint is simply:

$$\tau_t^w \ell_t + \tau_t^r \frac{d_t}{(1+\varrho_t)(1+n)} = R, \tag{6}$$

where R is given. The second term on the left is the revenue from capital income taxation which concerns the previous generation ($s_{t-1} = d_t/(1+\varrho_t)$).

We solve this problem by differentiating the Lagrangean expression,

$$\mathcal{L} = \sum \delta^t \left\{ v\left(\omega_t, \varrho_{t+1}\right) + \mu\left(\tau_t^w \ell_t\left(\omega_t, \varrho_{t+1}\right) + \tau_t^r \frac{d_t\left(\omega_{t-1}, \varrho_t\right)}{(1+\varrho_t)(1+n)} - R\right)\right\},$$

with respect to ω_t and ϱ_t.This yields:

$$\frac{\partial \mathcal{L}}{\partial \omega_t} = \delta^t \left(\alpha_t \ell_t + \mu \left[\tau_t^w \frac{\partial \ell_t}{\partial \omega_t} - \ell_t + \tau_t^r \frac{\partial d_{t+1}}{\partial \omega_t} \frac{\delta}{(1+n)\left(1+\varrho_{t+1}\right)} \right] \right) \tag{7}$$

$$\begin{aligned} \frac{\partial \mathcal{L}}{\partial \varrho_{t+1}} = \delta^t \Bigg(& \alpha_t \frac{d_{t+1}}{\left(1+\varrho_{t+1}\right)^2} + \mu \Bigg[\tau_t^w \frac{\partial \ell_t}{\partial \varrho_{t+1}} + \frac{\delta}{1+n} \\ & \left(\tau_{t+1}^r \frac{\partial d_{t+1}}{\partial \varrho_{t+1}} \frac{1}{1+\varrho_t} - \frac{d_{t+1}\left(1+r_{t+1}\right)}{\left(1+\varrho_t\right)^2} \right) \Bigg] \Bigg). \end{aligned} \tag{8}$$

Evaluating (7) and (8) in the steady-state, while adding and subtracting the income effect times ℓ for $\partial \mathcal{L}/\partial \omega$ and times $d/\left(1+\varrho\right)^2$ for $\partial \mathcal{L}/\partial \varrho$ yields:

$$\left(\frac{\alpha}{\mu} - 1 - \Delta \right) \ell + \tau^w \frac{\partial \tilde{\ell}}{\partial \omega} + \tau^r \frac{\partial \tilde{d}}{\partial \omega} \frac{\delta}{(1+n)\left(1+\varrho\right)} = 0 \tag{9}$$

$$\begin{aligned} & \left(\frac{\alpha}{\mu} - 1 - \Delta \right) \frac{d}{\left(1+\varrho\right)^2} - \frac{1+n-\delta\left(1+r\right)}{1+n} \frac{d}{\left(1+\varrho_t\right)^2} + \\ & \tau^w \frac{\partial \tilde{\ell}}{\partial \varrho} + \tau^r \frac{\partial \tilde{d}}{\partial \varrho} \frac{\delta}{(1+n)\left(1+\varrho\right)} = 0, \end{aligned} \tag{10}$$

where

$$\Delta = \tau^w \frac{\partial \ell}{\partial I} + \tau^r \frac{\partial d}{\partial I} \frac{\delta}{(1+n)\left(1+\varrho\right)},$$

and the $\tilde{}$ denotes the compensated effects. Given our assumption on the modified golden rule, this can be further simplified:

$$\tau^w \frac{\partial \tilde{\ell}}{\partial \omega} + \tau^r \frac{\partial \tilde{d}}{\partial \omega} \frac{\delta}{(1+n)\left(1+\varrho\right)} = \left(\tau^w \frac{\partial \tilde{\ell}}{\partial \varrho} + \tau^r \frac{\partial \tilde{d}}{\partial \varrho} \frac{\delta}{(1+n)\left(1+\varrho\right)} \right) \frac{\ell\left(1+\varrho\right)^2}{d}. \tag{11}$$

This equation characterizes the relative levels of the tax rates on earnings and capital income with the absolute levels being determined by the government's revenue requirement R. As usual this characterization depends on compensated and not gross derivatives. Assume for simplicity of interpretation that the cross effects are zero. Then we can have:

$$\frac{\tau^w/\omega}{\tau^r/\varrho} = \frac{\tilde{\varepsilon}_{d\varrho}}{\tilde{\varepsilon}_{\ell w}} \frac{1+\varrho}{\varrho\left(1+r\right)} \tag{12}$$

where the $\tilde{\varepsilon}$ are the compensated elasticities. If labor is completely inelastic along the compensated supply curve, the optimal tax on interest income is zero because the tax on earnings is equivalent to a lump-sum tax. The argument is reversed when the demand

for future consumption is inelastic. In general however there is no particular reason to believe that either tax will be zero nor that both taxes are the same.

