8

Tax Policy

Taxation without representation is tyranny.

James Otis (1725–83), US lawyer and politician at
the time of the American Revolution

A common contribution is essential for the maintenance of the
public forces and for the cost of administration. This should be
equitably distributed among all the citizens in proportion to
their means.

French Declaration of the Rights of Man and of
the Citizen, Article 13, 1789

Governments seldom charge for their services. Except in specific areas such as
museums, swimming pools, or universities, these services are generally pro-
vided free of charge. Think about scientific research, defense, or diplomacy.

Those are public goods (see Chapter 2); it is therefore impossible to identify precisely which citizens benefit from them and to let them pay for their consumption. Such *government services*[1] have to be financed through *taxation* (i.e., compulsory contributions by households or corporations).

Not all tax-financed government services are public goods. Think of schooling: it would be possible for the government to charge for its provision, but the common practice is to finance it at least partly through taxation. It is by their vote that citizens can express preferences regarding the level and quality of public services provision and the corresponding level of taxes.

The problem is that taxes generally distort relative prices. For instance, the personal income tax (PIT) is paid by households on their labor income. This increases the relative price of labor as compared to leisure and may therefore change the labor supply. Such distortions may affect welfare and gross domestic product (GDP) growth. Consequently, there is a trade-off between the provision of public goods (which in many cases, such as education, security, or infrastructure building, is expected to have a positive impact on welfare and growth) and the desire to reduce taxation in order to limit price distortions.

From a pure efficiency standpoint, public services should be financed through *lump sum taxes* (i.e., taxes that are levied in equal amounts on every citizen independently of their activity, consumption, or income) because such taxes do not distort work, saving, and consumption decisions. However, such taxation (experimented with by Margaret Thatcher's government in 1979 through the so-called *poll tax*[2]) is questionable from an equity standpoint since the poor pay relatively more as a percentage of their income than the wealthy. In order for the burden of taxation to be distributed in an equitable way, and even more so when income redistribution is a policy objective, taxes have to be proportional or more than proportional to income, which inevitably introduces economic distortions.

Because it is at the heart of the efficiency–equity trade-off, and because it is the simplest way to redistribute wealth among citizens, tax policy has always and everywhere been hotly politicized, often at the cost of overlooking essential economic considerations. Tax policy is a matter for political decision and is in all democracies a prerogative of parliaments. As we shall show in this chapter, though, economic analysis can greatly contribute to the design of efficient taxation systems.

8.1. Issues

8.1.1. What is taxation about?

Tax policy consists in setting, within the annual budget, the *rate* and the *base* of each tax. For instance, the government can decide to increase the consumption tax by one percentage point (a decision on the rate) or to exempt some items from this tax (a decision on the base). *Tax revenues* depend on

the combination of rates and bases. It is possible to maintain a given level of revenues through simultaneously cutting the rate and broadening the base (this has been the general trend recently, as we shall see). In most cases, choices on the rate and on the base interact: a higher tax rate tends to reduce the tax base. Additionally, tax bases generally depend on economic activity: for instance, for a given definition of rates and bases, a downturn in, say, consumption spending will automatically reduce the income accruing to consumption taxes. Hence, tax revenues are often difficult to predict.

a) Why do governments tax?

Tax policy is at the crossroads between the three functions of economic policy identified by Richard Musgrave and listed in Chapter 1:

- *Allocation*. Taxation affects relative prices between goods and services, labor and leisure, labor and capital, and the like. In so doing, it creates *price distortions*: for example, a tax on imports increases the price of foreign goods relative to the domestic ones. Only lump sum taxes are nondistortionary, but they are few. In a perfect market economy (i.e., where relative price adjustments maintain an optimum allocation of resources; cf. the first theorem of welfare discussed in Chapter 1), taxes would typically be detrimental to economic efficiency. However, the presence of market imperfections modifies this diagnosis. For instance, taxation makes it possible to correct externalities such as air pollution: without taxation, industries would pollute more than what is socially optimal. Taxation also makes it possible to finance public goods that would not be spontaneously produced by the markets. Last, it can play a *paternalistic* role by protecting private agents from their own errors. Taxes on alcohol and cigarettes are examples of such paternalist taxes, sometimes referred to as *sin taxes*.
- *Distribution*. Income taxation modifies the distribution of income between rich and poor, between families and single individuals, or between generations. Capital taxation (either at the firm or at the household level) and *social insurance contributions* (or *social security contributions*)[3] (levied on labor) affect the relative returns of capital and labor. Distributional effects can be involuntary but are also sought by governments when the market equilibrium is regarded as contrary to equity. Since the French revolution of 1789, it has been increasingly admitted that taxation should be either *proportional* to income or *progressive* (more than proportional, meaning that the rich pay relatively more in proportion of their income) but not *regressive* (less than proportional, meaning that the rich pay relatively less), as was often the case previously.[4]

- *Stabilization*: As shown in Chapter 4, a lower tax burden during a cyclical downturn helps sustain the demand for goods and services, and, conversely, higher taxes during a boom slow down demand, alleviating upward pressures on prices. Automatic stabilization (i.e., stabilization performed at constant tax rates through the endogenous adjustment of tax bases) is usually distinguished from discretionary stabilization through decisions to change tax rates and bases countercyclically. However, constraints on public finances as well as political pressures can lead the government to raise tax rates during economic downturns and reduce them when the economy is booming. Such procyclical policies accentuate, rather than dampen, business cycles. The stabilization role of tax policy, already discussed in Chapter 4, will not be further addressed in this chapter.

These three functions of taxation are closely interconnected and often give rise to trade-offs. For instance, automatic stabilizers (stabilization function) are larger in countries that have higher levels of taxation designed to redistribute more income among the residents (redistribution function) or to produce more government services (allocation). Typically, automatic stabilizers are larger in the euro area than in the United States. A progressive income tax reduces income inequalities across households (redistribution), but it also reduces the incentive to work and therefore affects economic efficiency (allocation). A tax on cigarettes reduces diseases and increases tax revenues (allocation) but generally has regressive effects, meaning that the poor pay relatively more.

b) How much?

During earlier historical periods, taxation was almost exclusively determined by wars: in peacetime, taxes would represent a very low share of national income, whereas kings and emperors would raise taxes to finance wars, whatever the social consequences. The beginning of the twentieth century still followed this pattern, with taxation representing less than 10% of GDP before World War I but reaching or even exceeding 50% of GDP for some belligerents during each of the two world wars. In the United States, the top marginal income tax rate reached 77% in 1918 and 94% in 1945, and the tax base was greatly extended, whereas only 2% of the population paid this tax in 1915.[5]

Between World Wars I and II, the decline in taxation was contradicted by the birth of the *welfare state* (i.e., the system of social protection). Compulsory health and old-age insurance had started to develop in Germany in the late nineteenth century under Chancellor Bismarck and had spread to other European countries (but not to the United States). Coverage was extended in

the twentieth century. In the United States, the New Deal of Franklin Delano Roosevelt introduced federal social programs that contributed to a significant rise in federal taxes. The trend accelerated after World War II with the introduction of comprehensive social insurance regimes covering unemployment, aging, health, and poverty risks. These systems involved a steady increase in *total taxation* (i.e., in the aggregate burden of taxes in a broad sense, i.e. including social insurance contributions).

In the 1980s, a divide emerged between, on the one hand, the further development of social protection in continental Europe, and on the other hand, a rollback on welfare development in the United States and several other English-speaking countries. Consistently, total taxation continued to rise in continental Europe, while it stabilized around a constant level in the United States and decreased in the United Kingdom. In the late 1990s and in the 2000s, however, some governments such as Canada or Sweden made substantial efforts to stabilize or even curb total taxation, while it rose again in the UK. In several countries, the 2009 global crisis led to an increase in taxation in percent of GDP, both due to the fall in the denominator (GDP) and to the rise in the numerator in an attempt to limit the public deficit (figure 8.1).

Within the European Union, total taxation varies from 25% of GDP in Ireland to 45% in France and 47% in Denmark (figure 8.2). With a few
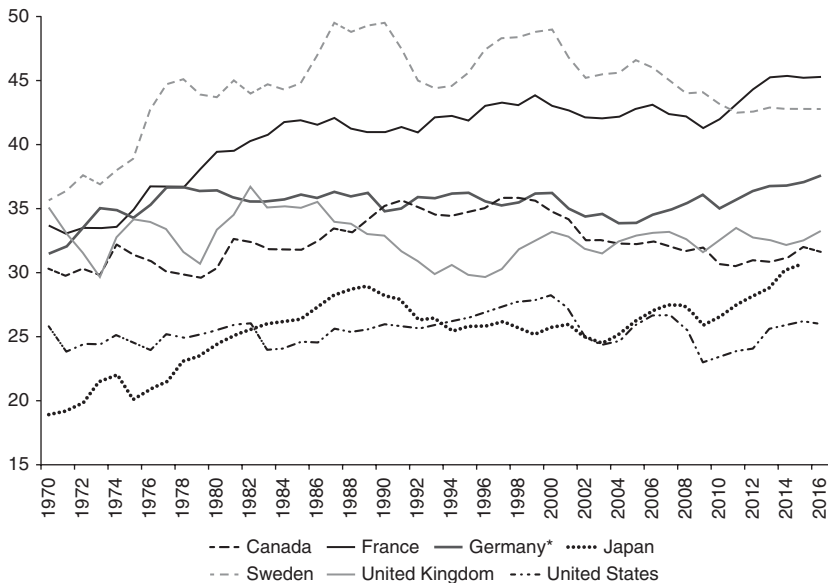

Figure 8.1 Total taxation in percent of gross domestic product (GDP), 1970–2016.
*West Germany before 1991.
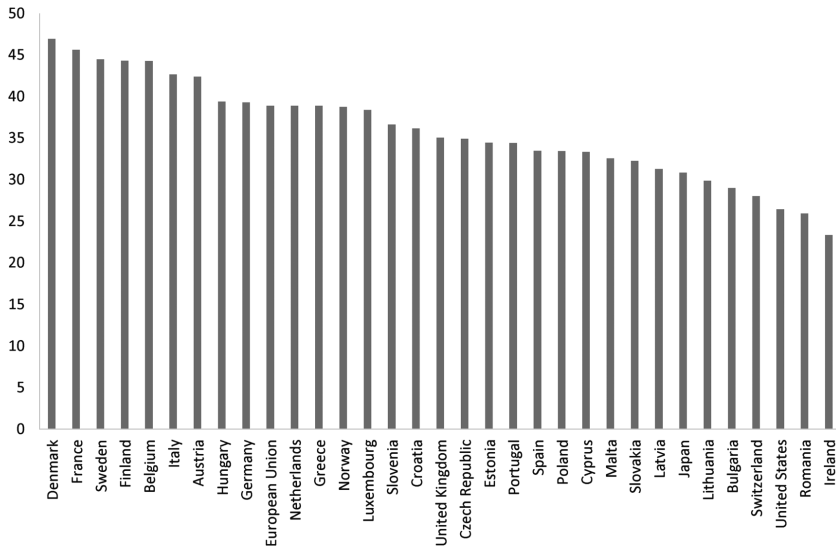OECD Tax Revenue Statistics.

Figure 8.2 Total tax revenues in percent of gross domestic product (GDP), 2016.[a]

[a] Excluding imputed social contributions.

European Commission, Ameco database.

exceptions, Central and Eastern European countries display lower levels of taxation than western countries, while Scandinavian economies display relatively high levels.

The wide dispersion of total taxation rates across countries of similar development levels, even within the EU, points to significant differences in national preferences for the provision of government services: taxation is high in Scandinavian countries where a large range of educational, health, and social services are available for free and financed by taxes, and it is low in Ireland where similar services are provided by the private sector. An indication that this difference can be ascribed to preferences is that differences in total taxation levels have not narrowed over the past decades in spite of the much tighter integration of product and capital markets. Thus, the widespread expectation that globalization would force convergence does not seem to be supported by the data. We will return to this issue when examining the consequences of openness for tax policies.

8.1.2. Typologies of tax systems

Taxes can be classified along three dimensions depending on (i) who collects them, (ii) how they are collected, and (iii) who pays.

a) Who collects taxes?

Taxes can be levied by the central government, state governments (especially in federal countries, e.g., *Länder* in Germany, *cantons* in Switzerland, *provinces* in Argentina), local governments, and social insurance administrations. However, the administration that levies the tax may not be the one that decides on it or benefits from it. For instance, local taxes can be levied by the central tax administration on behalf of local authorities.

Figure 8.3 shows the diversity of tax structures among the countries of the Organization for Economic Cooperation and Development (OECD). In federal countries (like Germany, Switzerland, Spain, or Canada), the central government often receives less than half of total tax receipts. In France, the largest part of the revenue is received by social security funds, whereas in Denmark or in the United Kingdom, social security is managed by the central government, along the lines of the "Beveridgian" system (where social security benefits are funded by general taxation; see later discussion).

The distribution of taxes between the central and local governments raises issues of *tax autonomy* and *tax competition*, in the context of Oates's equivalence discussed in Chapter 3. On the one hand, it is desirable that taxes be raised at the local level to make local governments financially responsible and
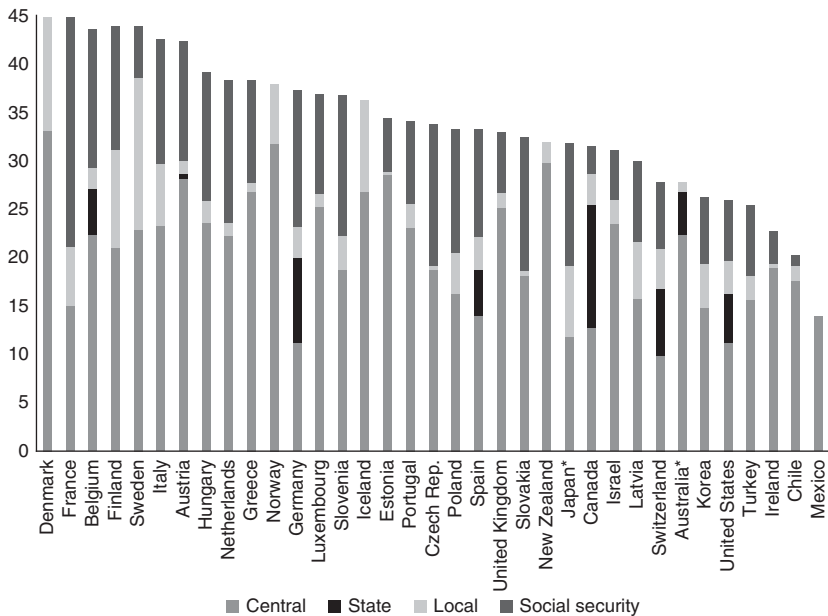

Figure 8.3 Tax revenue received by administrative level, in percent of gross domestic product (GDP), 2016.

* 2015.

OECD Tax revenue Statistics.

to allow them to develop policies that are consistent with local preferences (tax autonomy). On the other hand, there is a risk that autonomy would allow wealthy localities to become even wealthier because they are able to attract more individuals and companies through cutting taxes (tax competition), whereas poor localities would need to raise tax rates because the tax base is limited and because they have higher social expenditures. Central governments therefore frequently organize redistribution across localities. The level of this redistribution is a contentious issue since it affects the trade-off between efficiency (of local public choices) and equity (between localities).

b) How are taxes collected?

Another classification of taxes relies on the way they are collected.

A *direct tax* is a tax levied on income (or wealth) whatever the use of this income (or wealth). Direct taxes include:

- For households, the *personal income tax* (a tax on labor and capital income that can be paid directly by the households or levied by the employers), *inheritance taxes, property taxes*,[6] and *wealth taxes*;
- For companies, the *corporate income tax*,[7] and local business taxes such as the German *Gewerbesteuer*, the French *Contribution économique territoriale* or the Italian *Imposta regionale sulle attività produttive* (IRAP).

In contrast, an *indirect tax* is levied on the use of income, mainly on consumption. Typical examples include taxes levied on imports of goods and services (*import duties*), the US sales tax and the European *value-added tax* (*VAT*),[8] both of which are borne by consumers when they buy a good or a service. *Excise taxes* (i.e., taxes on specific products such as cigarettes or alcohol) are other examples of indirect taxes. Finally, environmental taxes (including energy, transport, and pollution taxes) are also indirect taxes.

The third category of taxes covers *social insurance contributions* that are paid both by employers and employees on the basis of the wage bill. Although they can be considered as direct taxes, social insurance contributions are generally treated separately due to the link between individual contributions and benefits.

Figure 8.4 shows the 2014 structure of taxation in the OECD countries according to this second classification. In Denmark, Australia, New Zealand, and Canada, direct taxes represent 60% or more of taxation. Conversely, Central and Eastern European countries, Greece, and Turkey rely more heavily on indirect taxes.

The disparity of tax systems illustrated by figure 8.4 embodies a differentiation between *Bismarckian systems* (Germany, Austria, France, the Netherlands) and *Beveridgian systems* (the UK, Denmark, Ireland). In
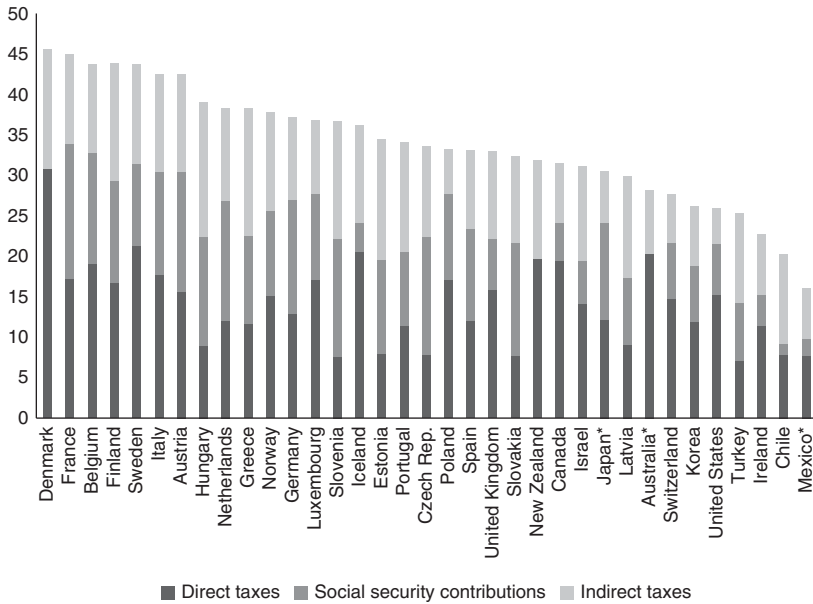
Figure 8.4 Direct[a] and indirect taxes, in percent of gross domestic product (GDP), 2016.

* 2015.

[a] Direct taxes include taxes on payroll and workforce.

OECD.

the first ones, inspired by the scheme introduced by German Chancellor Bismarck in the 1880s, social insurance benefits are treated as deferred wages; they are therefore financed primarily by social contributions based on wages, and each employee knows that what he or she will receive when unemployed or retired will be proportional to his or her contribution. In the second system, introduced in the United Kingdom after William Beveridge's 1941 report, social benefits are viewed as public transfers whose objective is to ensure that the most deprived receive a minimum level of income; they are financed primarily through taxes and there is little link, at the individual level, between contributions and benefits. With time, the contrast between the two schemes has tended to fade away: Beveridgian systems have introduced some insurance schemes, whereas Bismarckian ones have been altered by the capping of unemployment benefits or complemented with redistributive transfers. In some countries, there has also been a shift from social insurance contributions to indirect taxes, notably environmental taxes (Denmark, Sweden), and VAT (Denmark, Germany).

