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Taxing high-income earners: tax avoidance and mobility

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Abstract

The taxation of high-income earners is of importance to every country and is the subject of a considerable amount of recent academic research. Such high-income earners contribute substantial amounts of tax and generate significant positive spillovers, but are also highly mobile: a 1% increase in the top marginal income tax rate increases out-migrations by around 1.5 to 3%. We review research into taxation of high-income earners to provide a synthesis of existing theoretical and empirical understanding. We offer various avenues for potential future theoretical and empirical research.

JEL Classification: H26, H31, K34, K42

Keywords: high-income earners, mobility, tax avoidance

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Moving to an open economy creates another avenue by which individuals might reduce or eliminate their income-tax burdens: they may move abroad.

Wilson (2009), p. 285

1. Introduction

Economic agents respond to a tax system by trying to maximise the trade-off between costs (i.e., paying tax) and benefits (i.e., social security, public goods, etc.). One way to reduce one's tax liability is to engage in tax avoidance. In the words of Piketty and Saez, "[we] can define tax avoidance as changes in reported income due to changes in the form of compensation but not in the total level of compensation. Tax avoidance opportunities typically arise when taxpayers can shift part of their taxable income [...] [to receive] a more favourable tax treatment" (Piketty and Saez, 2013, p. 417).

Modern tax systems are designed to redistribute amongst taxpayers and to reduce inequality in society. Hence, the tax burden is much heavier for high-income earners, who therefore have an especially strong motive to try to contribute less by engaging in tax avoidance. Such taxpayers could well be mobile, and inter-jurisdiction mobility has proved to be an effective way to avoid taxes both in the case of labour and capital taxation. In this way, mobility becomes a means through which avoidance can be carried out. High-income earners are more likely to also have the opportunity to avoid taxes: their cost of moving is often smaller than for other agents and the need for skilled labour has pushed many countries to compete through tax discounts to attract them. This chapter focuses, for the most part, on labour mobility – mainly of high-income earners – as this issue has recently received much attention in both the theoretical and the empirical economics literature.

The rigorous approach to normative taxation finds its foundation in the seminal papers of Mirrlees (1971) and Diamond and Mirrlees (1971). There, the main concern is to account for the distortion that taxation may produce on labour supply, and therefore on efficiency and welfare. However, the empirical literature could not identify a strong response to taxes, at least for the labour supply of white males. The idea that other factors are relevant took hold, therefore. Over the last five decades, the economic literature on taxation proposed increasingly rich models. The standard model of optimal taxation was quickly augmented with the possibility that tax payers do not comply and the tax authority responds by choosing the optimal level of enforcement. Allingham and Sandmo (1972); Yitzhaki (1974); Pencavel (1979); Reinganum and Wilde (1985); Chander and Wilde (1998) are just a few notable examples of such studies.

Feldstein (1995, 1999) are considered the seminal papers introducing the idea that the behavioural response to a change in taxation is not necessarily through labour supply and, therefore, that the empirically relevant component is the elasticity of reported income with respect to true (gross)

income. Saez et al. (2012) critically review the literature that analyses the behavioural response to changes in marginal taxation following Feldstein's intuition. The main idea is that agents respond to a change in the marginal tax rate through a variety of different channels other than labour supply, including the intensity of work, career choices, form of compensation (e.g., fringe benefits, stock options, pension plans), mobility and tax compliance. The aforementioned elasticity, without disentangling the different components, computes the total behavioural response to a change in the marginal tax rate.

Factor mobility is a key element that an optimal tax scheme cannot disregard. Under free mobility, any factor should tend to relocate where it is more productive. Mobility induces tax competition, for where factors locate depends on the comparison of net-of-tax returns. Hence, distortionary tax schemes combined with mobility may produce an inefficiency by affecting factor location choice. Furthermore, they may also affect tax proceeds, for outwards mobility erodes the tax base.