Let us come back to the assumption that the economy is on the modified golden rule path, that is, on the assumption that the government can control capital. From (10) one can see that if $1+n \neq (1+r)\,\delta$ we have an additional term in either (11) or (12). In other words these taxes are not only used to finance R but also to foster or discourage capital accumulation depending on whether the rate of interest is higher or lower than the rate of population growth divided by the discount factor.

As shown by Atkinson and Sandmo (1980) too little capital may call for a *lower* taxation of *earnings* and a *higher* tax on *interest income* than when the modified golden rule holds. This apparent paradox can be explained by noting that with a log-linear utility function saving depends only on earnings and not on the interest rate.[20]

We shall now introduce transfers into this model and successively consider the motives discussed in Section 3. Within each setting we study the design of factor income and wealth transfer taxes. To do so it is convenient to distinguish the case where the government has the instruments to secure the modified golden rule from the case where the government cannot fully control the capital stock.

B.2 Accidental bequestn

The accidental bequest case is not much different from the case without bequest. Saving is affected by survival probabilities. Accidental transfers are taxed at 100%, without affecting the supply of saving. The part of public spending (if any) which exceeds the proceeds of the transfer tax is financed through labor and capital income taxes designed *à la Atkinson-Sandmo.*

B.3 Pure altruism[21]

To keep things relatively simple, we assume that $\beta = 0$ so that $d = 0$. In other words, people live only one period and only save for bequeathing. This assumption implies that

[20] Naturally, their argument applies also to other utility functions.
[21] The classical papers on this are Chamley (1986) and Judd (1985).

the tax on saving is also the tax on wealth transfer.[22] Then, the social planner's problem at time 0 is to maximize:

$$\sum_{t=0}^{\infty} \gamma^t u\left(c_t, \ell_t\right),$$

subject to the resource constraint

$$F\left(k_t, \ell_t\right) = (1+n)\, k_{t+1} + c_t + R,$$

and to the revenue constraint

$$(1+n)\, z_{t+1} = (1+\varrho_t)\, z_t + (1+\varrho_t)\, k_t + \omega_t \ell_t - F\left(k_t, \ell_t\right) + R,$$

where z denotes per worker public debt. Recall that k is the per worker capital stock while R per worker public spending and that the production function exhibits constant returns to scale.

Chamley (1986), Judd (1985) and Coleman (2000) show the following:

- if one could tax as much as possible initial wealth k_0, one could do without using any distortionary tax;
- if this first-best solution is not accessible, one will have initially a tax on both earnings and saving (that is bequests);
- in the long run the tax on saving tends to 0.

We restrict ourselves to proving the last point which represents the main result. The government's objective is the same as that of the representative individual ($\gamma = \delta$). It maximizes the Lagrangean:

$$\begin{aligned} \mathcal{L} \;=\; & \sum_{t=0}^{\infty} \gamma^t \left[u\left(c_t, \ell_t\right) + \lambda_t \left(F\left(k_t, \ell_t\right) - c_t - (1+n)\, k_{t+1} - R \right) \right] \\ & + \mu_t \left[(1+n)\, z_{t+1} - (1+\varrho_t)\, z_t - (1+\varrho_t)\, k_t - \omega_t \ell_t + F\left(k_t, \ell_t\right) - R \right], \end{aligned}$$

[22] We have the following equality between saving and bequest:

$$s_t = x_{t+1} = (1+n) k_{t+1}.$$

where λ and μ are the Lagrange multiplier associated with the resource and the revenue constraint respectively. The FOC with respect to z and k in the steady-state are:

$$(1+\varrho)\,\gamma = 1+n, \tag{13}$$

and

$$-(1+n)\,\lambda + \gamma\lambda\,(1+r) + \mu\gamma\,(r-\varrho) = 0. \tag{14}$$

Combining these two equations give:

$$-\lambda\,(1+\varrho) + \lambda\,(1+r) + \mu\,(r-\varrho) = 0.$$

This yields $(\lambda+\mu)\,(r-\varrho) = 0$ and thus $\tau^r = 0$, so that (13) implies $(1+r)\,\gamma = 1+n$. In words, we have the modified golden rule and most notably, a zero tax on savings which correspond to bequests in our setting. Consequently, wealth transfers are not taxed in the steady state.[23]

Chamley-Judd's result has become the standard rule for a number of public economists and particularly macroeconomists. However, it has also been challenged on various grounds. It relies on a set of strong assumption which have been questioned. In any case the zero tax result only applies to the steady-state; during the transition period, wealth transfers along with capital income are subject to taxation.