Since the mid-1960s, the share of indirect taxes in total tax revenues has tended to decline in advanced countries, but this aggregate evolution results

from the opposite trends of declining excise taxes and rising VAT revenues (figure 8.5). In fact, in a world of mobile capital and labor income bases, VAT has been increasingly regarded as an efficient, nondistortionary way to raise revenues. Another evolution since the 1980s has been a fall in the share of PIT revenues (over total tax revenues) from 30% in 1985 to 24% in 2015. Governments in many countries have reduced politically sensitive personal income taxes while increasing both social insurance contributions and VAT rates.

As highlighted by Tony Atkinson (1977), unlike indirect taxes, direct taxes can be personalized (i.e., adapted to the taxpayer's characteristics). For instance, the PIT depends on the household's characteristics and on the nature of income received (labor income, capital income, pensions, or social transfers). Similarly, the corporate income tax (CIT) depends on taxable profit that takes into account recent investment or R&D expenditures; in some countries, the tax rate is also different depending on the size of the company or on the use of profit (whether it is distributed as dividends or reinvested in the company). In contrast, indirect taxes are levied on anonymous transactions: any taxpayer
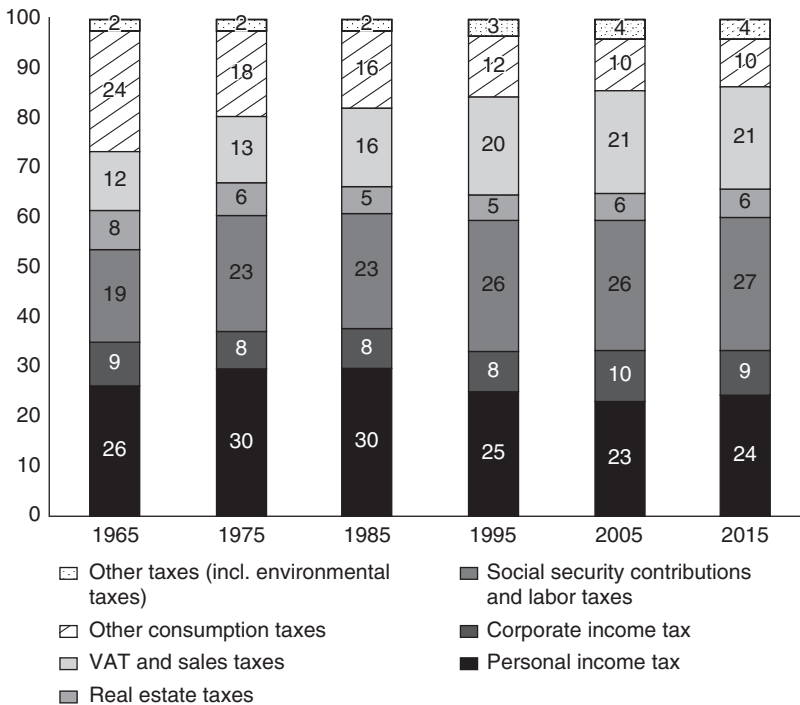

Figure 8.5 Structure of taxation in OECD countries (unweighted average), in percent of total tax revenue, 1965–2015.
OECD Tax Revenue Statistics.

thus faces the same tax rate. It follows that only the direct taxes should be used for redistribution purposes.

Indirect taxes are devoted to allocation functions, which consist both in financing the provision of public goods and in correcting market distortions. Note that these two objectives are largely incompatible because what is aimed at is a stable tax base in the first case and a shrinking one in the second. This calls for using distinct instruments: on the one hand, a broad, inelastic base from which revenues can be raised without too many distortions; on the other, an elastic tax base to which a high tax rate can be applied.

c) Who pays?

Economists are generally reluctant to classify taxes according to the person who administratively pays the tax and makes the transfer to the tax administration—the *taxpayer*. For instance, they are not at ease with adding up employers' social contributions and CIT on the grounds that both are paid by corporations. Similarly, they prefer not to aggregate personal income taxes raised on labor income and those raised on capital income. They prefer to attach each tax to its tax base. Accordingly, a third classification of taxes distinguishes three categories: labor, capital and consumption. For instance, labor taxation covers social insurance contributions paid both by employers and employees and lumps them together with the part of personal income taxes paid on labor income.[9]

Figure 8.6 shows the 2015 structure of EU countries' taxation systems across the three tax bases just mentioned. Taxes on labor account for the bulk of between-country differences in total taxation: those countries with the highest total tax burden are also those where labor taxation is the heaviest. The distribution of taxation among the three tax bases also depends on development levels. Developing countries tend to rely more heavily on indirect taxation (see box 8.1).

The question of who pays taxes raises the twin question of who does *not* pay taxes (i.e., that of *tax avoidance*). For 2015, the European Commission estimated the gap between expected and effective revenues from the VAT (the "VAT gap") to be close to 13% of net VAT receipts on average, with large variations across the Member States (up to 37% in Romania, but close to zero in Sweden; see European Commission, 2017a). Part of the VAT gap is related to corporate insolvency or bankruptcy (i.e., companies that are in fact unable to transfer the VAT they have collected from their customers to the tax administration). Part of the gap, however, comes from fraud through unreported sales, failure to register (small businesses), misclassification of commodities (when different rates are applicable), omission of self-deliveries, nonremittance of tax collected (for instance, through strategic bankruptcy), and imported goods not brought into tax.[10]
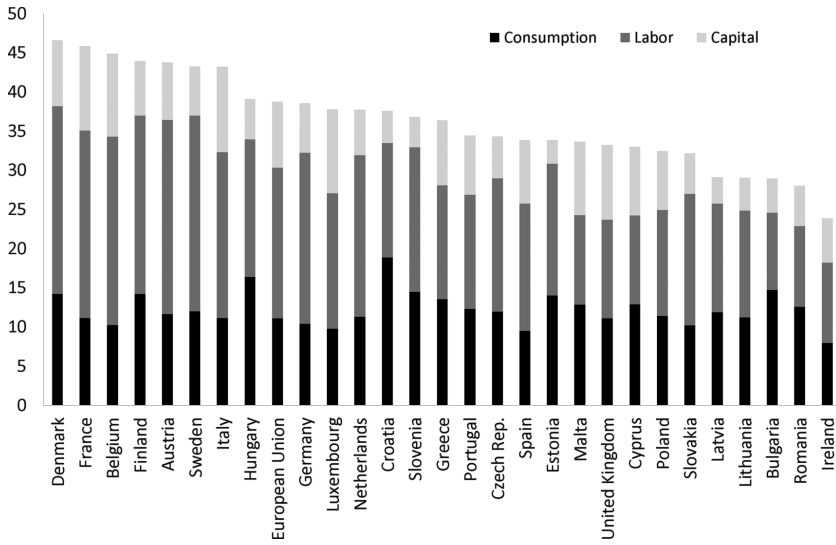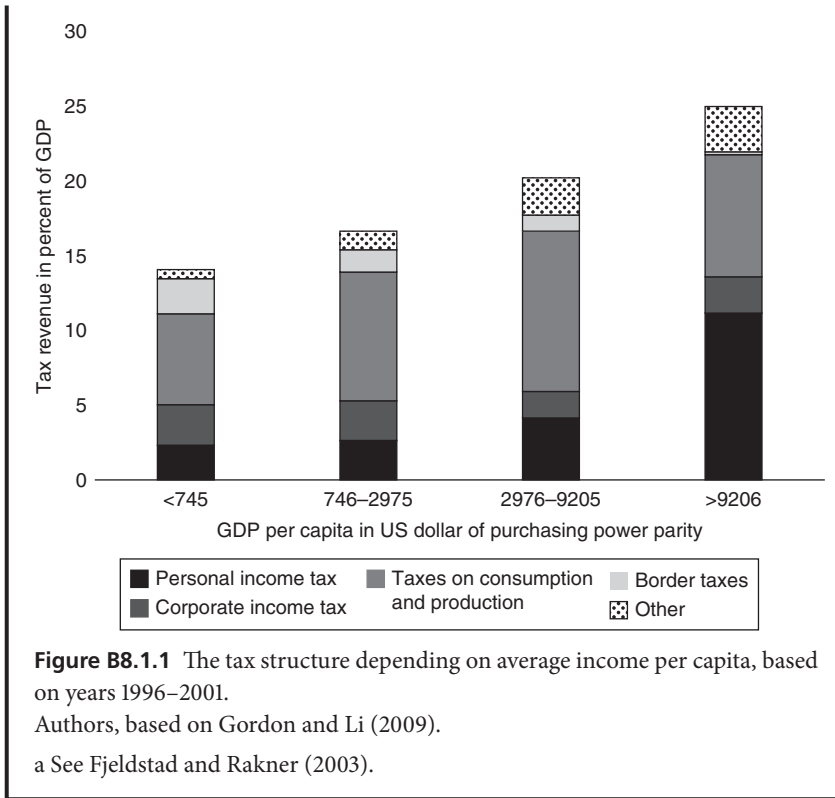
Figure 8.6 Implicit taxation of consumption, labor, and capital in the EU, in percent of gross domestic product (GDP), 2015.
European Commission, *Taxation trends in the European Union*, 2017.

Box 8.1 Taxation in Developing Economies

Developing countries generally display a lower level of total taxation than advanced economies. In West Africa, for instance, total taxation varies from 7% of GDP in Nigeria to 25% in Senegal (IMF figures for year 2015), against 30–50% of GDP in advanced economies. This is in part because taxation in developing countries encounters difficulties arising from low institutional development, corruption, and the large size of the informal sector. Those who hold political power and control natural resources often have the ability to escape taxation.[a] Second, the demand for public services, like education, health, and infrastructure, increases with the level of income, thereby giving rise to higher public spending and taxation. Third, Besley and Persson (2014) have shown that ethnic fractionalization has a significant, negative impact on the ratio of tax revenues to GDP: a poor sense of national identity reduces the ability of the national government to raise taxes.

These weaknesses especially affect direct taxes, in particular the personal income tax (PIT), which barely exists in developing countries. Social insurance contributions are also very limited, which reflects the low development of social protection systems, but also of wage-earning. Correspondingly, indirect taxes, especially import tariffs, often play a central role in tax collection (see figure B8.1.1).

Figure B8.1.1 The tax structure depending on average income per capita, based on years 1996–2001.

Authors, based on Gordon and Li (2009).

a See Fjeldstad and Rakner (2003).

Avoidance also concerns the taxation of wealth and of its returns in relation with tax "havens." For instance, Zucman (2014) estimates that more than 60% of foreign-owned deposits in Switzerland "belong" to the British Virgin Islands, Jersey, and Panama and largely escape residence-based taxation in the country of the ultimate beneficiary. He estimates the tax revenue loss to be US$190 billion globally, and US$75 billion in Europe for 2013. In the area of corporate taxation, too, there is ample empirical evidence that multinational companies organize their legal and financial structures with a view to reducing their tax bill through complex corporate structures involving tax havens and special tax regimes (such as the "double Irish Dutch sandwich" or patent boxes; see, e.g., Fuest et al., 2013). Contrasting with the off-shoring of private wealth, these tax avoidance activities are usually perfectly legal, and some countries actively create loopholes for multinational companies with the objective of attracting tax bases from other countries.

8.1.3 The main trade-offs

As already mentioned, taxation plays a central role along two dimensions of public intervention: it involves a trade-off between redistribution and allocation. The infranational and international mobility of tax bases also raises the question of the extent to which taxation may differ across jurisdictions: there is a second trade-off between differentiation and harmonization.

a) The efficiency–equity trade-off

The first tax policy trade-off is between efficiency and redistribution. It arises because more redistribution requires more taxes that, in turn, are the source of additional distortions.

As presented in Chapter 1, the extent of redistribution through taxes and transfers can be assessed by comparing the Lorenz curve or Gini coefficients based on market income (earnings) to that based on gross income (including social transfers) or disposable income (after tax and transfers). Figure 8.7 shows the evolution of the corresponding Gini coefficients for Finland and the United Kingdom between 2002 and 2015. Market income is somewhat less
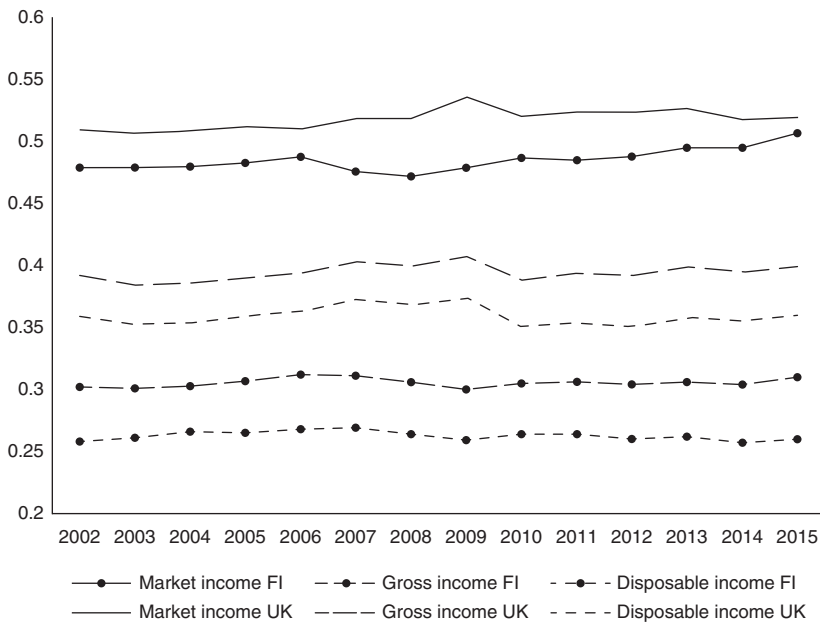

Figure 8.7 Inequalities in Finland and in the United Kingdom, 2002–2015 (Gini coefficient on market income, gross income, and disposable income, see text for definitions).
OECD database, 2017.

equally distributed (the Gini coefficient is higher) in the UK than in Finland, although the inequality in market income in Finland tends to converge to the British level. As expected, in both countries, the distribution of gross income is less unequal than that of market income, and that of disposable income is less unequal than that of gross income. However, the income redistribution is much more important in Finland than in the UK: in 2015, the inequality in disposable income is 48.7% less than that of market income in Finland, while the corresponding figure is only 30.8% in the UK. The graph shows that, over the 2002–2015 period, Finland managed to absorb rising market inequalities through more redistribution.[11]

The degree of redistribution across income deciles depends on two key elements. The first one is the profile of the *average tax rate* (i.e., the ratio between tax payments and income across income deciles): if the average tax rate increases with income, the tax system is deemed *progressive*; if it declines, it is said to be *regressive*; finally, if it is stable, the tax system is simply called *neutral*. The second key element for redistribution is the extent of social benefits, especially *mean-tested transfers* (i.e., conditional on primary income being under a certain threshold).

Redistribution does not occur solely across income levels (vertical redistribution) but also between categories of households; for instance, between single persons and families or between two-parent and single-parent families. This horizontal redistribution aims at correcting income inequalities *per consumption unit*.[12] Targeting redistribution on the poorest families allows the system to combine vertical and horizontal redistribution.

Redistribution through taxation involves an efficiency loss: taxing richer taxpayers more heavily in order to finance transfers to poorer ones may discourage efforts to earn a higher income through participation in the labor force and through longer working hours. In an open economy, heavy taxation may also encourage wealthy households and companies to relocate their tax residence abroad.

In contrast with redistribution, the appropriate variable to assess incentives to work is not the average tax rate, but the *marginal tax rate* (i.e., the fraction of a marginal increase in income that is captured by the tax system). Formally, if $T(R)$ is the tax bill T as a function of pre-tax income R, the marginal rate is $T'(R)$ while the average rate is $T(R)/R$. Most PIT schedules directly specify marginal tax rates per income bracket.

Strikingly, a tax system with a constant marginal rate can be progressive if there is a *basic allowance* (i.e., if the first R_0 units of income are exempted from taxation), which is generally the case for the PIT. Figure 8.8 illustrates this possibility in the case of a flat marginal tax rate of 20% combined with a basic allowance of 1,000 euros. However, it is difficult to achieve significant degree of redistribution through the tax system with a single marginal tax rate, as will be illustrated in Section 8.3.
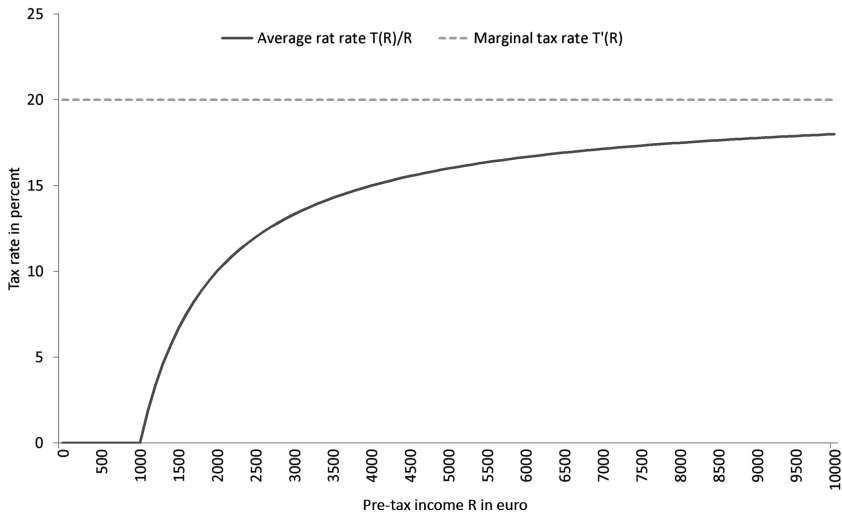
Figure 8.8 Redistribution with a flat marginal tax rate combined with basic allowance.[a]
[a] Flat marginal tax rate of 20% combined with basic allowance of 1,000 euros.
Authors.

In most advanced economies, the combination of increasing PIT rates as a function of income and means-tested transfers at the low end of the income distribution results in *net marginal tax rates*[13] being a U-shaped function of income: very-low-income households receive social transfers (minimum income, housing, and family benefits) that fall when their income rises, resulting in high marginal net tax rates for incomes immediately above the ceilings of means-tested transfers; the marginal rate also increases at the higher end of the income scale due to PIT progressiveness. The net marginal tax rate is often higher for low incomes than for the higher ones: the discouraging effect of the tax and transfer system is more marked for low-income households, thus creating *poverty traps*. This feature is illustrated in figure 8.9 in the case of France in 2010. The graph shows the net marginal tax rate of a single-worker couple with two children. The net marginal rate is close to 70% for households earning one full-time minimum wage. It falls dramatically to 6% at around three times the minimum wage before rising gradually as the income reaches successive income brackets to arrive at a maximum of 41% for the highest income bracket.