Labour and capital mobility differ in several aspects, which explains why the literature treats them separately. Capital – compared to labour – can be relocated more easily and at lower cost, although the cost of labour mobility may have decreased over the last decades. More importantly, the labour force (as opposed to capital) has location preferences that must be considered when computing equilibrium and the social optimum. Location preferences are orthogonal to productivity, which means that agents may face a trade-off between these. Factor productivity can only be observed ex-post. A specificity of labour productivity is that it depends on an ex-ante characteristic (skills) that is: (i) heterogeneous among individuals, (ii) unobservable by the tax authority, and (iii) possibly dependent on location. Skills may be correlated with the cost of mobility: arguments can be put forward in favour of either a positive or a negative correlation between skills and mobility costs. Empirically, it may be harder to track labour migration than to track capital migration (for instance, when agents are free to circulate amongst different tax jurisdictions, as for example within the Schengen area).[1]

The mobility of the labour force as a relevant factor in shaping the optimal tax schedule appears for the first time in the modern optimal (income) taxation literature with Wilson (1980). With this notable exception, the early literature mainly focused on capital mobility (e.g., Wilson, 1986; Zodrow and Mieszkowski, 1986). Keen and Konrad (2013), Keen and Konrad (2013), and Zucman (2013, 2014) provide an extensive review of the literature and a discussion of the issues related to firm mobility, tax competition, and tax avoidance. Labour mobility has been mainly (and extensively) considered in the literature as a consequence of wage differentials (net of local amenities and welfare benefits). Borjas (1999) provides a survey of this literature. Part of the empirical literature focuses on tax-induced mobility within a federal country: the cases of Canada (Day and Winer, 2006), Switzerland (Kirchgassner and Pommerehne, 1996; Liebig et al., 2007) and the U.S. (Feldstein and Wrobel, 1998; Young and Varner, 2011) have been considered. However, the question of how taxation has affected

1 International tax avoidance may be reduced by means of international cooperation and information sharing (see, e.g., Keen and Ligthart (2006) for more on this point).

international mobility is quite new to the literature.

International labour mobility has changed substantially over the last decades, mainly because of a sharp decrease in its cost. Globalisation has reduced both the psychological cost of emigrating (because countries are increasingly similar to each other), and the cost of adapting to a new working environment (because production processes have become more homogeneous, language skills have improved significantly, and barriers to entry have fallen – especially within OECD countries). Meanwhile, several countries started to offer tax-discounts to skilled immigrants: the Beckham law in Spain (the eponymous football player was one of the most famous people to benefit from it) is only one example. The list of European countries that offer (or have offered) tax reductions to skilled immigrants also includes, among others, Belgium, Denmark, Finland, Italy, the Netherlands, Romania and Sweden. Such special regimes increase tax competition and the opportunities for tax non-compliance. Their popularity amongst policy makers explains the growing interest in the literature on the mobility of high-skilled workers. In this analysis we provide an overview of the most well-known contributions to the study of the impact of mobility, given that it is an important potential source of tax avoidance and that it has a major impact on the optimal design of national tax laws.[2]

Labour force movements are not easy to be tracked, especially – but not only – when it comes to high-skilled workers with appointments in different tax jurisdictions. This implies that mobile workers can enjoy an informational rent that can be exploited to reduce the tax burden. Indeed, when location (or time spent in a jurisdiction) is private information, tax arbitrage and tax avoidance can increase whenever there are differences across countries in the tax legislation. Osmundsen (1999) models precisely this framework. In his model, skills and time abroad are not observable by the tax authority, and therefore both moral hazard and adverse selection problems arise, with the immediate consequence that workers obtain an informational rent and distortions are generated. However, with a continuum of types, the results differ from the well-known ones of the standard principal-agent model in that distortions occur both at the top and at the bottom of the skills distribution, while the decision of the agent with the average skill level is not distorted. This is due to the presence of countervailing incentives by skilled agents who have an incentive to pretend that they are both very mobile and unskilled, although mobility is assumed to be increasing in skills.

Even when mobility is not observed in equilibrium, agents may be very mobile and simply decide not to move because the local tax authority is able to retain them through an attractive tax scheme. From a global perspective, mobility is welfare enhancing when it relocates production factors towards where they are more productive (although optimal relocation should account for some possible tensions between individuals' productivity and location preferences). However, any mobility

2 Mobility may certainly be an instrument to avoid taxes. Its consequences, however, impact several domains of the economy that are not related to taxes. The literature on the so-called brain drain developed in the late 1960s (see, for instance, Adams, 1968). While the early literature focused on the cost of emigration for those countries that lose their skilled workers (e.g., Miyagiwa, 1991), some more recent contributions point out that the opportunity for skilled workers to emigrate may also become a relevant incentive for young people to invest in education in developing countries (Beine et al., 2001).

that is induced (or restrained) by taxes is likely to imply an inefficient distribution of factors and, therefore, to lower total welfare. Nevertheless, it may be welfare maximising for an individual country to attract some agents by offering a suitable tax scheme, although this puts at risk the ability of other countries to collect taxes.