B.4 Joy of giving

Unlike in the case of pure altruism, the objective of individuals and that of the social planner may now diverge. Each individual maximizes:

$$u\,(c_t, d_{t+1}, \ell_t) + \gamma v\,(x_{t+1})\,,$$

subject to

$$x_t + \omega_t \ell_t = c_t + \frac{d_{t+1} + (1+n)\,(1+\tau^x)\,x_{t+1}}{1+\varrho_{t+1}}.$$

In a *laissez-faire* equilibrium, each individual chooses ℓ_t, c_t, d_{t+1} and x_{t+1} given factor prices ω_t and ϱ_t and inherited wealth x_t. As to the social optimum, one faces the issue

[23] This result generalizes to the case where $\beta > 0$ and $d > 0$. However, the proof becomes much more complicated.

of whether or not laundering individual utilities. Harsanyi (1995) and Hammond (1988) have advocated "excluding all external preferences, even benevolent ones, from our social utility function". Advocates of a utilitarian approach, on the other hand, argue that the social planner cannot paternalistically modify individuals' preferences.

We shall use a generalized objective which admits the two approaches as special case. Denoting the social factor of time preference by δ, social welfare is given by

$$U_t = \sum_{s=1}^{\infty} \delta^s \left[u\left(c_s, d_{s+1}, \ell_s\right) + \varepsilon \gamma v\left(x_{s+1}\right) \right],$$

where $0 \leq \varepsilon \leq 1$ with $\varepsilon = 0$ for the non utilitarian and $\varepsilon = 1$ for the utilitarian case..

With this setting, the steady-state rule of optimal capital accumulation is the modified golden rule. The key issue is the treatment of x_t. For $\varepsilon = 1$ the first-best optimal value of x is that for which $v'(x) = 0$. In other words without laundering out utilities the social planner will push for a very high value of x (that could be infinity). In a first-best world, such a solution could be implemented through a subsidy on x financed by public debt. It is clearly not reasonable and such a pathological outcome provides an argument in favor of laundering out the joy of giving from the donors' welfare.

In the second-best, with linear taxes on earnings, capital income and bequests, the revenue constraint is given by:

$$R = \tau_t^w \ell_t + \tau_t^r \ s_{t-1} + \tau_t^x \left(1+n\right) x_t,$$

which can also be written as:

$$R = \tau_t^w \ell_t + \tau_t \ \frac{d_t}{1+\ell_t} + \theta_t^x \left(1+n\right) x_t,$$

where

$$\theta_t^x = \frac{\tau_t^r \left(1+\tau_t^x\right)}{1+\varrho_t} + \tau_t^x$$

is the total (or effective) tax on transfers. Observe that bequests are subject to a double tax: first, the tax on savings, τ^r, and then the specific tax on transfers τ^x. The total tax on bequest is higher than that on second period consumption if $\theta^x > \tau^r/(1+\varrho_t)$, which occurs when $\tau^x > 0$.

Michel and Pestieau (2002a) show that with no laundering the tax structure is not much different from (11). Taxes on earnings, on second period consumption and on bequests only depend on compensated elasticities and on the revenue requirement when the capital stock is directly controlled. In the case of zero cross elasticities, the tax on second period consumption (τ^r) may be higher than the estate tax (θ^x) if the own compensated elasticity of second period consumption is lower than that of bequests. When there is laundering, bequest loses its direct social utility and is thus subject to a relatively higher tax.