There is a consensus among economists that high net marginal rates for low incomes have a negative impact on work incentives and lead to poverty traps. At the other end of the income scale, the debate on the impact of high marginal tax rates on economic efficiency is more open. The direct impact of taxes on the labor supply of the resident labor force is probably limited. The risks of discouraging investment in human capital and of encouraging highly qualified workers to move abroad are more significant.
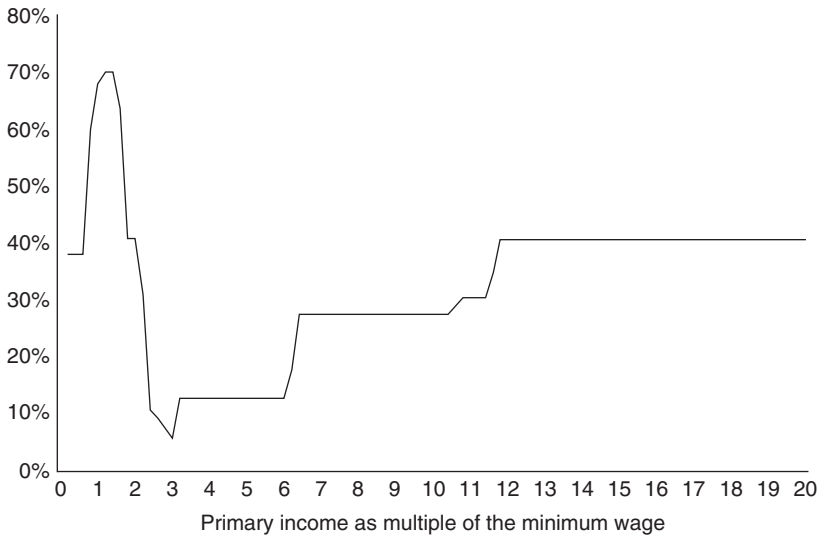
Figure 8.9 The U-shape of the net marginal income tax rate in France, 2010, in percent (single-worker couple with two children).
French Treasury.

b) The differentiation–harmonization trade-off

As evidenced in figures 8.1 and 8.2, the total tax burden varies greatly across advanced economies. Within each country, taxation also varies across jurisdictions (municipalities, states, cantons, provinces, Länder, etc.). These differences reflect differences in preferences in terms of public good provision and of equity. However, the mobility of certain tax bases such as capital or skilled labor makes it difficult for a given jurisdiction to impose a higher tax rate on these bases. Taxation then falls more heavily on less mobile bases such as unskilled labor or consumption. Figure 8.10 illustrates this phenomenon in the EU, where both capital and (skilled) labor are allowed to move freely: from 1995 to 2015, the average top PIT rate fell by 8 percentage points while the top CIT rate fell by 12 percentage points. During the same period, the standard VAT rate rose by 2.4 percentage points.[14]

The question then is whether EU countries should coordinate their tax policies in order to limit the downward trend in the taxation of mobile bases and allow the design of more equitable tax systems or whether each country should remain free to express its own preferences in terms of taxation (e.g., through light taxation on high incomes). This trade-off points to the difference between formal tax sovereignty, which is enshrined in national parliaments, and actual or "genuine" sovereignty, which depends on the ability of each parliament to depart from international standards.[15] It also points to the theory of federalism, according to which tax coordination
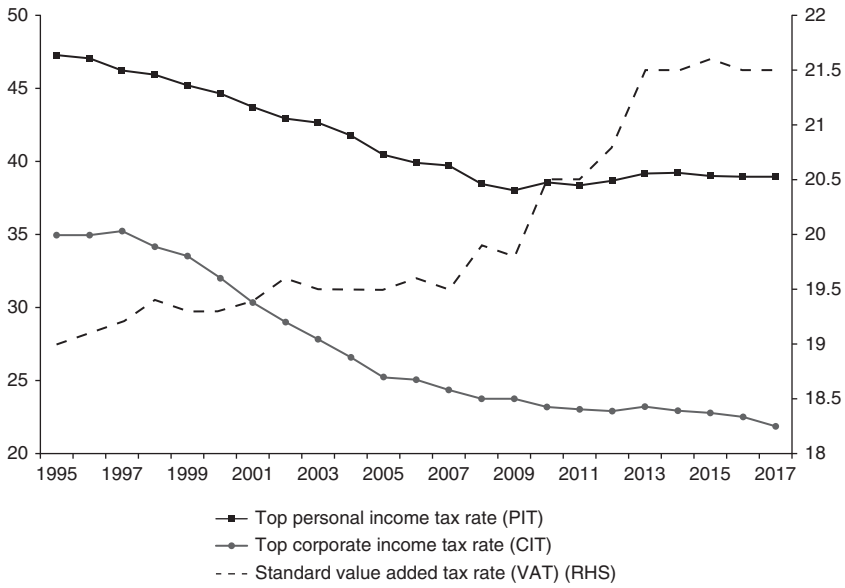
Figure 8.10 Trends in three tax rates in the European Union (simple EU28 average, in percent).

European Commission *Taxation trends in the European Union*, 2017.

should aim at making the best trade-off between respecting local preferences and internalizing the externalities across jurisdictions coming from base mobility and/or economies of scale (see Chapter 3).

8.2 Theories

Like in other policy areas, the theory of tax policy covers both a positive and a normative dimension. The positive dimension consists primarily in providing tools to identify which tax base will finally bear the burden of taxation, to measure the loss of economic efficiency due to distortionary taxes, or to assess the welfare gain due to targeted taxes (such as environmental taxes). In turn, the normative dimension of tax theory involves laying down guidelines for designing the tax system in an optimal way, given the primary distribution of income, social preferences and international constraints.

8.2.1. Tax incidence and efficiency losses

A first major insight from tax theory is that taxation is rarely borne by the particular taxpayer that orders the bank transfer to the tax administration. For instance, suppose that the labor supply is strictly fixed in a specific place or

for a specific skill: the quantity of hours supplied by workers is constant whatever the wage offered by (competitive) firms. In this particular case, a cut in employers' social insurance contributions will ultimately benefit the employees through higher wages since employers will compete among themselves to hire the fixed stock of labor. Reciprocally, higher employers' contributions will be passed on the employees through lower wages. Although employers pay the contributions, they do not bear the tax burden. This simple reasoning applies both in partial equilibrium (i.e., considering only one market in isolation) and in general equilibrium (i.e., accounting for the interaction between several markets).[16]

a) Tax incidence in partial equilibrium

Consider a standard market with a positively-sloped supply curve and a negatively-sloped demand curve. This is represented in figure 8.11, where quantities are noted Q and prices P. Market equilibrium is obtained when the supply and demand schedules intersect. In the absence of taxes, this corresponds to point E in both the left and the right panels.

Let us now introduce a proportional tax t. The tax can be either a *specific tax* (a fixed amount per volume unit, for instance per ton or gallon) or an *ad-valorem tax* (a fixed percentage of the unit price). Energy taxes are generally of the former type, whereas VAT or social contributions are of the latter type. Both types of taxes have similar effects in perfect competition but react differently to inflation. Here we consider a specific tax, which is easier to tackle graphically.
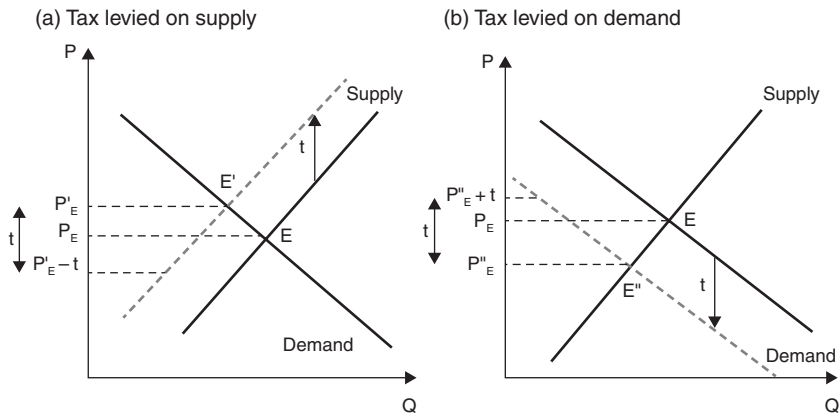

Figure 8.11 Tax incidence in partial equilibrium.
Authors.

On the left panel of figure 8.11, the tax t is formally levied on supply. In order to compensate for the tax they have to pay, suppliers require a higher price for any level of production: The supply curve moves upward by t. At the initial before-tax equilibrium price P_E, there is now excess demand since suppliers are no longer willing to supply the same quantity at this initial price. The market equilibrium moves from E to E', where the quantity is lower and the price paid by consumers is $P_E' > P_E$, whereas the price received by suppliers (after the tax has been paid) is $P_E' - t < P_E$. Both sides therefore suffer a loss. As is apparent in figure 8.11, the tax is partly borne by the demand side since the market price has increased due to the tax. The steeper the demand curve, the stronger the price increase, hence the greater the share of the tax that is eventually borne by the demand side. In the extreme case where demand is totally rigid (a vertical demand curve), the tax levied on supply is entirely borne by the demand side since the price received by suppliers remains constant at P_E: the effective tax burden falls on the demand side. This is what is called *tax incidence*.

Now, if the tax is levied on the demand (figure 8.11, right-hand side, it shifts the demand curve downward, and the incidence of the tax again depends on the relative slopes of the demand and supply curves. For instance, because of a low price elasticity of fuel demand in the short run, taxes on gas are mostly paid by consumers. Conversely, taxes on manufactured goods are more likely to be shared between consumers and producers because demand for these items is more elastic to the price. Price elasticities are crucial, for instance, when an increase in VAT rates is at stake. If demand is weakly elastic to prices, the VAT increase will be quickly passed on to consumer prices.

These results have far-reaching practical implications for labor taxation since the labor supply curve is frequently kinked: at the lower end of the wage scale, there is often a minimum wage (or, equivalently, a backstop provided by social benefits to the unemployed), and labor supply is perfectly flexible at this wage level. Any increase in employers' contributions will then be borne by employers since they are unable to reduce net wages paid to employees. Symmetrically, a cut in social contributions for low-paid jobs is not passed on to net wages, which indeed creates an incentive for employers to hire more workers (rise in L on figure 8.12). For higher wages, labor supply becomes an increasing function of the net wage. For instance, a higher wage may persuade the partner of an already-working person to take a job. The scarcity of some skills can also make labor supply steeper. The burden of social contributions is then shared between employers and employees, and the distinction between employers' and employees' contributions is not relevant (except in the short term where there may be some wage rigidity).

Finally, tax incidence analysis can be applied to external tariffs. Protectionist governments impose tariffs on imports as a way of protecting local production and hence— or so they think—the jobs and purchasing power of local workers. But economists view tariffs on imports as a tax on consumption. If
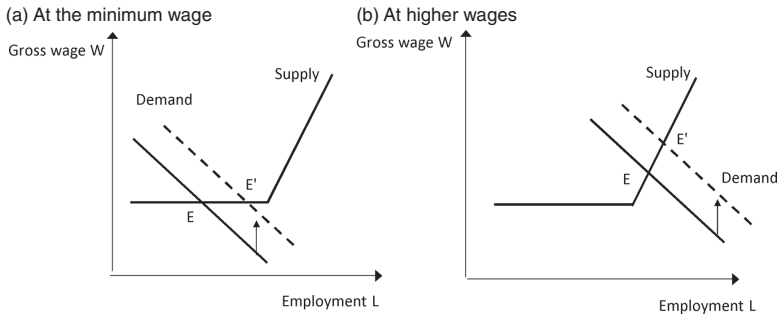
Figure 8.12 Effect of a cut in employers' social contributions depending on the wage level.

Authors.

the price of a product is given internationally (i.e., if the supply curve is horizontal), a $t\%$ tax on imports raises by $t\%$ the local price for producers and consumers alike: it is fully passed on to consumption prices, which reduces households' purchasing power. Reciprocally, even a unilateral tariff cut is beneficial to the households' welfare, a result that some policymakers find hard to believe.

b) Distortions and social losses

The second policy lesson from tax theory is that, except if it is lump-sum, introducing a tax within a "perfect" market involves a social loss[17] because relative prices are changed by the tax, hence they no longer carry the correct information on relative scarcity. For instance, a tax on consumption raises the price paid by the consumer. Accordingly, she reduces her consumption, and her utility declines. The fall in consumption triggers a fall in the before-tax market price. Since both the unit price and the quantity sold decline, the producer's profit is reduced. There is tax revenue that could be used to compensate both consumers and producers through lump sum transfers, but it can be shown (see box 8.2) that the tax revenue does not cover their respective losses, leading to a net social loss.

The size of this loss depends positively on the price elasticities of supply and demand and is quadratic on the tax rate, which has two practical implications: (i) except if taxation aims at correcting specific market distortions (such as pollution externalities), one should avoid, on efficiency grounds, taxing elastic bases; and (ii) a large tax has proportionally more impact on welfare than a small one. This implies that it is preferable to rely on a range of small taxes rather than on a single large tax. However, tax collection generally entails a fixed cost, and this is an argument against a proliferation of small taxes.

Box 8.2 Computing the Social Loss

In the previous section, we have seen that taxation introduces a discrepancy between the price paid by consumers and the price received by suppliers. If demand and supply are not rigid, taxation also reduces the quantity produced and exchanged on the market, irrespective of whether the tax is actually paid by the demand side or by the supply side. Using a simple surplus analysis, figure B8.2.1 measures the resulting social loss. In the absence of a tax, the quantity produced and exchanged is Q_0 and the market price is P_0. In the presence of a tax, output falls to Q_1 and there is now a difference between the price paid by the demand side (here, consumers) P_1^d and that received by the supply side (producers) P_1^s. Table B8.2.1 derives the surplus of consumers, producers, and the government. The tax induces a social loss because the quantity produced and consumed decreases. Even if the tax proceeds are redistributed in a lump-sum way (to avoid additional distortions), this is not enough to compensate for the loss incurred by both consumers and producers. The social loss or *deadweight loss* is represented in the figure B8.2.1 by the $C + E$ triangle, called the *Harberger triangle*.[a] The deadweight loss L hence can be measured by the surface of the $C + E$ triangle. It is equal to the base of the triangle (i.e., the tax rate t) multiplied by the height of the triangle $(Q_0 - Q_1)$ and then divided by two:

$$L = -\frac{t}{2}\left(Q_1 - Q_0\right) \qquad\qquad \text{(B8.2.1)}$$

The $(Q_1 - Q_0)$ quantity can be derived from the price elasticities of supply and demand, ε^s and ε^d:

$$\frac{Q_1 - Q_0}{Q_0} = -\varepsilon^d\,\frac{P_1^d - P_0}{P_0} = \varepsilon^s\,\frac{P_1^s - P_0}{P_0} < 0$$

with ε^s, $\varepsilon^d > 0$, and $\left(P_1^d - P_0\right) - \left(P_1^s - P_0\right) = t$

These two relations imply:

$$\frac{Q_1 - Q_0}{Q_0} = -\frac{t}{P_0} \times \frac{1}{\dfrac{1}{\varepsilon^d} + \dfrac{1}{\varepsilon^s}} \qquad\qquad \text{(B8.2.2)}$$

Hence the loss L is:

$$L = \frac{1}{2}t^2\left(\frac{\varepsilon^d\,\varepsilon^s}{\varepsilon^d + \varepsilon^s}\right)\frac{Q_0}{P_0} \qquad\qquad \text{(B8.2.3)}$$
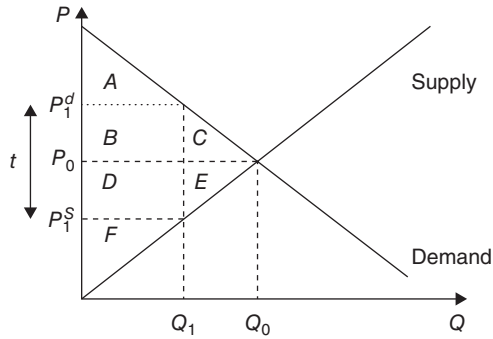
Figure B8.2.1 Taxation and surpluses.

Table B8.2.1
Social loss related to taxation

Surplus	Without tax (1)	With tax (2)	Difference (2)–(1)
Consumers	A + B + C	A	−(B + C)
Producers	D + E + F	F	−(D + E)
Government	0	B + D	+(B + D)
Total	A + B + C + D + E + F	A + B + D + F	−(C + E)

This methodology can be used to compute the deadweight loss resulting from virtually any kind of tax. For instance, Hufbauer and Elliott (1994) have assessed the cost of protection on orange juice in the United States. In 1990, the import duty on orange juice was 20% in *ad valorem* equivalent. They have found the deadweight loss to amount to US\$70 million, equivalent to 13% of domestic orange juice consumption. When moving away from a single good, however, a partial equilibrium analysis may no longer be appropriate since income effects, with possible spillovers across markets and intertemporal effects, should be accounted for.

[a]For a historical perspective on the Harberger triangle, see Hines (1999*a*).

The *Ramsey rule* (1927) more precisely states that for the government to minimize deadweight losses while raising a given amount of tax revenue, the tax rate on each market needs to be inversely proportional to the *compensated price elasticities* of supply and demand. A compensated price elasticity is the variation of supply or demand resulting from a 1% variation in the price level,

holding income constant (i.e., compensating for the variation of income due to the price variation). This rule can be written as[18]

$$t = k\left(\frac{1}{\varepsilon^s} + \frac{1}{\varepsilon^s}\right) \tag{8.1}$$

where t is the *ad-valorem* tax rate, k refers to the total amount of taxes to be collected, $\varepsilon^d > 0$ the compensated price-elasticity of demand, and $\varepsilon^s > 0$ the compensated price elasticity of supply. Note that the Ramsey rule aims at levying taxes while minimizing distortions. Hence, it concentrates on the allocation function, neglecting the redistribution function of tax policy. Indeed, applying the Ramsey rule can lead to unfair policies. For instance, it would imply taxing unskilled labor rather than capital or skilled labor, bread rather than perfumes, and health expenditures rather than theater tickets.

c) "Too much taxes kill taxes": The Laffer curve

Another consequence of the surplus analysis developed in box 8.2 is that the tax revenue is not a monotonous function of the tax rate, because a tax rate increase has two opposite effects on tax receipts. On the one hand, each unit of the tax base is taxed more heavily, which raises revenues. On the other hand, the tax base is reduced by the tax increase, which cuts revenues. The net effect depends on the elasticity of the tax base (see box 8.3). Starting from no taxation at all, a tax increase raises tax revenues, but less and less so as the tax rate increases. After a certain threshold, called the *revenue-maximizing tax rate*, a further rise in the tax rate *reduces* tax receipts because the positive impact of the tax increase is overcompensated by the reduction in the tax base. The revenue-maximizing tax rate can be low for elastic tax bases (e.g., internationally mobile tax bases).

Figure 8.13 illustrates the inverted U-shaped relationship between the tax rate and the tax revenue for two different values of the semi-elasticity[19] of the tax base to the tax rate (see the calculation in box 8.3).