Before moving, in section 3, to the introduction of the simplest theoretical framework that can be used to study mobility, section 2 presents a feature of mobility that is yet to receive much attention in the literature but that will have a major impact on any model's policy recommendation.

2. Objective function: whom should we care about?

When it comes to mobility, and in particular to the design of optimal tax schemes and optimal policies, the first problem to solve consists in agreeing upon the objective function that the jurisdictions maximise, that is, their Social Welfare Function (SWF).

A mobile labour force can only be conceived within a multi-jurisdiction framework. The issue with multi-jurisdiction frameworks is that the perspective (i.e., the objective function) matters. To fully understand the problem, let us first consider a federation of states, such as the U.S., with mobility amongst the different states. In such a case, it may be natural to think that we want to maximise the total welfare of the whole population, regardless of their initial and final location. However, when facing a group of neighbour and independent countries, each of them designs its own "optimal" tax scheme, accounting for mobility, disregarding spillovers and externalities on other countries, and adjusting its own strategy, so as to best respond to the others' choices. In such a framework, regardless of the type of interaction among states (sequential, simultaneous or non-strategic decisions), a relevant issue is deciding whose utility should enter the social welfare function. Four different principles can be identified:

1. *citizens principle*: all and only citizens count in the SWF, and this regardless of their location
2. *residents principle*: all and only residents count in the SWF, and this regardless of their citizenship
3. *resident-citizens principle*: only inland (resident) citizens count in the SWF. Citizens living abroad are excluded.
4. *citizens and immigrants principle*: all citizens and all foreign residents (immigrants) count in the SWF.

The choice of principle may crucially affect outcomes. To fully understand this point, we consider some extreme cases. Suppose that the state authority has a Rawlsian welfare function and compares the optimal strategy when either the *citizens* or the *residents principle* is adopted. In the former case, poor agents negatively affect the value of the SWF, regardless of their location choice. The authority will try to transfer them as many resources as possible. If we consider that redistribution may be easier to implement when agents reside within the country, such an authority would either be indifferent or prefer poor agents to stay in the country. The opposite is true when the *residents*

principle is adopted. When poor agents emigrate, they disappear from the SWF count, which means that an inexpensive way to increase Social Welfare would simply consist of letting the poorest in the population emigrate.

This example shows the relevance of the choice of welfare function for the authority. A normative analysis of mobility would probably call for the maximisation of global welfare; hence, we would expect the planner to consider all agents' well-being. However, tax authorities operate at the tax jurisdiction level, usually without cooperating with neighbouring jurisdictions. Any positive analysis needs therefore to introduce some assumptions on the objective function of the tax authority, and such assumptions may lead to opposing policy recommendations. The choice of the objective function is fully arbitrary: it should be considered as a political, ethical and cultural choice with no economic grounds but with important economic consequences.

In the two-skill model in Hamilton and Pestieau (2005), decisions are taken by majority voting, hence the tax authority is controlled by the largest skill-community within the jurisdiction. When low-skill agents represent the majority in a jurisdiction, the tax authority is therefore maximising a Rawlsian (i.e., maximin) social welfare function. In the opposite case of a majority of skilled agents, decisions reflect the preferences of the most productive agents in the economy and the authority follows a maximax social welfare function. In both cases, voters maximise their own utility, which means that they follow the residence principle. Osmundsen (1999) analyses the location decision of agents that can allocate their working time between two jurisdictions. The tax authority is unable to observe their location decision: indeed, the authority only observes domestic income. In the model, all agents are resident-citizens, although they may spend part of their time abroad. The authority's utilitarian social welfare function accounts for the utility of all citizens, considering homeland public good pro-vision and agents' total consumption, therefore, it includes citizens' foreign income. Simula and Trannoy (2012) and Lehmann et al. (2014) also study the optimal taxation scheme under the threat of migration. The authors compare the results under different Rawlsian SWFs. In particular, they consider the *citizens*, the *residents* and the *resident-citizens* principles. Simula and Trannoy (2010) also consider a Rawlsian SWF, and focus on the *residents* principle. To avoid the government's perverse incentive to push all the unskilled out of the country discussed previously, they include a participation constraint in the government's maximisation problem, according to which the authority must ensure that none of its citizens will want to leave the country.