B.5 Preference for wealth

Formally as seen above the case of preference for wealth and that of joy of giving are very similar. The only difference is that individuals who have a preference for wealth are interested by their entire life-cycle saving: $d_{t+1} + x_{t+1}$

B.6 Exchange

We will use an exchange model of the strategic type in which parents obtain attention from their children in exchange of some bequests. By playing their children against each other they control the exchange to their full benefit.[24]

The utility function of an individual belonging to generation t is given by:

$$u\left(c_t - v\left(a_t^g\right), d_{t+1}, \ell_t, a_{t+1}\right), \tag{15}$$

where a_{t+1} denotes attention received and a_t^g attention given which requires some effort. The disutility of attention given is expressed in monetary terms. First and second period budget constraints are:

$$\omega_t \ell_t + b_t = c_t + s_t, \tag{16}$$

$$\left(1 + \varrho_{t+1}\right) s_t = \left(1 + \tau_{t+1}^x\right) x_{t+1} + d_{t+1}. \tag{17}$$

In addition, we have

$$x_{t+1} = (1 + n)\, b_{t+1} \tag{18}$$

[24] We exclude collusion between children whereby they would agree to supply a minimal amount of attention and share the inheritance; see Cigno (1991).

and

$$v\left(a_t^g\right) = b_t. \tag{19}$$

Equation (18) gives the straightforward relation between bequest and inherited wealth. Equation (19) results from our strategic bequest assumption: parents extract all the surplus from their children who are just paid for the disutility of their effort.

Substituting (16)–(19) into (15) shows that each member of generation t maximizes the following expression

$$u\left(\omega_t \ell_t - \frac{(d_{t+1})}{1+\varrho_{t+1}} - \frac{v\left(a_{t+1}\right)\left(1-\tau_{t+1}^x\right)}{1+\varrho_{t+1}}, d_{t+1}, \ell_t, a_{t+1}\right).$$

The indirect utility is given by:

$$V_t = V\left(\omega_t, \varrho_{t+1}, \tau_{t+1}^x\right).$$

The problem for the social planner is to maximize the discounted sum of utilities, $\sum \delta^t V_t$, subject to the revenue constraint:

$$R = \tau^w \ell + \frac{\tau^r d_t}{(1+\varrho_t)(1+n)} + \frac{\tau_t^r + \tau_t^x (1+r_t)}{(1+\varrho_t)(1+n)} v\left(a_t\right).$$

We continue to assume that capital accumulation is socially optimal (i.e., $1+r = (1+n)/\delta$). The FOC in the steady-state can be written as:

$$\begin{aligned} \tau^w \frac{\partial \tilde{\ell}}{\partial \tau^w} &+ \frac{\tau^r}{(1+r)(1+\varrho)} \frac{\partial \tilde{d}}{\partial \tau^w} + \frac{\tau^r + \tau^x (1+r)}{(1+r)(1+\varrho)} v'(a) \frac{\partial \tilde{a}}{\partial \tau^w} \\ &+ \left(\frac{\alpha}{\mu} - 1 - \Delta\right) \ell = 0 \end{aligned}$$

$$\begin{aligned} \tau^w \frac{\partial \tilde{\ell}}{\partial \tau^r} &+ \frac{\tau^r}{(1+r)(1+\varrho)} \frac{\partial \tilde{d}}{\partial \tau^r} + \frac{\tau^r + \tau^x (1+r)}{(1+r)(1+\varrho)} v'(a) \frac{\partial \tilde{a}}{\partial \tau^r} \\ &+ \left(\frac{\alpha}{\mu} - 1 - \Delta\right) \frac{d}{(1+\varrho)^2} = 0 \end{aligned}$$

$$\begin{aligned} \tau^w \frac{\partial \tilde{\ell}}{\partial \tau^x} &+ \frac{\tau^r}{(1+r)(1+\varrho)} \frac{\partial \tilde{d}}{\partial \tau^x} + \frac{\tau^r + \tau^x (1+r)}{(1+r)(1+\varrho)} v'(a) \frac{\partial \tilde{a}}{\partial \tau^x} \\ &+ \left(\frac{\alpha}{\mu} - 1 - \Delta\right) \frac{v(a)}{1+\varrho} = 0 \end{aligned}$$

For same reasons as developed above (subsection B.4), the overall tax on bequests, $\tau^r + \tau^x (1+r)$, may or may not be higher than that on future consumption. In other words, there is no particular reason to believe that the wealth transfer tax τ^x is positive. This will depend on the relative magnitude of the compensated derivatives which determine the overall tax on bequests and the tax on future consumption through Atkinson and Sandmo type rules.

To illustrate this point in the simplest possible way, assume again that the cross elasticities are zero. Then, we have:

$$\frac{\tau^r + \tau^x (1+r)}{\tau^r} = \frac{v(a) \dfrac{\partial \tilde{d}}{\partial \tau^r} (1+\varrho)}{v'(a) \dfrac{\partial \tilde{a}}{\partial \tau^x} d}.$$

Clearly if the demand for attention is much more elastic than that for future consumption, the tax on inheritance, τ^x, is negative.