This inverted-U-shaped curve was popularized in the 1970s by Arthur Laffer after he had supposedly sketched it on a napkin at a December 1974 working lunch (Wanniski, 2005). The idea was not new (it had already been hinted at by David Hume and by John Maynard Keynes), but Laffer surprised his contemporaries by declaring that, in view of the high tax pressure in the United States at that time, a cut in the income tax rate was likely to increase tax revenues (Laffer, 2004). Put differently, he was supposing that the income tax rate was lying on the downward-sloping section of the *Laffer curve*. His argument had a strong influence on President Ronald Reagan's tax policy. However, the legislated tax cuts led to steady increases in the budget deficit,
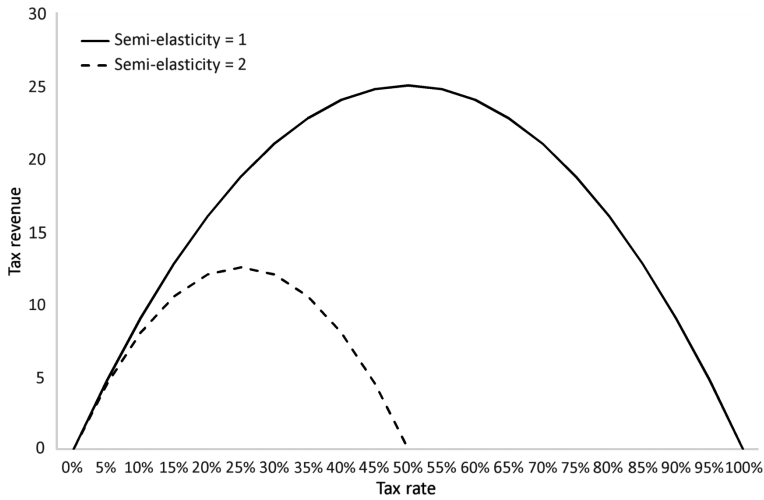
Figure 8.13 The Laffer curve: tax revenue as a function of the tax rate.

We use the calculation of Box 8.3 with $B_0 = 100$. For a unitary semi-elasticity, the tax revenue rises from 0 for a zero tax rate to 25 for a tax rate of 50%. For higher tax rates, the revenue falls, and it is zero for a tax rate of 100%. For a semi-elasticity of 2, the maximum revenue is reached with a tax rate of 25%.

Authors.

Box 8.3 Tax Rates and Revenues

Let us denote by $B(t)$ the tax base as a function of the tax rate t:

$$B(t) = B_0(1 - \varepsilon t) \tag{B8.3.1}$$

with B_0, $\varepsilon > 0$. The tax revenue then is:

$$R(t) = tB(t) = tB_0\left(1 - \varepsilon t\right) \tag{B8.3.2}$$

Raising the tax rate t from zero increases the tax receipt up to a level where the shrinkage of the tax base equals the rise in the tax rate. The rate t^* that maximizes the tax revenue is given by derivating the revenue $R(t)$ with respect to the tax rate:

$$t^* = \frac{1}{2\varepsilon} \tag{B8.3.3}$$

This rate is lower, the higher ε. For instance, for $\varepsilon = 1$, we have $t^* = 50\%$, whereas for $\varepsilon = 2$ we have $t^* = 25\%$ (see figure 8.13).

showing that the economy was not in the downward-sloping section, but rather on the upward-sloping section of the Laffer curve.

A compelling illustration of the Laffer curve is provided by the Russian PIT reform of 2001, which involved a sharp fall in the top marginal tax rate, from 30% to 13%. Related tax receipts eventually rose by 25% in real terms. However, it is not clear whether tax revenues increased as a result of the reform itself or due to to accompanying enforcement measures (see Ivanova, Keen, and Klemm, 2005).[20]

Whatever its empirical relevance, the Laffer curve acts as a warning device for decision-makers, because of the threat of reduced tax revenues if they raise rates beyond a certain threshold. However, the Laffer curve does not constitute any fiscal "theory," which would need detailed modeling of microeconomic behaviors in each area of taxation. Neither does it provide any operational guide: in the absence of a precise specification of individual behaviors, one cannot determine whether the average tax rate of the economy is higher or lower than its revenue-maximizing level and therefore whether a tax rise would lead to higher or lower tax revenues.

d) Tax incidence in general equilibrium

Up to now, we have focused on a single specific market and used a partial equilibrium approach. This is obviously a limitation since the behavior of, say, consumers, depends on the variation of all relative prices (including consumption prices, but also wages, interest rates, etc.), as well as on the variation of their income. Hence, taxation on one specific market alters behaviors on other markets by modifying relative prices (substitution effects) and purchasing power (income effects).

Figure 8.14 illustrates the need for general equilibrium reasoning on the specific case of a consumer who allocates her nominal income R between two goods in quantities C_1 and C_2, respectively, in order to maximize her utility $U(C_1, C_2)$. On the graph, the choice of the consumer is represented by point E, where the budget constraint is tangent to a utility (or indifference) curve. *Ex ante* (i.e., before price adjustments occur), the introduction of a tax on good 1 moves the budget constraint downward and clockwise (around the point corresponding to zero consumption of good 1), as shown on the left panel of Figure 8.14. Utility maximization then leads the consumer to substitute good 2 for good 1 in her consumption basket because the relative price of good 1 has increased. However, the purchasing power of her income R is reduced by the tax increase, which leads to a fall in the consumption of both goods. The net effect on the consumption of good 2 is ambiguous. Suppose that demand for both goods decreases. Their prices will fall from P_1 to P'_1 and P_2 to P'_2 (right panel of Figure 8.14), which eventually will shift the budget constraint upward. By ignoring these effects, one would overestimate the impact of the tax on the market for good 1.
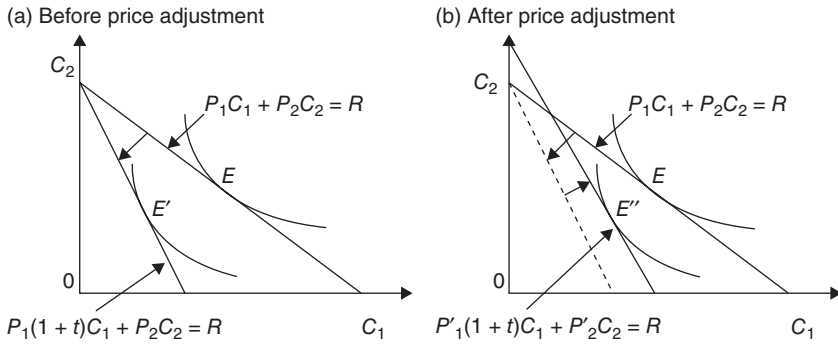
(a) Before price adjustment   (b) After price adjustment

Figure 8.14 Effect of a consumption tax in a two-good model.
Authors.

This simple example has multiple applications. For instance, taxing capital income amounts to raising the price of deferred consumption (good 1) relative to immediate consumption (good 2). If the substitution effect dominates (households prefer consuming immediately because it is less expensive than consuming tomorrow), the saving rate falls; conversely, if the income effect dominates (households need to save more today in order to maintain a given level of consumption tomorrow), the saving rate increases, see box 8.4. Suppose the saving rate falls. In a closed economy, the before-tax return will

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Box 8.4 The Impact of Taxes on Households' Capital Income

Consider an individual who lives two periods. In period 1, he is young: He works and receives a wage w that is used to pay social insurance contributions and a PIT at rate t_w, to consume a quantity c_1 of a representative good that we take as the numeraire (which means that its price is equal to 1), to pay a consumption tax t_c and to save an amount s. In period 2, he is old, no longer works but consumes the product of his savings after paying a tax t_s on capital income and a consumption tax t_c. For simplicity, we assume that there is no bequest. The real interest rate is noted r. The budget constraints for each period are:

$$\text{Period 1}: \left(1+t_c\right)c_1 = \left(1-t_w\right)w - s \qquad \text{(B8.4.1)}$$

$$\text{Period 2}: (1+t_c)c_2 = (1+(1-t_s)r)s \qquad \text{(B8.4.2)}$$

Assume that the individual maximizes an intertemporal, CES-type utility function[a]:

$$\underset{s}{Max}\, U(c_1,c_2) = \left(c_1^{\frac{\sigma-1}{\sigma}} + \beta c_2^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma-1}{\sigma}} \qquad \text{(B8.4.3)}$$

where $\sigma > 0$ is the intertemporal elasticity of substitution and β the preference rate for future consumption ($0 < \beta < 1$). The resolution of the optimization program leads to the following level of saving:

$$s = \frac{(1-t_w)w}{1+\beta^{-\sigma}\left(1+r\left(1-t_s\right)\right)^{1-\sigma}} \tag{B8.4.4}$$

The level of saving depends positively on disposable income in period 1, $(1 - t_w)w$. Note that the income tax t_w has a proportional impact on saving by lowering period 1 disposable income. The impact of the after-tax return on saving $r(1 - t_s)$, however, depends on whether the intertemporal elasticity of substitution σ is higher or lower than unity. If $\sigma > 1$, then a rise in the capital income tax, by reducing the relative price of current consumption in terms of the future one, reduces the level of saving. If $\sigma < 1$, we get the opposite effect as the individual will save more for his or her old age in order to spread the consumption loss over the two periods. Lastly, the consumption tax t_c plays no role insofar as it affects consumption in the two periods in the same way.

[a] CES stands for Constant Elasticity of Substitution: the elasticity of substitution does not depend on the amounts consumed at the two periods.

increase in order to equalize savings with investments. The upward adjustment of the real interest rate then wipes out the impact of the tax increase for savers, but the tax is at least partially passed on to companies, which suffer from the rising cost of investment.

The distribution of the tax burden between households (savers) and firms (investors) depends on the elasticity of both savings and investments to the real interest rate. Instead of investing (directly or indirectly) in companies, households may buy government bonds or foreign assets. Hence, they are generally considered highly responsive to the return offered by corporate investment. In contrast, physical investment by companies is relatively rigid: it depends more on market prospects than on the real interest rate. Consequently, both taxes on savers and on investors are likely to be borne mainly by firms: the before-tax return on capital has to increase to ensure unchanged after-tax return for savers.

To raise the before-tax return on capital, a firm must reduce its capital stock (assuming, typically, that marginal productivity is a decreasing function of the capital stock). Because the capital stock per worker falls, labor productivity also falls, which leads to a reduction either in wages or (if and when wages hit the minimum wage floor) in employment (cf. box 8.5). On the whole, the incidence of a tax on savings depends on the relative elasticities of supply and demand, not only on the capital market, but also on the labor

market. The more rigid the labor supply relative to capital supply, the higher is the share of the tax eventually borne by workers (through lower wages) rather than capital owners (through reduced after-tax return). Empirically, Arulampalam, Devereux, and Maffini (2012) find that at least 54% of an additional corporate tax is passed through to lower wages and that this proportion even exceeds 100% in the long run.[21] Only general equilibrium reasoning allows one to understand why.

This discussion qualifies the traditional debates on the burden-sharing of taxes between labor and capital: although a tax on capital raises the price of capital relative to labor, which can involve favorable substitution effects for employment, it also reduces labor income. Thus, a tax on savings can ultimately have the opposite impact from what is generally believed.

Box 8.5 The General Equilibrium Effect of Capital Taxes

Here we build on the savings model presented in box 8.4. Suppose that period 1 savings are used to acquire productive capital that the old generation sells to the young one. For simplicity, we assume that there is neither capital depreciation nor demographic growth. As there are only two generations, the young generation must buy the entire capital stock of the economy. The supply of capital by each young person is (see box 8.4):

$$k^s = \frac{(1-t_w)w}{1+\beta^{-\sigma}\left(1+r(1-t_s)\right)^{1-\sigma}} \qquad (B8.5.1)$$

Here we assume that $\sigma > 1$, so that capital supply is an increasing function of the after-tax return. We assume a Cobb-Douglas production function,

$$Y = K^\alpha L^{1-\alpha} \qquad (B8.5.2)$$

where K represents the capital stock, L employment and $0 < \alpha < 1$. Let us call $y = Y/L$ the output per worker and $k = K/L$ the capital stock per worker. The per capita level of output and income is $y = k^\alpha$. The marginal productivity of capital is $\alpha k^{\alpha-1}$ and that of labor is $(1-\alpha)k^\alpha$. Profit maximization in perfect competition involves equalizing each of these marginal productivities to the corresponding factor cost. If t_{ssc} designates the employers' social contribution rate and t_{cit} the corporate income tax (CIT) rate, and if capital depreciation is ignored, profit maximization leads to:

$$\text{Capital:} \left(1-t_{cit}\right)\alpha k^{\alpha-1} = r \qquad (B8.5.3)$$

$$\text{Labor:} (1-\alpha)k^\alpha = \left(1+t_{ssc}\right)w \qquad (B8.5.4)$$

From Equation (B8.5.3), it is possible to recover capital demand as a decreasing function of the real interest rate and of the CIT rate:

$$k^d = \left(\frac{r}{\alpha\left(1-t_{cit}\right)}\right)^{1/(\alpha-1)} \qquad (B8.5.5)$$

Then, Equation (B8.5.4) shows how the wage that firms are prepared to pay depends positively on capital per worker. Together with Equation (B8.5.5), this leads to the following negative relation between the CIT and the wage that firms are prepared to pay for a given interest rate:

$$w = \frac{1-\alpha}{1+t_{ssc}} \left(\frac{r}{\alpha(1-t_{cit})} \right)^{\alpha/(\alpha-1)} \tag{B8.5.6}$$

The negative impact of the CIT on the wage rate is moderated by its positive impact on the cost of capital, which triggers substitution from capital to labor. The final impact depends on the reactions of supply and demand on both the capital and the labor markets.

Figure B8.5.1 represents the supply and demand for capital as functions of the real interest rate. A rise in the PIT rate (or in employees' social insurance contributions) or a rise of the tax on capital income shifts the capital supply curve k^s to the left. In a closed economy, the interest rate rises to restore the balance between supply and demand. Conversely, a rise in the corporate tax rate shifts the capital–demand curve k^d to the left: the real interest rate decreases to restore equilibrium. In both cases, capital per worker falls. The result is a reduction in the marginal productivity of labor. Symmetrically, a rise in employers' social insurance contributions (t_{ssc}) reduces employment and therefore both the productivity of capital and its return. The relative impact of taxation on wages and on capital returns depends on the relative slopes of the supply and demand curves in both markets.

(a) Taxes on households' income   (b) Corporate income tax
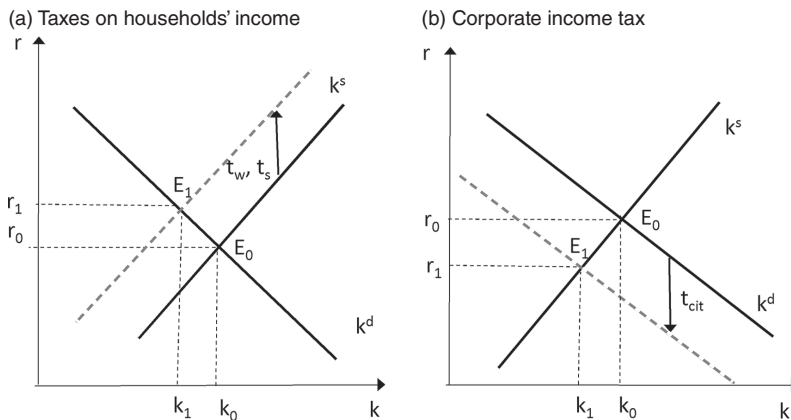
Figure B8.5.1 Impact of various taxes on the market for capital. A rise in the personal income tax t_w or in the capital income tax t_s reduces the households' capital supply k^s, which leads to a rise in the real interest rate r, to a fall in the per capita stock of capital k and, ultimately, to a fall in labor income; a rise in the corporate income tax t_{cit} lowers capital demand k^d from the firms, which leads to a decline in the real interest rate but also lowers the capital stock and therefore labor productivity. Authors.

8.2.2 Redistribution

The theory of income redistribution is enshrined in the theory of welfare, which was briefly presented in Chapter 1 but is beyond the ambition of this book. Here, we restrict ourselves to the difficult problem of combining efficiency and equity, which is the purpose of the literature on *optimum taxation*.[22]

A first approach consists in minimizing the efficiency cost of taxation for a given amount of public revenue. This leads to the *Ramsey rule*, which recommends taxing the various tax bases in inverse proportion of the compensated elasticities of supply and of demand. However, as already mentioned, the Ramsey rule can lead to an inequitable distribution of the fiscal burden. A more elaborate approach, which has inspired most of the literature on optimum taxation, consists in introducing an equity objective alongside the efficiency one. In consequence, for example, the optimum tax rate on luxury goods will be higher than implied by the Ramsey rule, whereas the optimum tax on necessity goods will be lower.

Through James Mirrlees's pioneering work (1971), the optimum taxation literature first addressed personal income taxation, which may encapsulate means-tested transfers (considered as negative taxes). Mirrlees defines the social utility function as a weighted sum of individual utilities, with weights inversely proportional to individual incomes, which amounts to giving more consideration to the poorest. This social utility function is maximized under two constraints: a public *income constraint* (i.e., the tax revenue to be collected) and an *incentive constraint* that recognizes the impact of taxation on the incentive to work.

Assuming that individuals can be characterized by their productivity and that each individual's income is equal to his or her marginal productivity, redistribution requires taxing higher productivity individuals more heavily, but this is likely to discourage them from working and therefore to reduce tax revenues by shrinking the tax base. The marginal tax rate needs to be relatively small for the middle class because it is numerous, hence the disincentive effect is large. This approach, which does not account for labor market imbalances, justifies higher marginal tax rates at the lower end of the income. An optimum income tax profile can be derived from this trade-off between equity and efficiency (cf. box 8.6).

On the whole, optimum taxation theory offers a better understanding of the efficiency–equity trade-off but hardly provides operational guidance to governments contemplating a tax reform. As underlined by Slemrod (1990), measuring the elasticity of labor supply or the degree of substitution between consumption and leisure is particularly difficult, and optimum taxation models rarely argue for strongly progressive tax profiles except when they assume very low elasticities of substitution between consumption and leisure. Furthermore, these models are highly stylized. For instance, they do not distinguish between the individual and the household, even though the composition of a household is crucial for the elasticity of the individual labor supply and for the individual's utility.

Box 8.6 Optimum Taxation

Assume that there is a continuum of individuals, each characterized by his or her labor productivity w. Mirrlees's general result (1971) can be summarized in the following way (see Salanié, 1998).[a] The optimum marginal tax rate for an individual with potential wage or productivity w is $T'(w)$ such that:

$$\frac{T'(w)}{1-T'(w)} = E(w)R(w)H(w) \qquad \text{(B8.6.1)}$$

$E(w)$ measures the inverse of the elasticity of labor supply for each productivity level w. Assuming more productive labor is more elastic to taxation, E is a decreasing function of w: consistent with the Ramsey principle—other things equal, higher-productivity workers should be less heavily taxed: $E'(w)<0$.

In turn, $R(w)$ is the weight allocated by the government to individuals with productivity w in the social utility function: the government may want to give more consideration to the poorest by alleviating their net tax burden: $R'(w)>0$.

Last, $H(w)$ reflects the primary income distribution. It is a decreasing function of the number of individuals with productivity w and an increasing function of the number of individuals with productivity higher than w:

$$H(w) = \frac{1-F(w)}{wf(w)} \qquad \text{(B8.6.2)}$$

where f is the statistical distribution of w and F its cumulated distribution: the marginal rate of taxation of individuals with productivity w must not be too high if there are many such individuals (a high $f(w)$) in order to dampen what could be a massive discouraging effect on labor supply; conversely, a rise in the marginal tax rate of individuals with productivity w is appropriate if there are many individuals with a productivity higher than w $(1 - F(w)$ is high) because these individuals then contribute significantly to the budget without facing a disincentive to work.

Combining $E(w)$, $R(w)$, and $H(w)$ yields a roughly flat or moderately U-shaped optimum tax rate. However, the marginal tax shape strongly depends on assumptions regarding the social utility function or the elasticity of labor supply. Refined versions of the Mirrlees model have introduced a lower substitutability between consumption and leisure at the lower end of the income scale, which justifies higher marginal rates for low-income individuals often observed in advanced economies. Accounting for the clustering of labor productivities in the middle of the income scale also helps in recovering a U-shaped curve since it is optimal to reduce taxation on the most numerous groups of individuals in order to limit the tax-induced fall in labor supply.

8.2.3 Corrective taxation

The efficiency–equity trade-off misses the point that, in some cases, taxation may actually improve economic efficiency if it corrects existing market failures such as imperfect competition, externalities, asymmetrical information, and the like. In such cases, taxation can substitute for other policies—regulations, codes of conduct, or the creation of new markets.

The idea goes back to the 1920s, when Arthur Pigou (1920) proposed to introduce a tax on London chimney emissions in order to fight the infamous "smog." This involved bridging the gap between the *private cost* of emissions, incurred by the agents who were responsible for them, and their *social cost*, which includes the damage caused to other agents (*polluter–payer principle*).[23] This principle can be applied to any activity that causes negative externalities to other producers or consumers (e.g., carbon taxes or congestion charges, such as the one introduced in London in 2003 for motorists willing to enter the city center). The effectiveness of so-called *Pigovian taxes* hinges on equalizing the marginal cost of emission reduction for polluters to the social cost of the emission (see box 8.7). All polluters will reduce their emissions up to the point where the marginal cost of a further reduction is equal to the tax, hence to the social benefit of an additional reduction. Beyond that point, they will prefer paying the tax rather than incurring the costs of further reducing their emissions. This behavior is economically efficient and socially optimal, because the firm that faces the lowest marginal cost of cutting emissions will reduce its emissions more than a firm facing a higher marginal cost, unlike what happens with the imposition of a uniform emission limit for any firm.

However, Pigovian taxes affect emissions only indirectly, through changes in marginal costs. Their success relies on adequately assessing the social cost of damage and the economic agents' response to price variations. If these parameters are known, then it is possible, using a tax, to reach the desired quantity objective (for example, a given reduction of pollution). But if these parameters are uncertain, the quantitative results from a tax will also be uncertain. In brief, setting a price for pollution allows one to internalize the externality in an efficient way, but the outcome in terms of the volume of pollution may be uncertain.

Another solution for correcting externalities is to rely on regulations. In the London case, for instance, it could have been decided that only cars with even plate numbers would be allowed to enter inner London on even days and odd-plated cars on odd days.[24] The quantity of vehicles entering the city would then have been certain (in our case, a 50% drop in traffic could have been expected), but the social cost of the regulation would have been higher because, on even days, some owners of odd-plated cars would suffer a cost while some owners of even-plated cars would be granted a benefit that they cannot value. As mentioned earlier, this would not have been a cost-efficient way of reducing the traffic.

A way to combine economic efficiency with a better control on the volume of pollution is to consider the externality as the result of a missing market

Box 8.7 The Principle of a Pigovian Tax

The idea behind the Pigovian tax is to let polluters internalize the cost of pollution. Assume for instance that households consume a good in quantity q, the production of which releases an amount e of pollution that deteriorates households' welfare. Let $U(q, e)$ be their utility function, we have:

$$\frac{dU(q, e)}{dq} = \frac{\partial U}{\partial q} + \frac{\partial U}{\partial e}\frac{de}{dq} < \frac{\partial U(q, e)}{\partial q} \qquad \text{(B8.7.1)}$$

The marginal utility of consuming the good is reduced due to the associated pollution de/dq. In turn, the production cost, $C(q, e)$ is an increasing function of the quantity produced and a decreasing function of the pollution released. Hence the marginal cost of production is reduced thanks to the associated emissions:

$$\frac{dC(q, e)}{dq} = \frac{\partial C(q, e)}{\partial q} + \frac{\partial C(q, e)}{\partial e}\frac{de}{dq} < \frac{\partial C(q, e)}{\partial q} \qquad \text{(B8.7.2)}$$

In the decentralized, perfect competition equilibrium, this marginal cost determines the price of the good. This price is, however, too low in terms of social welfare: a central planner would rather choose a price that equalizes the marginal cost of production (Equation B8.7.2) to the total marginal utility of consumption (including associated pollution disutility, Equation B8.7.1). A way to reach the social optimum is to impose a tax t on each unit of production, with:

$$t = -\frac{\partial U(q, e)}{\partial e}\frac{de}{dq} > 0 \qquad \text{(B8.7.3)}$$

The marginal cost of production then is inflated by the tax, which makes the firm internalize the negative externality of pollution:

$$\frac{\partial C(q,e)}{\partial q} + \frac{\partial C(q,e)}{\partial e}\frac{de}{dq} + t = \frac{\partial C(q,e)}{\partial q} + \left(\frac{\partial C(q,e)}{\partial e} - \frac{\partial U(q,e)}{\partial e}\right)\frac{de}{dq} \qquad \text{(B8.7.4)}$$

Note here that the tax is imposed on production rather than on the emissions themselves. Although it is preferable to target the pollution itself, it is often impossible to do so due to information problems.

(for instance, a market for clean air or for smooth-flowing traffic). Public intervention then consists in establishing this new market. Issuing *tradable emission permits* or *tradable traffic permits* makes it possible to limit the total quantity of pollution (or of traffic) to the volume of available permits and to minimize the cost of pollution (or traffic) reduction by concentrating reduction efforts on those who will suffer less. For instance, the transport authority

of a big city could allocate a given volume of inner-city traffic permits to residents for one semester corresponding to, say, a 25% reduction in traffic compared to past figures. Those who use public transportation would have the opportunity to sell their permits on a market, and those who did not have enough permits (or did not live in this area) could buy these permits at market price. One advantage of this system is that the transport authority would not need preliminary knowledge on the relationship between price and traffic; a second advantage is that those individuals who are able to use public transport would gain from selling their permits, which would reduce the private welfare cost of the tax.

Such tradable permit schemes with an initial allowance are called *cap-and-trade* systems. Prominent examples are the US sulfur dioxide trading system established under the 1990 Clean Air Act to combat acid rain and the EU Greenhouse Gas Emission Trading System (ETS) launched in 2005 for carbon dioxide emissions. A cap-and-trade system sets an overall pollution quantity and lets the price be set at a decentralized level, while a Pigovian tax sets an overall price and lets the pollution level vary. Absent uncertainty, the two systems are equivalent. However, uncertainty may lead to instability either on the side of quantities (with a Pigovian tax) or on the side of prices (with a market). The high instability of the ETS prices observed since 2005 is however an impediment to long-term investments in energy-saving production processes.

In theory, any problem of externalities can be resolved through negotiation. For example, smokers can be forbidden from smoking, or they can be required to negotiate with nonsmokers the right to smoke in exchange for some compensation. In 1937, in his article "The Nature of the Firm," Ronald Coase, a British economist and 1991 Nobel Prize winner, stated what has subsequently been called the *Coase theorem*: as long as all parties are free to bargain, negotiation will deliver an efficient outcome irrespective of legal entitlements. If the law forbids smoking, it is up to the smokers to buy the nonsmokers' indulgence, whereas if smoking is allowed, it is up to the victims to buy pure air from smokers. However, the Coase theorem is valid only in the absence of (or with limited) transaction costs; that is, it can fix neighborhood disputes, but it cannot solve the global warming problem. Furthermore, the outcome of the negotiation depends on the initial allocation of property rights. In the case of industrial pollution, the difficulty is precisely to establish property rights: Do firms have the right to pollute when they produce, in which case the firm has to be subsidized to reduce its emissions, or is the planet entitled to preserve its climate, in which case firms have to pay for the pollution they generate? The Pigovian tax adopts the latter viewpoint, whereas the market for tradable emissions permits is more flexible depending on the initial allocation of permits.

What should be done with tax revenues? There are three possibilities. The first consists in compensating polluters through a lump sum transfer in order not to penalize them unduly or, from a more political-economy perspective,

to make the tax more acceptable to them. For example, the Swedish power stations are taxed proportionally to their nitrogen dioxide emissions, but they receive a transfer proportional to their electricity production. This taxation-cum-redistribution scheme allows behavior to be directed toward a reduction of emissions without modifying the net tax burden for the sector as a whole. The second possibility is to use tax revenues to produce public goods, in particular to finance environmental expenditures. This is the option chosen in London, where congestion charge receipts are invested in the city's transportation infrastructure. Finally, the tax revenue can be used to cut other taxes considered as distorting, especially taxes on labor: this allows a *double dividend* to be reaped since social welfare rises both because of the Pigovian tax itself (which corrects an externality) and because of the cut in tax-induced distortions on the labor market. Germany and the Netherlands thus have substituted eco-taxes for social insurance contributions (see Section 8.3). The very existence of a double dividend is, however, debated since (i) under perfect competition on the goods market, the incidence of green taxes is likely to fall on labor, (ii) the success of a Pigovian tax means that the tax base will shrink, which makes cuts in social security contributions unsustainable, and (iii) Pigovian taxes are generally regressive.

8.2.4 Taxation in open economies

Taxation in open economies raises two distinct issues: (i) the use of taxation to protect national suppliers against international competition or to carry out a "fiscal" devaluation and (ii) the taxation of mobile tax bases and subsequent issue of tax competition.

a) Taxing foreign suppliers

Since the introduction of the General Agreements on Tariffs and Trade in 1947, followed by the creation of the World Trade Organization in 1994, reducing tariffs on imports and exports has been a long-lasting objective of the international community. At the top of the international agreements, regional and bilateral agreements have proliferated, reducing trade barriers even further. Taxing imports is admitted by international rules in very specific cases of verifiable dumping or illegal state aid, or if a major internal objective (e.g., an environmental objective) is at stake. The political economy of international tariffs is, however, favorable to well-organized groups of local suppliers, especially when consumers are uncoordinated and when their price elasticity is relatively low (Grossman and Helpman, 1994).

A uniform tax on imports is equivalent (when associated with a uniform export subsidy) to a real depreciation of the domestic currency. Theoretically, in the long run, it is absorbed by the adjustment of the real exchange rate (Lerner, 1936; Lindé and Pescatori, 2017). For example, if the trade balance

is in surplus thanks to barriers on imports, the real exchange rate will appreciate. In practice, however, tax rates applied to various goods and services differ widely. They are generally much higher for agriculture than for manufactured goods, and, among the latter, they can be very low—with exceptions (tariff peaks). Hence the macroeconomic logic does not really apply.

At a microeconomic level, the dynamics of tariffs is subject to two opposite forces. On the one hand, the development of intraindustry trade implies that domestic and foreign goods are close substitutes, which reinforces demands for protection. On the other hand, the fragmentation of international supply chains reduces the demand for protection since tariffs on intermediate goods will inflate the cost of domestically produced final goods.

More generally, the issue of tariff protection arises when domestic companies consider domestic taxation (or environmental standards) as a disadvantage in world competition. One way to address their concern, then, is to move domestic taxation from source-based to destination-based (box 8.8). For instance, raising the VAT rate while cutting social insurance contributions will reduce the unit cost of home suppliers since both imported and local goods are subject to the VAT while only domestic suppliers will enjoy the cut in social contributions. Like the monetary devaluation, such *fiscal devaluation*, however, has only a transitory effect. In the long term, to the extent that local wages are indexed on the consumer price index, the unit cost of labor will increase following the VAT hike.[25]

Box 8.8 Source, Residence, and Destination

Consider a company whose legal residence is in country R. As a simplification, assume that the company is owned by residents of R. The company has a subsidiary in country S, which exports all its production to country D where its consumers are located.[a] The income produced by the subsidiary may be taxed at the source country S, at the residence country R, or at the destination country D. It is actually taxed in the three countries: The *source country* S raises a CIT on the profit made by the subsidiary, on the top of social insurance contributions and local taxes related to real estate and public services. The *residence country* R may raise a tax on repatriated profits (after crediting the mother company for the CIT already paid by the subsidiary).[b] More importantly, it will raise an income tax on the dividends perceived by the shareholders of the company. Finally, the *destination country* D raises a VAT or a general sales tax on the value of the goods sold on its market. The trend over the past decades has been a shift away from *source-based taxation* in favor of *destination-based taxation*.

[a]This box borrows from the *Mirrlees Review* (2011), chapt. 18.
[b]In many countries, though, repatriated profits are exempted at the residence, while the CIT paid at the source is not credited.

Likewise, it has been proposed in the US tax policy debate to replace the standard CIT (which is raised on the profit of a company in the source country) by a *destination-based cash flow tax* (DBCFT; see Auerbach 2010).[26] A *cash flow tax* would allow a company to deduct the entire value of its investments immediately in the year of the investment rather than progressively through depreciation allowances. Furthermore, new borrowing would be taxable, but debt repayments would be deductible. A *destination-based* cash flow tax would exempt sales to foreign customers while purchases from foreign suppliers would not be deductible. The problem with the DBCFT is that, unlike the VAT, which is also destination-based, it involves a discrimination between foreign and domestic inputs because the total value of foreign inputs (not just the share corresponding to the profit of foreign suppliers) is taxed under the DBCFT whereas domestic inputs are deductible (see Cline, 2017). A destination-based cash flow tax can therefore be regarded as a protectionist measure.

b) Taxing mobile bases

It was argued in Section 8.2.1 that taxes are ultimately borne by the least flexible bases. In an open economy, capital is generally more mobile than goods and especially labor. Hence, the burden of taxation tends to fall on labor and consumption, two relatively immobile tax bases.

The seminal model of tax competition (Zodrow and Mieszkowski, 1986; Bucovetsky and Wilson, 1991) relies on the international arbitrage condition: if capital is internationally mobile, the after-tax returns on capital are equalized. If a country increases the tax rate on capital, some capital will flow out; since the marginal productivity of capital is decreasing, the the pre-tax return will rise. In practice, the least productive investments are delocalized so that, on average, the pre-tax marginal return is higher, equalizing the after-tax return to its international level (see box 8.9). As the government can tax an immobile tax bases (land, consumption, or low-skilled labor), the burden of taxation will fall on them, while no levy will be imposed on the mobile bases.[27]

These traditional results of the literature on tax competition, which predict a *race to the bottom* in corporate tax rates, have been questioned since the late 1990s by the "new economic geography" literature (see Baldwin et al., 2003, and Chapter 9 of this book). According to this research avenue, large, geographically connected countries benefit from *agglomeration rents*[28] allowing them to maintain higher tax rates without suffering from a relocation of their activities. These agglomeration effects are related to economies of scale, which create an incentive for firms to concentrate their activities in a small number of places, provided that transport costs between production and markets are not too high (Andersson and Forslid, 2003). Government services themselves can contribute to this dynamics. The presence of firms in a location generates resources that can be used to provide local amenities such as infrastructure or education which, in turn, will attract new firms—the "bright lights, big city" effect.

Box 8.9 Tax Competition According to Zodrow and Mieszkowski

Consider a representative household that consumes both a private good (in quantity x) and a public one g. The household's utility function is $U(x, g)$, with positive and decreasing marginal utilities in each of the two goods (and zero marginal cross-utilities).[a] The private good is produced by a representative firm through the production function: $y = f(k)$, where k is the amount of productive capital, $f'(k) > 0$ and $f''(k) < 0$. In turn, the public good is delivered by the government by taxing private capital at a proportional rate t: $g = tk$. The public budget is balanced. The problem of the (benevolent) government is to set t so that the household's utility is maximized.

The household is endowed with an amount of wealth K that is invested in shares of productive capital. In a *closed economy*, the representative household holds the domestic productive capital stock: $K = k$. Its budget constraint is $x = f(k) - tk$. The first-order condition of profit maximization involves equal marginal utility for the public as for the private good:

$$\frac{u_g}{u_x} = 1 \qquad \text{(B8.9.1)}$$

where u_g, u_x denote the marginal utilities of the public and the private good, respectively.

In a *small, open economy*, the representative household chooses between investing in domestic or in foreign capital. The arbitrage condition is the equality between the domestic, after-tax return $f'(k) - t$, and the exogenous world real interest rate, r^*: $f'(k) - t = r^*$. The first-order condition becomes:

$$\frac{u_g}{u_x} = \frac{1}{1 - \varepsilon_k} > 1 \qquad \text{(B8.9.2)}$$

where $\varepsilon_k > 0$ is the elasticity of the capital to the tax rate. Because u_g is a decreasing function of g, Equation (B8.9.2) implies a lower public good provision, hence lower equilibrium taxation than in the closed economy case (Equation B8.9.1).

Allowing the public good to be productive, or considering two large economies (that together determine the world interest rate), reduces the impact of capital mobility on the optimal tax rate without eliminating it. Finally, it can be shown that smaller economies are more prone to lowering their tax rates because the world capital return is more exogenous for them than for large economies.

Figure 8.10 in Section 8.1 confirms the downward trend of marginal tax rates for mobile bases (the CIT and, to a lesser extent, the PIT) and the upward trend of marginal tax rates for immobile bases (the VAT) in the European Union.

[a]This box is derived from Krogstrup (2002).

Empirical studies[29] confirm that location choices are primarily driven by the breadth of local demand. Cost factors, including taxation, also have an impact, but they are mainly secondary factors, especially in advanced economies. This means that tax differentials can be maintained to the extent that they compensate for geographic or size differences.

Competition across jurisdictions to attract productive investment through lower taxation should be distinguished from the mere facilitation of tax avoidance through schemes that allow assigning profits to entities located in tax havens or low-tax jurisdictions. Whereas there is a valid discussion to be held on the degree to which lower taxation can compensate locational disadvantages, there is no economic argument for tax avoidance (apart from the hypothesis that government taxation is predatory). Tørsløv, Wier and Zucman (2018) estimate that close to 40% of multinational profits are shifted to tax havens globally.

8.3 Policies

As mentioned in Section 8.1, tax policies aim at (i) collecting resources without introducing too many market distortions, (ii) redistributing incomes without discouraging labor supply or saving, and (iii) correcting specific market imperfections. The availability of a wide range of instruments makes these various objectives less contradictory than might appear at first glance. If taxation is so much debated, it is, of course, because of its impact on the various agents' disposable income, but also because tax incidence is generally poorly understood, because the agents' horizons may differ, because the model used to understand its effects can vary (depending on whether it assumes perfect or imperfect competition, open or closed economy, etc.), and, of course, because of differences in the relative weights of the efficiency and redistribution objectives. Here we focus on how the theories presented in Section 8.2 can be called on to address concrete tax policy issues.

8.3.1. Distributing the tax burden efficiently

Economic theory suggests that the amount of public goods provided by the government should be determined trhough comparing their marginal benefit to the marginal efficiency cost of raising taxes. Beyond this principle, however, theory fails to provide any reliable tool for determining the optimum level of the total tax burden. As already mentioned, the Laffer curve does not provide useful guidance to identify this level: absent tax collection problems, an economy as a whole generally lies on the left part of the curve, where a higher tax rate increases tax revenues. Although high taxes mechanically translate into large price distortions in the economy, there is hardly a correlation between total tax pressure and long-term growth, as illustrated in figure 8.15.
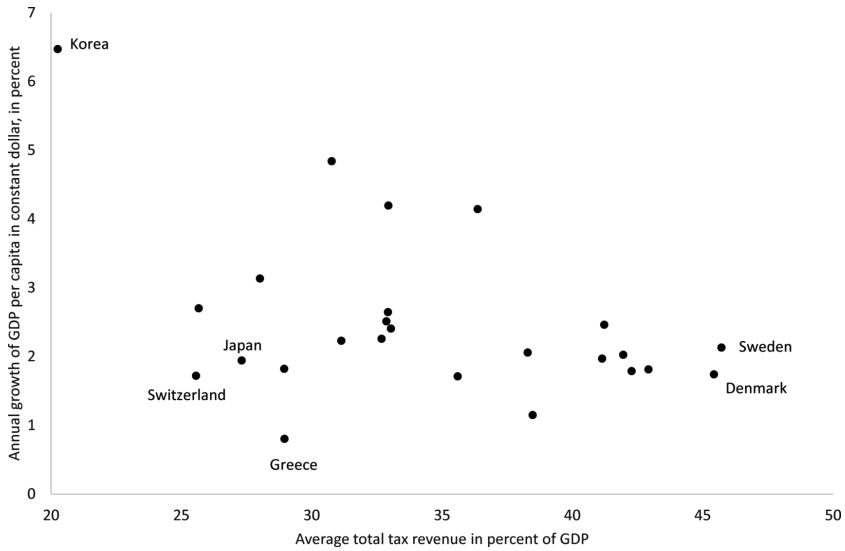
Figure 8.15 Total tax pressure and gross domestic product (GDP) growth in OECD countries, 1980–2015.
OECD.

Korea appears as an outlier, with both low taxation and high growth of GDP per capita over 1980–2015. However, Denmark and Sweden display similar growth rates as Switzerland or Japan, with much higher tax pressure. The level of tax pressure is mostly determined by social preferences and especially by the desired generosity of the welfare state. Furthermore, the link between taxation and growth is not univocal, since more public education, health services, or infrastructure may actually increase the growth potential of a country (see Chapter 9), while less inequality is also growth-enhancing (see Ostry, Berg, and Tsangarides, 2014).

Theory is more prolix on how to distribute the tax burden in an efficient way (i.e., so as to raise taxes without introducing too many market distortions): public resources should be raised through low tax rates applied on large, relatively inelastic tax bases. However, several tax bases can be used: consumption, payrolls, personal income, corporate income, and more. A first question is, which of them should be favored.

a) The long-run equivalence between different taxes

It is safe to start from the long-run equivalence between social insurance contributions, personal income taxation, and general consumption taxes.[30] With W denoting the nominal cost of one unit of labor for the employer and Ω the purchasing power of the corresponding remuneration for the employee, we have:

$$\Omega = \frac{\left(1-t_{sc2}\right)\left(1-t_{PIT}\right)}{\left(1+t_{sc1}\right)\left(1+t_{VAT}\right)}\frac{W}{P} \tag{8.2}$$

where t_{SC1}, t_{SC2}, t_{PIT}, t_{VAT} denote the rates of employers' social contributions, employees' social contributions, the PIT, and VAT (or any general consumption tax), respectively, and P represents the before-tax consumption price index. Equation (8.2) states that the four taxes and contributions have approximately the same impact on workers' purchasing power.[31] The distribution of these taxes between employers (who pay W/P in real terms) and employees (who receive Ω, also in real terms) only depends on the relative slopes of labor supply and labor demand, as detailed in Section 8.2.1. If labor supply is steeper (less flexible) than labor demand, then W/P will remain unchanged whatever the taxes, and a tax increase will result in a fall in purchasing power Ω.

An important exception to this equivalence between taxes occurs at the minimum wage level because the latter is generally defined as net of social contributions but gross of VAT.[32] In this case, a rise in social insurance contributions mechanically raises the cost of labor W because the net wage received by employees cannot fall; on the other hand, VAT rise causes a drop in the employees' purchasing power (unless the minimum wage is adjusted). Policies aimed at encouraging the demand for low-skilled labor can use cuts in social contributions because they lower labor costs while preserving purchasing power. Since the 1990s, European countries have extensively used targeted cuts in social security contributions to reduce the cost of low-skilled workers while maintaining their purchasing power relative to the median worker. For instance, in France, the net minimum wage received by the workers was 67% of the median wage in 2011, but the labor cost at the minimum wage was only 50% of that at the median wage. In Belgium, the corresponding figures were 66% and 46% (see Groupe d'experts du SMIC, 2014).

Another exception to tax equivalence occurs in the short run, before wage negotiations take place: A rise in employers' social insurance contributions increases labor costs because nominal wages are rigid. In contrast, a rise in the employees' social contributions, PIT, or VAT reduces their purchasing power (since wages are not indexed in the short run). Hence, these various taxes have different stabilization properties. In 2007, Germany raised its standard VAT rate by three percentage points while cutting employers' social contributions by one percentage point. This tax package had a negative impact on consumption in the short run due to its detrimental impact on purchasing power. Later in 2007, German unions asked for wage increases to compensate for the rise in VAT.

Finally, the preceding reasoning does not account for capital income or pensions, which are taxed through VAT and PIT (or withholding taxes), but are not subject to social insurance contributions, which are generally based on payrolls.[33] Cutting labor taxes by one percentage point may be financed by an increase in a broad-based PIT by less than one percentage point.[34]

b) The value-added tax

Since its introduction in France in 1954, the value-added tax has been adopted in most countries in the world. In December 2016, more than 140 countries had a VAT, with standard rates ranging from 8% to 25%. VAT is a prerequisite for EU membership. About 20 countries, like the United States, Canada, Australia, New Zealand, Singapore, or Japan, do not use VAT but a retail sales tax (RST). The latter is raised only on final consumption, whereas VAT is raised at each stage of the value-added chain (with appropriate tax credit for intermediate consumption). As detailed in box 8.10, VAT and the RST are equivalent from an economic point of view, but VAT is generally viewed as more resilient to tax evasion.

Most developing countries have also adopted VAT systems. However, some sectors are often left out, which significantly reduces VAT receipts. Enforcing VAT in developing countries, where a large part of the economy is informal, is

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Box 8.10 VAT Versus Sales Tax

Let us assume that a single producer of intermediate goods sells for 100 euros to a single producer of a final good; and that the latter is sold for 150 euros to final consumers.[a]

- Under a 20% VAT rate, the producer of intermediate goods charges 20 euros (20% × 100) VAT to his or her customer and transfers this amount to the tax administration; the producer of the final good charges his or her customers 30 euros (20% × 150) VAT and transfers 10 euros (30 – 20, the VAT he or she already paid for the intermediate good) to the tax administration. The total tax revenue is therefore 30 euros.
- Under a 20% retail sales tax (RST), the producer of intermediate goods charges no tax and pays no amount to the tax administration. The final good producer charges 30 euros (20% × 150) to his or her customers and transfers this amount to the tax administration.

Hence, the same rate of VAT and of RST produces the same tax revenue. However, the VAT is generally viewed as preferable because it spreads the risk of noncompliance over a larger number of agents: if one firm within the supply chain fails to comply with VAT, the corresponding tax will be levied at the next stage of the chain; furthermore, suppliers have an incentive to register to charge the VAT since this will allow them to receive a refund for the VAT paid on the expenditure side; finally, there is no incentive under VAT to cheat on the nature of sales and declare a final sale as a business-to-business transaction.

[a]This box partly draws on Keen and Smith (2006).

a crucial issue especially since import tariffs are being cut as a result of membership in the World Trade Organization.

If the advantage of the VAT is to be used to raise revenues in a minimally distortive way, it is important to resist the temptation to use it for targeted actions, such as promoting employment in selected sectors. Multiple rates tend to create loopholes and to distort relative prices. Furthermore, playing with a consumption tax is a very indirect way to stimulate employment. Suppose, for instance, that the VAT rate is reduced for restaurants in order to stimulate employment. There is no guarantee that the tax cut will be passed on to the consumers and that the consumers will react by raising their demand. Even if both conditions are fulfilled, the gain may be captured by the landowners through higher rents. To encourage demand for labor, it is therefore preferable to act directly on labor costs through cuts in social insurance contributions.

8.3.2. Distributing the tax burden equitably

Although it is generally considered an efficient way to raise public revenues, the VAT is a regressive tax: despite lower rates on necessity goods, low-income household tend to pay more in percent of their income than do high-income ones just because they consume a larger share of their income. There is a need to at least counterbalance this regressive feature through a progressive income tax (*vertical equity*). However, tax equity also involves taxing all sources of income the same way (*horizontal equity*). We start with this horizontal dimension of equity before studying vertical equity.

a) Horizontal equity

Taxing all sources of income equally is a necessity to avoid creating tax loopholes. For instance, failing to raise a CIT could lead some households to "incorporate" so as to declare their revenues as corporate income. It is also a necessity to avoid creating price distortions (e.g., between labor and capital). Finally, it is a requirement in terms of equity. For instance, rentiers, self-employed, and wage earners should be taxed the same way.

Taxing all types of income equally is, however, a very complicated task because several taxes interact. For instance, should the same PIT rate apply to dividends as to labor income? The problem with taxing the dividends is that they have already been taxed as profit at the source through the CIT. Therefore, dividends are often taxed at a lower rate than labor income. However, if the incidence of the CIT falls partially on labor, there is no reason to tax dividends and labor income differently.

Restricting the problem to the CIT does not make it easier, though: should interest payments be deductible from the taxable profit, as it is generally at least partially the case? Doing so introduces a distortion between debt and equity financing of the firm and also incentivizes multinational companies to shift profit to low-tax countries through intracompany loans (box 8.11).

Box 8.11 The Search for a Nondistortionary Corporate Tax

The relevance of taxing corporate income may be questioned since capital is internationally mobile, which tends to shift the burden of a CIT on to immobile tax bases.[a] The corresponding income may be taxed at the less-mobile shareholder level (i.e., as a personal capital income). Still, the CIT may be justified on several grounds: (i) the corresponding income may be easier to trace at the corporate level than at the individual one; (ii) the tax base is easier to measure at the corporate level, especially when the purpose is to tax rents rather than total profit[b]; (iii) the CIT may be used as an (imperfect) substitute for missing fees for the use of government services by corporations; (iv) the CIT is the only way to tax foreign shareholders; (v) the CIT acts as a backstop for the PIT; and (vi) from a political point of view, it may be less difficult to directly tax corporations than actual voters—workers or capital owners.

Still, taxing corporate income raises two series of questions:

- Should the tax be raised in the country where the activity takes place (*source principle*), in the country where capital owners (either individuals, headquarters, or institutional investors) are located (*residence principle*), or in the country where the goods and services are finally consumed (*destination principle*)?
- Should the tax fall on the full return on equity (including both normal return and rents), on the full return on capital (including debt-financed capital), or only on rents (excluding "normal" return by exempting interest payments and "normal" dividends)?

In most countries, the CIT is raised under the source principle, and repatriated profits from foreign affiliates are exempted from any taxation. However, in some countries (the United Kingdom, Ireland), there is a credit for taxes paid abroad on the affiliates' profits so that the residence principle *de facto* applies to the multinationals headquartered in the country (unless taxes paid abroad exceed the domestic tax bill, since there is no refund). Due to this tax credit scheme, foreign affiliates of, say, UK multinationals do not receive the same tax treatment as local firms abroad or as affiliates of multinationals headquartered in exemption countries.

In most countries, the tax base is the full return on equity. In particular, interest payments are at least partially deductible from taxable profit. This tax base, combined with the source principle, is especially vulnerable to tax optimization by multinationals. Indeed, multinationals can shift profit from one country to another through transfer pricing (e.g., overpricing intermediate goods or services sold by those affiliates located in low-tax countries) and intrafirm finance (e.g., loans from affiliates located in low-tax countries to those located in high-tax ones), which has led governments

and international organizations (especially the OECD) to try to impose codes of conduct.

To remove some of these distortions, several tax reforms have been proposed and sometimes adopted. One of them aims at taxing only rents, not the "normal return," by introducing an allowance for the cost of equity finance. Such a system, which was introduced in Belgium in 2006,[c] reduces the distortions related to the CIT since debt and equity finance are treated equally and only extra profits ("rents") are taxed, and tax optimization through intrafirm loans is reduced. The main disadvantage of this system is that it amounts to narrowing the tax base, which leads to a rise in the statutory tax rate if constant receipts are needed. This reintroduces the risk of more distortions as well as profit-shifting.

Another proposal consists, on the contrary, in removing interest payment deductibility. Again, debt and equity finance would be treated equally so that both would be taxed, which means a broadening of the tax base and a lower statutory tax rate. Such a *Comprehensive Business Income Tax* (CBIT) was proposed by the US Treasury in 1992. Countries such as Germany or France have moved significantly in this direction by limiting the deductibility of interest payments from taxable profit. This is also the direction taken by the European Union through the Anti-Tax Avoidance directive of 2016 (see box 8.15).

[a]This box relies on Devereux and Sørensen (2006) and Auerbach, Devereux, and Simpson (2007).

[b]The taxation of economic rents is theoretically nondistortionary since the normal return generated by the marginal investment project is exempted.

[c]The interest deduction for risk capital (a.k.a. *notional interest deduction*) was introduced in Belgium in 2006 to replace the special tax regime for "coordination centers"—a system that was banned as discriminatory by the European code of conduct. The interest deduction is calculated as a notional interest rate (itself a moving average of past 10-year interest rates on government bonds) multiplied by the company's equity.

The CIT may also affect differently the same income depending on corporate ownership. In some countries, such as Germany or France, all companies are taxed the same way whatever the ownership, but income from foreign affiliates is exempted. In other countries, such as the United Kingdom, the tax paid by affiliates in foreign jurisdictions is credited on the mother's tax bill, meaning that, unless taxes paid abroad exceed the domestic tax bill, foreign affiliates *de facto* pay the British CIT (Box 8.11).

Aside from the interaction between different taxes and tax systems, the taxation of all income sources along the same rates is also impaired by the temptation of national governments to grant exemptions. For instance, companies may deduct part of their R&D expenditures from the CIT base or households may deduct part of their child care expenditures or charitable donations from

the PIT base. The notion of *tax expenditure* refers to the loss in tax revenues related to these specific provisions: it can be interpreted as equivalent to subsidies in favor of various purposes or interest groups. According to the Tax Policy Center of the Brookings Institution, the 13 top tax expenditures in the United States totaled US$972.9 billion in 2016, hence around 5% of US GDP. The call for simplification and base broadening (through reduced exemptions) of the tax system is a leitmotiv of newly elected governments but generally does not resist the pressure from lobbies and the pursuit of reelection.

Finally, the ability of governments to tax equally all sources of income is also impaired by the unequal mobility of tax bases. Following the theoretical model of tax competition (see Section 8.2.4), the higher mobility of capital compared with labor and especially consumption induces a shift of taxation from the former to the latter. When consumption is mobile, as is the case for digital trade, it becomes more difficult to tax it (box 8.12). In a sense, the *race-to-the bottom* related to base mobility is consistent with the Ramsey rule, which suggests that highly elastic tax bases should be taxed less. However, such rate differentiation introduces a distortion between different activities— here with traditional retail and new business models.

Box 8.12 Taxing the Digital Economy

The digital economy differs from the traditional economy by three key characteristics that affect the ability of a government to tax both sectors the same way. First, the nonphysical location of digital activities (and the intermediation carried out by digital platforms) makes it easy for digital companies to register their headquarters in countries where the rules concerning taxation and data use are most advantageous. Second, the digital economy heavily relies on data. These *de facto* constitute an untaxed production factor substituting for sometimes heavily taxed labor. Consumers also often exchange their data for free services, in a sort of barter economy that escapes VAT or sales taxes and therefore benefits from a distortion vis-à-vis traditional services. Third, the principles governing transfer pricing between subsidiaries of the same group hardly apply to the digital economy. The general principle of "arm's-length pricing" stipulates that trade between firms of the same group should be charged at the same price as though those were independent from each other (i.e., at market price). The problem here is that the services traded are very specific (e.g., royalties paid in exchange for using a brand or algorithm), so there is no market benchmark.

These specificities involve distorted competition between companies of the same sector (for instance between the GAFAs[a] and smaller firms) and between governments (through profit-shifting by multinational companies). Taxing the digital economy therefore calls for reforming existing taxation frameworks while at the same time preserving the incentives for innovation.

The OECD BEPS[b] working group has identified four key domains along which to tax the digital economy: (i) the territoriality of digital companies needs to be restored (this implies, e.g., to redefine permanent establishment requirements, to develop the concept of significant digital presence, or to use source taxation); (ii) for tax purposes, value the data and the provision of "free" services to users; (iii) define international digital transactions (e.g., sales, rental, royalties) on which to ground differentiated taxes; and (iv) collect VAT or destination-based consumption taxes.

Other proposals include, for example, taxing royalties at the source and crediting the corresponding tax in the country of the firm receiving the royalties. For instance, if royalties paid to other EU Member States and royalties paid to third countries were both taxed at source, widely used tax-planning strategies based on the location of intellectual property in tax havens would become ineffective. Introducing such source taxation would, however, necessitate a revision of the Interest and Royalties Directive, or at least a coordination of double taxation agreements with third countries, to make sure that royalties or interest paid to tax havens outside the EU do not go untaxed.[c]

Another possibility would be the adoption by a club of countries of an *ad valorem* tax on advertising revenues or revenues from personal data collection. Collecting taxes on these revenues would be effective as both are easily imputable to a national territory. In order to preserve the incentives for innovation, the tax rates would need to be low, and a lump-sum allowance would be introduced to exempt smaller companies.[d]

[a]Google, Amazon, Facebook, and Apple and, more generally, the giants of the digital economy.
[b]Base Erosion and Profit Shifting.
[c]See Finke et al. (2014).
[d]See Charrié, J. and L. Janin (2015), "Taxation of the digital economy," France Stratégie, Policy Brief n°26, March.

Finally, horizontal equity raises the question of identifying the taxpayer: is she an individual or a household? The same individual income provides a different standard of living depending on whether the individual shares some fixed costs with another income earner living in the same household or whether he or she is the only income earner of a household with several children. In many countries, the PIT is raised on the total income of the household rather than on each individual income.[35] However, family-based taxation may reduce the incentive of the second income earner (often a female) to work if the PIT is progressive since the marginal tax rate of the second income earner will, by construction, be higher than with individual taxation. This is a clear example of efficiency–equity trade-off, where individual taxation is to be preferred for efficiency purpose, but family taxation is more

equitable. Empirical research confirms that a more neutral tax treatment of second earners (relative to single individuals) has a positive impact on female labor participation (Jaumotte, 2003), while, conversely, family-based taxation negatively affects female labor supply (Dingeldey, 2001).

b) Vertical equity

PIT and wealth taxes are the traditional instruments of income redistribution through the tax system. However, as evidenced through the marked fall in the top marginal rate of the PIT in the United States (figure 8.16), there is a tendency toward reduced progressivity of the PIT.[36] In some countries (such as France), the progressivity of the tax system results in large part from relatively generous means-tested transfers. Hence the whole tax system needs to be considered when measuring the progressivity of taxes in any given country.

The redistribution motive raises the traditional trade-off between efficiency and equity. As underlined by the optimum taxation theory, distortions induced by progressive income taxation carry an economic cost. In some cases, it is possible to raise both efficiency and equity by redesigning taxes. For instance, when a high statutory tax rate is levied on a narrow tax base (due to the multiplicity of exemptions), it can be more efficient and more equitable to reduce the rate while broadening the base. This was the case with the US PIT reform in 1986, which combined tax rate cuts and base-broadening. After the
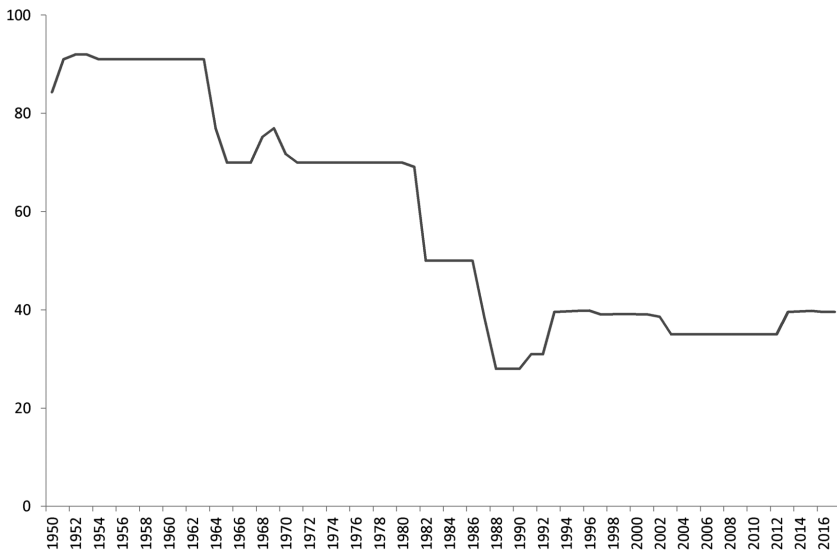
Figure 8.16 Top marginal rate of the personal income tax, United States, 1950–2016 (in %). http://federal-tax-rates.insidegov.com/ and Tax foundation.

reform, fewer individuals were able to escape the tax, whereas those who already complied with it benefited from lower rates. However, most tax reforms of the 1990s and 2000s have resulted in a flattening of the marginal tax rate curve, with rates falling more markedly for high-income brackets. The most radical examples are provided by countries having implemented *flat tax* systems (i.e., tax systems with constant marginal tax rates). In its purest form, the flat tax system applies the same flat rate to personal income, corporate income, and consumption. In 2016, however, of all EU countries, only Estonia had the same rate for the three bases (table 8.1).

In theory, a flat tax system may achieve both efficiency and redistribution when combined with a generous *basic allowance* (i.e., a fixed income level that is not taxed): taxpayers are exempted on their first units of income. In practice, however, a flat tax system generally leads to much flatter average tax rates because, for high levels of income, the basic allowance becomes negligible. Figure 8.8 in Section 8.1 illustrates this phenomenon, with a flat tax at 20% and a basic allowance of 1,000 euros. The personal tax appears highly progressive for relatively low incomes (between 1,000 and 3,000 euros), but much less for higher levels of income where the average tax rate converges to the flat marginal rate.

Another problem with the flat tax system is the absence of progressivity below the basic allowance threshold (in our example, the minimum wage). In figure 8.8, households (or individuals) whose income is below the basic allowance do not pay any tax, but they do not receive any transfer. Hence their average tax rate (zero) is the same as for individuals receiving the minimum wage.

One way to extend tax progressiveness to the very-low-income population is to combine a flat tax with *means-tested transfers* (i.e., transfers that are granted to households below certain thresholds of primary income).

Table 8.1
European Union countries with a flat tax system, 2016

	PIT rate (%)	CIT rate (%)	Standard VAT rate (%)
Bulgaria	10	10	20
Czech Rep.	15	19	21
Estonia	20	20	20
Cyprus	35	12.5	19
Hungary	15	20.6	27
Latvia	23	15	21
Lithuania	15	15	21
Romania	16	16	20

CIT, corporate income tax; PIT, personal income tax; VAT, value-added tax.
Source: European Commission, *Taxation Trends in the European Union*, 2017.

Means-tested transfers are a form of *negative taxation*, and they are widely used in advanced economies. However, they raise a number of difficulties. First, they involve bureaucratic costs for both the social administrations and the households concerned. Second, it has been observed that a significant proportion of the potential beneficiaries fail to apply for the transfers due to a mixture of information problems and worry of a stigma effect.[37] Finally, means-tested transfers involve high marginal net tax rates as moving above the income thresholds triggers a loss of the transfers (see figure 8.9 in Section 8.1). In turn, high marginal rates reduce the incentives to work, hence they may lock the individuals in *poverty traps.*

As an alternative to means-tested transfers, it has been proposed to introduce a *universal transfer* or *basic income* system, where a transfer would be given to any individual or household, regardless of their income, and financed through an income tax applied from the first unit of income (box 8.13). Such a system would address the three weaknesses of means-tested transfers at the same time since it would (i) dramatically reduce the administrative costs, (ii) eliminate the problem of nonrecourse, and (iii) erase the high net marginal tax rates observed at the lower end of the income scale.

The advocates of the basic income scheme further argue that it would provide "real freedom" to the individuals by allowing them to discriminate between "attractive (or promising)" jobs and "lousy" ones (Van Parijs, 1995). The availability of a basic income may also increase the willingness of individuals to take more risks (e.g., through innovating and starting new businesses).

On figure 8.17, we simulate a basic income of half the minimum wage financed through a flat marginal tax rate of 20% that tops up the initial flat tax of 20% that is supposed to cover the other government costs. Individuals (or households) whose income is lower than 1.25 times the minimum wage receive a net transfer, the amount of which reaches 60% of their primary income for half the minimum wage and even more below this threshold (not shown on the graph). In contrast, with a more traditional basic allowance system, the average tax rate is never negative (see figure 8.8 in Section 8.1). In both cases, though, at the other end of the income scale, the average tax rate is rather flat as it converges toward the marginal rate. Of course, a universal transfer system may be combined with a progressive marginal tax schedule. The problem, however, is that the marginal tax rate may reach very high levels for high incomes, which raises the question of tax acceptability and avoidance.

The basic income proposal encounters two key constraints. The first is its affordability, already illustrated in figure 8.17. Indeed, if extending a universal transfer to all taxpayers costs x% of GDP, it would require levying a tax worth x% of GDP on the top of what is already required to finance the provision of public goods (Atkinson, 2015). Even without any change in the net tax paid by taxpayers, a universal income would raise both tax pressure and government spending. In some countries, such perspective is hardly implementable given initial tax burdens. The second problem concerns the net beneficiaries

Box 8.13 The Different Objectives of a Universal Transfer System

The idea of a universal transfer paid to any individual independently of his or her income goes back to the sixteenth century when it is said to have been (unsuccessfully) proposed to the mayor of Bruges. At the beginning of the nineteenth century, the *Speenhamland system* was the first natural—and unhappy—experience of universal allocation: in Speenhamland, a district located in southern England, magistrates decided that the parish would supplement peasants' income up to a certain subsistence level based on the price of bread and the number of children. This system spread quickly in the south of England. But Thomas Malthus criticized this encouragement to have children without being able to provide for their needs. The idea, nevertheless, was taken up by the utopians of the late nineteenth century, then again in the 1930s and 1940s in the UK by the economist James Meade, and finally in the twentieth century by Lady Juliet Rhys-Williams, who proposed this system as an alternative to the Beveridge report. Contrasting to the Malthusian view, she argued that a universal transfer would maintain the incentives to actively seek for work.

The welfare systems put in place after the World War II, however, relied on unconditional transfers in kind (e.g., the British National Health Service) and means-tested transfers (e.g., family allowances, or social assistance), in combination with progressive income tax schedules. The limitations of these systems emerged in the early years of the twenty-first century in relation with (i) flattening tax schedules in relation to rising capital and skilled labor mobility, (ii) the incomplete recourse and heavy administrative burden of means-tested transfers, and (iii) the fragmentation of labor and of family patterns. The idea of a universal transfer then reemerged as a way to address the three problems at the same time through a "basic income" given to all individuals, whatever their market income, and financed through an income tax paid on all market income (with no allowance). Additionally, an unconditional transfer would better protect individuals against the instability of their professional careers and family patterns. It would even provide "real freedom" to individuals (Van Parijs, 1995) since they would no longer be obliged to accept any job to survive. Rather than an unconditional transfer, Atkinson (2015) envisages a condition of "participation" in society: work, education, training, active job search, home care for young children or elderly people, or else voluntary work in a recognized association (with special provisions for illness and disability). In practice, few individuals would be excluded from the scheme, but, according to him, a form of reciprocity is required.

Figure 8.17 The average tax rate under a universal transfer system.[a]
[a]Universal transfer corresponding to half of the minimum wage combined with a flat marginal rate of 40%. The graph is truncated at 0.5 times the minimum wage for readability.
Authors.

of the transfer at the lower end of the income schedule. In most free-market versions of the basic income proposal, the transfer would replace all forms of social benefits, including any form of health care or public education. The idea is to empower the individual who will then take care of herself. However, most authors consider that the basic income is not meant to satisfy the totality of a beneficiary's basic needs, nor should it be a single benefit (i.e., replacing all other cash benefits). For instance, disability allowances will still need to be provided. The problem then is whether the basic income really simplifies the social transfer system. An intermediate solution would be to offer a universal child benefit, paid by the PIT. Such universal benefit would be complementary to public investments in health care and education, and it would help address the child poverty that is widespread in many countries. The benefit would replace means-tested family benefits (Atkinson, 2015).

Vertical equity concerns also have a dynamic, intergenerational dimension. Indeed, progressive income taxation limits wealth accumulation. Combined with inheritance taxes, it reduces inherited inequalities across individuals while also limiting individual incentives to climb the social ladder. In the case of France, Piketty (2001*a*, 2001*b*) showed that this mechanism has been powerful in limiting the increase of inequalities. The problem arises again if wealthy households can escape taxation, for instance, by relocating their income or wealth.

As shown in figure 8.18, the distribution of personal wealth was very unequal in Europe at the end of the nineteenth century. In the United Kingdom, as much as 70% of personal net wealth was owned by only 1% of the population (which means that the other 99% had to share a mere 30% of total wealth). The top 1% share fell during most of the twentieth century, down to 15% in the UK during the 1980s. However, wealth inequalities increased again in the 1990s and in the beginning of the twenty-first century—a feature that may be related to flattening PIT schedules, reduced inheritance taxes, and the scrapping of wealth taxation in most advanced economies. Not only is wealth concentrated in a small number of hands, but, thanks to longer life, these hands tend to belong to the elder part of the population. Individuals increasingly tend to inherit when they are close to retirement, if not already retired. The wealth received cannot be used to help in acquiring a first home or starting a business.

A reform of inheritance taxation was proposed by Anthony Atkinson (2015), following an old idea of John Stuart Mill. The idea would be to introduce a progressive taxation of the cumulated donations and inherited wealth received over the entire lifetime of the heir: the rate would depend upon donations and inheritance received in the past. Hence there would be an incentive for the donor to spread his or her donations more evenly across various receivers.

One step further would be the introduction of a minimum or universal inheritance, equivalent to a negative wealth tax (Atkinson, 2015). The idea comes from the philosopher and revolutionary Thomas Paine (1797/1999) who had proposed that, at the age of 21, each individual would receive lump-sum capital from a fund while losing his or her "natural" inheritance. The idea of
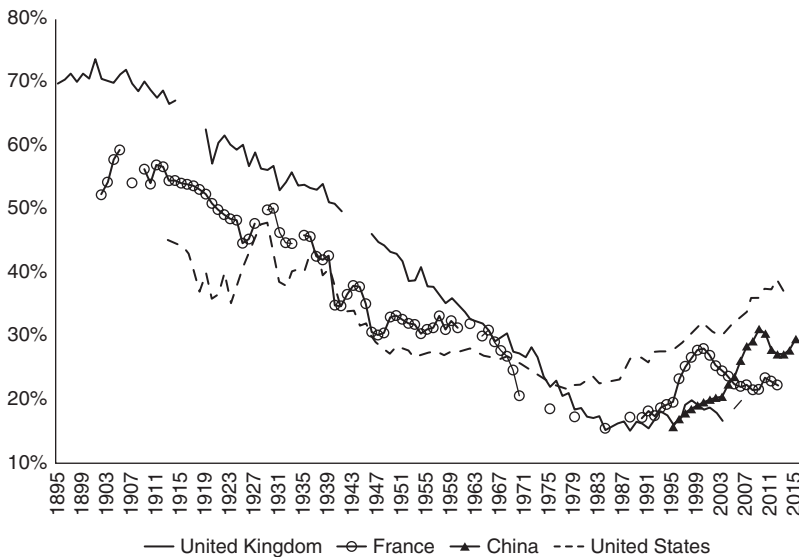

Figure 8.18 Top 1% share in personal net wealth, 1895–2015, in percent. World Wealth and Income Database, February 2017.

"asset-based egalitarianism" was taken up by several authors in the twentieth century. From 2003 to 2010, the British government ran a Child Trust Scheme where a lump-sum endowment of £250 was invested by the government for each newborn, with further payment for poor families and the possibility for families to top up the investment. These sums were to be made available at the age of 18, with no restriction on use. Anthony Atkinson (2015) has proposed a slightly revised version of the scheme named "inheritance for all": a capital endowment financed by the lifetime capital tax described earlier. Universal inheritances would be paid at birth into "capital endowment accounts" as a minimum endowment to every individual, thus reducing wealth inequalities between and within generations.

8.3.3 Correcting market failures

As illustrated earlier, it is difficult in practice to design a tax system that would reconcile neutrality and redistribution. However, in some cases, neutrality is not searched for—just the opposite, as the tax is then designed to correct market imperfections. Introducing nonneutral taxes may contribute to making markets more efficient.

a) Paternalist taxation

What is the difference between a social insurance contribution and a private contribution to a pension fund or a health insurance scheme? Both aim at protecting the individual against the risk of getting old without resources or of having to support costly medical care. The only difference is the compulsory nature of social contributions as opposed to free contributions to private schemes (and the choice between various schemes). Why, then, impose a public social insurance system financed through taxation? Two reasons may be put forward: equity, and individual myopia (or lack of rationality).

- *Equity*: A compulsory system allows for redistribution across individuals and better risk mutualization. For instance, the cost of a given illness is basically the same whether the patient is rich or poor. Leaving each individual responsible for his or her own insurance through the private system is therefore anti-redistributive, since the poor will pay relatively more, in proportion to their income. Some households may even not be able to pay for the insurance scheme. Having a single, compulsory system allows for cross-subsidization from the richer contributors to the poorer. It can also create incentives for the poorer to take costly preventive measures such as vaccination and consulting a doctor when sick, which has positive externalities on other individuals (lower risk of contagion) and on public finance (lower pressure on public-funded hospitals).

- *Myopia or lack of rationality*: If individuals are myopic, then they may not correctly insure against the various risks they incur. For instance, they may be overoptimistic concerning their ability to work during their old age or not well-informed about their life expectancy. Also, *financial illiteracy* is well-documented: most households do not master the basics of risk, return, and portfolio choice (Lusardi and Mitchell, 2007). In addition, it is well-known from behavioral economics that people exhibit dynamic inconsistency (see, e.g., Kahneman and Tversky, 2000, and Chapter 2 of this book). For this reason, the government may wish to force, or at least incentivize individuals to hedge against some risks. The same idea can justify policies aimed at encouraging households to save, for instance, through a tax exemption on voluntary contributions into pension funds or in some popular savings vehicles (e.g., life insurance) or through owning their house (exemption of mortgage interest payments).

These targeted tax exemptions, however, introduce distortions insofar as they modify the relative yield of the various savings vehicles, for instance, between investing in housing, bonds, or equity. Hence, a specific distortion (excessive preference for the present) is replaced by another one (distortion across savings vehicles).

In advanced economies, tobacco and alcohol are heavily taxed, notably on grounds of public health since individuals may not properly assess the risks involved in consuming too much of these items. Taxes are designed to make individual behaviors fit a "safe" behavior defined by the government.[38] In the same vein, the British government introduced a tax on soda drinks in 2016 in order to fight child obesity. Opponents of "fat taxes" argue that it is anti-redistributive; since sodas and fatty products are cheaper than healthy fruits and vegetables, they are consumed in larger quantities by the less wealthy households. Another way to encourage poor households to consume healthier food could be to reduce tariffs on agricultural imports because this would lower the consumer prices of farm products. More radically, some economists consider paternalism to be contrary to the freedom of choice, which is at the heart of free markets. Milton Friedman was the herald of this approach, as exemplified in the case of Social Security, in the following judgment:

> I believe that it is not the business of government to tell people what fraction of their incomes they should devote to providing for their own or someone else's old age. (Milton Friedman, "Social Security: The General and the Personal," *Wall Street Journal*, March 15, 1988)

It can be objected that paternalism does not go against individual freedom as long as it does not involve coercion (Thaler and Sunstein, 2003). Tax policy is well suited for this purpose, as long as the tax level is not confiscatory. Thaler

and Sunstein refer to *nudges* (i.e., small incentives to help individuals take the "right" decisions without, however, forcing them).

b) Environmental taxes

Whereas paternalist taxation aims at responding to households' lack of information or to their too-short horizons, environmental taxes implement the polluter-payer principle and aim to have polluters internalize the externalities they produce, along the lines of box 8.7. *Energy taxes,* which mainly aim at raising public revenue from a relatively less-elastic demand, need to be distinguished from *environmental taxes*, or *green taxes*, intended to curb the behavior of taxpayers. The former have traditionally been much higher than the latter, with wide differences across OECD countries (see figure 8.19). It should be noted, however, that, as discussed in Section 8.2.3, taxation is not the only way of having private agents internalize the cost related to their polluting emissions. In the European Union, the industry is covered by the Emission Trading System (ETS), which means that, rather than paying a tax for their carbon emissions, firms need to buy carbon emission on the cap-and-trade market. Some sectors (such as construction or vehicles) are

Energy ■ Motor vehicles and transport ■ Other*
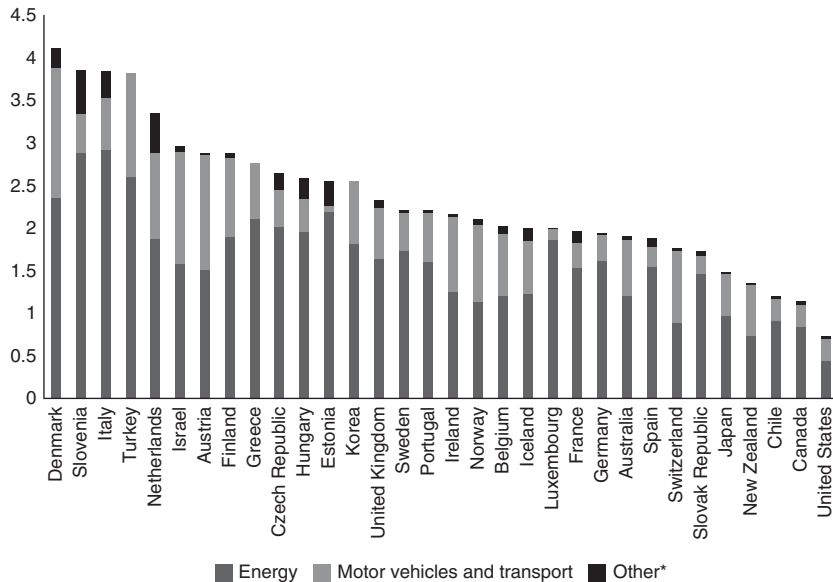
* Ozone depleting, water and wastewater, waste management, mining and quarrying, unallocated.

Figure 8.19 Environmentally related tax revenues in 2014 (% of gross domestic product [GDP]).
OECD.

covered by environmental standards. The coexistence of taxes, markets, and technical standards generates a wide variety of explicit and implicit carbon prices that make the reduction in carbon emissions especially inefficient (OECD, 2013).

How should the proceeds to environmental taxes be used? To the extent that their incidence is significantly on the producers (and not just on the consumers), environmental taxes will increase the costs of the polluting companies. Those in competition with foreign firms that do not support similar taxes will then need to be compensated for the sake of their competitiveness and the establishment of a level playing field. More generally, the political economy of green taxation suggests that the revenue of these taxes should be redistributed to the polluters themselves. Otherwise they will oppose the tax or propose voluntary contributions in order to rule out regulation or taxation (see Wilson, 1980). For instance, a carbon tax may be imposed on passenger transportation companies in proportion to their carbon emissions and returned to them in proportion to their passenger traffic. Individual companies would then be incentivized to reduce their carbon emissions, while the sector as a whole would not be submitted to higher taxes. Another way of compensating the polluting industries is through cutting taxes on labor, in order to reap a *double dividend* (see Section 8.2.3). Finland (1990), Sweden (1990), Norway (1991), Denmark (1992), the Netherlands (1996), Slovenia (1997), Germany (1998), and the United Kingdom (2000) have introduced simultaneously green taxation and a reduction of income taxes. These joint measures were revenue-neutral on average. In Germany, Denmark, and Sweden, the tax shift amounted to up to 1.1% of GDP (Andersen, 2010). However, empirical evidence on the double dividend is weak, especially since the welfare loss related to green taxes (e.g., through increased inequalities[39]) is not always accounted for (Mirrlees, 2011).

Environmental taxes can be extremely effective provided the tax rate is high enough. In 2002, for instance, Ireland introduced a heavy levy on plastic bags (0.15 euros per bag). By the end of the year, the consumption of these bags had fallen by 90% (OECD, 2007).[40] In 1991, a heavy tax on carbon dioxide and sulfur dioxide emissions was introduced in Sweden. The subsequent reduction in emissions exceeded 50%. In Norway, the carbon emission tax introduced in 1991 led to a reduction in corresponding emissions by 21% the same year.

By construction, however, success with a Pigovian tax reduces the revenue that can be expected from this tax. An emblematic example outside the environmental sphere is that of the *Tobin tax*, a small tax on capital flows inspired by Nobel Laureate James Tobin (1978)[41] that has been advocated by a number of nongovernmental organizations to limit the scope for speculation and, at the same time, raise revenues for less-developed countries. The two objectives are somewhat contradictory. Additionally, since financial turnover is highly mobile, imposing a tax on financial transactions in one country (or in a group of countries) is likely to move the activity to

another country. We'll come back to these coordination problems in the next section.

On the whole, the capacity of various countries to raise environmental taxes depends on the structure of the economy, the ability of the government to redistribute the proceeds appropriately, and social preferences, but also geographic factors. For instance, the size of the United States and its relatively low population density may explain why its citizens, confronted with large transportation needs, are attached to cheap energy and oppose energy taxes.

8.3.4 Tax cooperation

a) From competition to cooperation

The debate on tax competition opposes those who praise its positive effect on budget discipline and those who accuse it of distorting public choices and inducing inequality. The underlying paradigm behind the first argument is that of the *Leviathan government,* namely a partisan government moved by electoral objectives or dominated by an administration plagued by its own logic; the opponents, in contrast, believe in a *benevolent government* whose objectives coincide with social ones and are not taken hostage by the administration.

The European Union offers an instructive case due to the full mobility of goods, services, capital, and labor across the different Member States. Tax coordination within the EU is impeded by strong disagreements regarding the degree of desirable tax competition and by the unanimity rule governing tax issues. Somewhat paradoxically, the only example of strong coordination in the EU concerns VAT, even though it mostly affects immobile tax bases (see box 8.14). VAT harmonization has been viewed as a useful complement to the single market in goods and services, whereas capital tax harmonization was not initially viewed as a useful complement to the single capital market.

Cooperation on capital taxation has proved a long and painful process in the EU. A "tax package" was adopted in January 2003 that includes a "code of conduct" regarding detrimental practices on corporate taxation (for instance, tax rebates for foreign-owned companies) and full exchange of information across Member States on capital income after a transitory period. However, it took more than a decade and a financial crisis for the automatic exchange of information to become effective. Simultaneously, some initiatives have been taken in the area of corporate taxation, but again the discussions have proved difficult (box 8.15).

At international level, the OECD and G20 have launched the Base Erosion and Profit Shifting (BEPS) initiative, gathering more than 100 countries and jurisdictions. The BEPS initiative aims at setting an international tax framework to tax profits at the source of value creation. The initiative has developed

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Box 8.14 VAT in the European Union

VAT is the only tax subject to harmonization in the EU, as a complement to the single market. According to a 1977 directive, three different VAT rates are applicable in the EU: a standard rate (minimum 15%) and two reduced rates (minimum 5%). Some "super-reduced" rates (2–4%) can be seen as inheritances from the past to be progressively phased out, and some activities, such as financial services, are exempted from VAT. Reduced rates can be applied only to a limited list of subsistence items such as food or drugs. In 1999, the European Council extended the right to use reduced VAT rates for a strict list of labor-intensive services (small repairs, house renovation, house cleaning, domestic care, hairdressing) for an experimental period of three years in order to boost job creation in these sectors. The experiment was then extended several times, and, in May 2009, the Council allowed these exceptions to remain permanent. It is easy for Member States to argue that, because those services are mostly immobile across EU countries, cutting VAT on them is not harmful to other Member States, so the subsidiarity principle (see Chapter 3) should apply to them.

Within the EU, and with few exceptions, VAT is raised according to the destination principle; that is, it is raised in the country where final consumption takes place, at that country's prevailing rate. To reduce compliance costs for companies active in different countries, and to limit cross-border fraud, the European Commission has proposed a reform whereby the tax will be collected only in one Member State for each European company: goods will be taxed in the source country but at the rate of the destination country (the tax administration in each country will therefore collect the VAT for all EU countries and transfer the proceeds).

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targeted measures in 15 key domains such as the digital economy, controlled foreign companies (CFC) rules, interest deductions, and permanent establishment status.

b) Global taxation

When common public goods are identified (see Chapter 3), a common tax would appear appropriate. However, levying a tax at the international level would require adequate representation of the citizens. Three examples are developed here.

- *A European tax?* The EU budget, whose purpose is to finance common policies, is funded through Member States' contributions,

Box 8.15 Coordination on the Corporate Income Tax Within the European Union

In 1990, the "mother-affiliate" European directive tackled the double taxation of repatriated profits by a mother company from its subsidiaries. Member States are requested either to exempt repatriated profits or to deduct taxes already paid by the affiliates from the mother's tax bill (partial credit system). The objective was to avoid discriminating against foreign subsidiaries (taxed twice) in relation to local firms (taxed only once).

In 2001, the European Commission proposed a two-step strategy to remove remaining corporate tax distortions in the EU: on the one hand, to suppress specific distortions (for example, by extending the scope of the mother-affiliate directive); on the other hand, to harmonize and consolidate the corporate tax base across Member States through a *Common Consolidated Corporate Tax Base (CCCTB)* system (i.e., through consolidation and apportionment of the tax base).

Such an apportionment system is used in Canada and the United States. The European Commission has proposed to introduce it in the EU. According to the CCCTB, each Member State would be allocated a share of the single consolidated tax base of each multinational firm, according to an apportionment formula, based on physical capital, payrolls, employment, and sales. It could then tax this base at its own statutory rate.

In 2016, the Commission made a new proposal of a CCCTB, now organized in two steps: first, the harmonization of the tax base across the Member States; second, the consolidation and apportionment of the base. The first step will, however, make tax competition more transparent, hence more vigorous, which raises the question of coordinating not only the bases but also the rates. As for the second stage of CCCTB, the elimination of intragroup tax avoidance will be conditional on a proper definition of "permanent establishment" and of group structure (to avoid a group with intensive activities in a country avoiding the CIT thanks to its legal structure).

The Anti-Tax Avoidance Directive adopted in 2016 has introduced a number of anti-avoidance measures. For instance, a Member State is allowed to tax the profits parked in a low-tax country, the transfer of assets, and a share of interest payments (based on a fixed ratio of its earnings); it is also possible to tax some hybrid schemes that exploit national mismatches to avoid taxation. A *general anti-abuse rule* allows states to counteract aggressive tax planning in all other cases.

transfers of VAT revenues, and import tariffs. Even though the EU budget finances common policies, each Member State is tempted to calculate its net contribution (i.e., the difference between what it gives to and what it gets from the EU budget). This blocks any discussion on the characteristics of the budget in terms of allocation and of redistribution (Tabellini, 2003). If, as the Sapir report recommended in 2004, the European budget had to develop toward more redistribution (between rich and poor regions, between expanding regions and regions in conversion) and higher provision of government services (infrastructures, R&D), then it would be advisable to back the budget with a genuine European tax, paid by citizens or companies and not by states. In all logic, this tax should replace some existing taxes (because Member States would reduce their direct contribution to the EU budget, or companies would be permitted to credit the European tax on the national tax), and it should rest on a mobile base within the EU such as corporate income (because it would allow internalizing tax externalities). Along these lines, the "Monti group" presented nine reform proposals in January 2017, aiming at overhauling EU financing without increasing the contribution of Member States. In particular, they recommended replacing the current contributions based on national income with resources based on a European carbon tax, a common environmental tax (e.g., on fuel or other energy), a common CIT, a common reformed VAT, or a tax on the financial sector. The Report, however, specifies that the revenues forming the EU budget are unanimously agreed upon between Member States and can therefore not be qualified as "EU taxes."

- *A global wealth tax?* In 2013, Thomas Piketty proposed to introduce a progressive global wealth tax in order to limit the concentration of wealth in the world. The rate would start small but rise up to 10% annually for net worth in billions. The tax would incentivize the net wealth holders to make valuable use of their assets. Implementing such a tax would require international cooperation. For instance, countries accounting for the largest share of world output could establish a global registry of financial assets or impose sanctions on tax havens refusing to cooperate. Such cooperation could, however, be difficult to reach.

- *A Nordhaus tax?* Ambitious actions on climate change are undermined by the issue of free-riding since all countries will benefit from the efforts of a subset of countries. A Climate Club (Nordhaus, 2015) could provide an effective solution to this

problem and contribute to reach global climate targets. The idea is to establish a Club upon agreement of a few countries (the main polluters) to undertake harmonized emissions reductions centered on an international target carbon price. The target price could be met using a carbon-tax, cap-and-trade, or hybrid mechanism. The novelty of the Club scenario is the penalization of nonparticipants through a uniform *ad valorem* tariff on their exports into the Club region. According to Nordhaus, a relatively low tariff rate (e.g., 2%) would be sufficient to induce participation as long as the international target carbon price is not too high.

Notes

1. In this chapter, we speak of *government services* to designate all goods produced or services provided by governments (or, in some cases, public enterprises) whatever the justification (or the lack of it) for their public character. We reserve the expression *public goods* to goods and services whose consumption is neither excludable nor rivalrous, as defined in Chapter 2.
2. The "poll tax" was a flat community charge decided in the 1980s to replace a tax based on property values. The project was abandoned after the resignation of the Prime Minister. It was, however, replaced by a council tax based on property values but with regressive structure (Atkinson, 2015).
3. In Europe, contributions to health, old-age, and unemployment insurance are often called *social security contributions*, but, in the United States, the federal old-age insurance program is called *social security*. To avoid confusion, we speak of *social insurance contributions* rather than social security contributions.
4. In the Middle Ages, serfs would pay contributions in money and kind to finance the expenditures of the lords. The French Revolution introduced the notion of proportional taxes, but progressive taxation only appeared at the beginning of the twentieth century.
5. See Salanié (2003).
6. Property taxes are based on the market value of land and housing held by households, with a tax rate generally decided at the local level.
7. The CIT is levied on companies' profits, after tax allowances (such as accelerated capital depreciation, or R&D allowances) have been deducted.
8. As detailed in Section 8.3, the VAT is a tax on final consumption. Unlike a general sales tax, the VAT is paid at each stage of the value chain and then recovered on intermediate consumptions and investments. The fact that intermediate consumption is not taxed ensures that the same good is not taxed several times (as an intermediate consumption, then as a final consumption) and explains why this tax is named "value-added."

9. In some countries, personal income taxes on labor income are raised by the employers and transferred by them to the tax administration. Although the employer then pays the entire package of labor taxes, these taxes in fact bear on labor supplied by the workers.

10. The VAT is also subject to false claims for credit or refund, fictitious "invoice mills" (companies that are set up solely to generate invoices that allow for VAT credit or refund, whether the corresponding VAT has been paid or not), "carousel fraud" (within the EU, where company A imports goods from another member state and sells the goods to company B; the latter is refunded for VAT paid on its domestic purchases, while company A did not pay any VAT on imported goods and disappears before the tax administration can ask it for VAT received on its sales to B).

11. Similar analysis can be conducted on net wealth rather than income, generally showing more extensive and rising inequalities.

12. To compare income across households, statisticians take into account the number of persons within a household as well as their relative consumption levels. According to an equivalence established by the OECD, the first adult aged 18 and older represents one consumption unit, each subsequent adult aged 18 and older represents 0.7 consumption units, and each person younger than 18 accounts for 0.5 consumption units. A family composed of two adults and two children younger than 18 therefore represents 2.7 consumption units.

13. The net marginal tax rate is the marginal fall of net income (including the loss of means-tested transfers) following a marginal rise in primary income.

14. The quasi elimination of wealth taxes in the EU is consistent with these trends. In 2017, only France, Luxembourg, and the Netherlands still retained a wealth tax.

15. Hence, tax policy has common features with monetary policy where international capital mobility reduces the leeway for an independent monetary policy (see Chapter 7).

16. Partial and general equilibrium settings are explained in Chapter 1.

17. The concept of social loss is discussed in Chapter 1. A social loss appears when there is a fall in social welfare. In this section, social welfare is approximated by the sum of agents' surpluses. Producers' surplus is equal to aggregate profit. Consumers' surplus is the difference between the disposition to pay and the actual market price, for each unit of good. Last, the surplus of the public sector is equal to its tax revenue.

18. See Salanié (2003).

19. Consider two variables x and y. The elasticity of y to x is $(dy/y)/(dx/x)$, whereas the semi-elasticity is $(dy/y)/dx$. The concept of semi-elasticity is often preferred to that of elasticity when x may be close to zero (tax rate, interest rate).

20. There is also some evidence of a Laffer curve for corporate income tax, especially since multinational firms may shift profit abroad as the tax rate increases relative to the foreign one. See Clausing (2007) and Devereux (2006).

21. This striking result is based on data for 23,000 companies located in 10 countries over the period 1993–2003 (i.e., during a period of high capital mobility). In a

closed economy, Auerbach (2005) argues that capital owners may bear a large part of a corporate tax increase in the short run because the price of their shares is immediately reduced. In the longer run, the tax is borne by both corporate and noncorporate capital owners, as shown by Harberger (1962).

22. For a review, see Slemrod (1990). See also Auerbach and Hines (2002).

23. The polluter-payer principle is enshrined in the Rio declaration on environment and development by the United Nations in 1992. It is in fact very old. From the Middle Ages to the French Revolution, a so-called *pulverage charge* existed in Dauphiné and in Provence (France). This tax was charged by villages crossed by transhumant herds to compensate for the dust raised by their passage.

24. Other schemes are, of course, possible for regulating traffic in cities, such as granting access only to emergency vehicles and to buses and delivery vehicles during certain hours.

25. See IMF (2011), Farhi, Gopinath, and Itskhoki (2011).

26. The proposal was endorsed in 2016 by two Republican members of the US Congress, Paul Ryan and Kevin Brady.

27. This result contrasts with the "happy" tax competition theory (Tiebout, 1956), according to which each individual will relocate to the jurisdiction offering the combination of taxes and government services that are closest to his or her preferred basket: individuals "vote with their feet." Hence, tax competition will just eliminate ineffective jurisdictions.

28. *Rents* are excess profit related to limited competition or economies of scale. Taxing rents theoretically does not involve any efficiency loss, unlike taxing "normal" profit.

29. Surveyed by Hines (1999*b*, 2007), de Mooij and Ederveen (2001), Devereux and Griffith (2002), and Devereux (2006).

30. See, e.g., Malinvaud (1998), Sterdyniak et al. (1991).

31. For relatively high tax rates, $1/(1 + t) > 1 - t$, so t_{VAT} or t_{SC1} have a slightly larger impact on purchasing power.

32. As for PIT, households at the minimum wage are generally exempted.

33. This should be qualified, however. As suggested by the theory of tax incidence, capital income may *de facto* escape any form of taxation due to its high elasticity compared to other tax bases.

34. Conversely, the VAT base, which is limited to consumption, is generally not broad enough to finance a cut in social charges on a less than one-to-one rate variation basis.

35. See OECD (2016). For instance, the PIT in France is based on a family quotient, while Germany applies joint taxation and decreasing-in-income child allowances. Other countries with joint taxation or options for joint taxation are the United States (optional, married couples), Estonia (for married couples), Luxembourg (spouses and partners), Switzerland (married couples), Ireland (optional, married couples), Norway (optional), Poland (optional, married couples), Portugal (families), and Spain (optional, families). The individual tax systems of Denmark

and the Netherlands also include "joint" elements such as transferrable tax reliefs and allowances between partners.

36. See Piketty and Saez (2007).

37. See, for instance, Riphahn (2001) or Currie (2004).

38. The corresponding tax revenues are, of course, welcomed by the government. However, it should be noted that there is some contradiction between using such a tax to curb private consumption (which relies on high elasticity of consumption) and the wish to raise public revenue (which necessitates low elasticity).

39. A poorer household spends a larger share of its income on heating and transportation.

40. In the Irish case, retailers were obliged to fully pass on the tax to their customers.

41. After an old suggestion by Keynes (1936): "The introduction of a substantial Government transfer tax on all transactions might prove the most serviceable reform available, with a view to mitigating the predominance of speculation over enterprise in the United States" (Keynes 1936, chapt. 12, VI).

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