3. Theoretical framework

In the literature on tax-induced mobility, the basic structure of the model can be summarised as follows: two competing countries *A* and *B* are inhabited by economic agents who are identical in all aspects except productivity, which is defined by the parameter $\theta \in \left[\underline{\theta}, \overline{\theta}\right]$. The density of agents of productivity θ resident in country *A* is $\varphi(\theta)$: this distribution coincides with the initial probability distribution if there is no mobility, while it differs from it if some agents migrate. In the simplest case (e.g., Hamilton and Pestieau, 2005), productivity is binary, with a group $\underline{\theta}$ of unskilled agents, and

another one $\overline{\theta}$ of skilled. Each country is assumed to be able to only tax residents.[3]

The agent's utility function, *U*, depends on their type, location, and consumption level $x = [1 - T(y)]y$, where *y* is gross income and $T(y)$ is the tax function. Taxes are usually considered as a redistribution device only, in which case the tax authority's budget constraint requires that the sum of all the taxes is zero (hence, that some agents receive a subsidy): $\int_{\underline{\theta}}^{\overline{\theta}} T(\theta)\varphi(\theta)d\theta = 0$. The basic model can be extended to allow for the production of a publicly provided good or service (possibly a public good), in which case the tax authority needs to collect a fixed and positive amount. In the presence of a pure public good, non-rivalry implies that the per-capita cost is decreasing in the number of agents residing in a country. However, in the case of a rival good, a larger population would affect the budget constraint of the tax authority, or the quality of the provided good.

Before analysing the shape of the utility function, we note that an agent who has to decide where to locate will base his/her decision on the comparison between his/her total utility in either country, that is, (s)he will locate in country *A* if and only if $U_A \geq U_B$. This means, in practical terms, that the location decision depends on the total utility of an agent and not on the marginal one. This binary choice occurs when agents reside in only one country. A notable alternative is proposed in Osmundsen (1999), where agents share their time between two jurisdictions, and therefore their location decision is based on the marginal tax rate.

The standard model assumes that the production function exhibits constant returns to scale (CRS), and that agents are paid at their marginal productivity $f(\theta)$. An agent's productivity may depend on the location. For instance, it may be that an agent is less productive abroad. Furthermore, there may be some costs of moving: adaptation costs, learning the language, etc. The loss in productivity and the displacement costs may be independent of the skill level, or they may be either positively or negatively correlated with it. All the costs related to moving, including any location preference, may be summarised in the cost of moving function $C(\theta) = c_0 + c_1 V(\theta)$, where $V(\theta)$ is a generic function that describes the variation in the cost of moving depending on agent type. Then, an agent locates in country *A* (rather than moving to *B*) if $U_A(\theta) \geq U_B(\theta) - C(\theta)$. Clearly, if $c_1 = 0$ then the cost to migrate is orthogonal to skills. From the previous equation, we can define $R(\theta) = U_A(\theta) - U_B(\theta) + C(\theta)$ as the location rent, that is, the utility differential of an agent of type θ who does not migrate.

One important difference with the standard closed-economy taxation models is that an agent's average tax rate also plays a role: indeed, the location decision depends on the total level of utility and hence on the total (or average) tax burden. Suppose that the two countries are perfectly symmetric, and that agents' labour supply is constant (that, is, agents do not choose labour/leisure optimally). Then, all that matters for an agent is the average tax burden. Accordingly, in the unique equilibrium with symmetric countries the average tax paid by an agent of skill θ is the same

3 Bhagwati (1976a,b) proposes a model of international taxation in which countries tax their citizens on their income generated abroad. The difficulties in enforcing such a model may account for why almost no country has ever implemented it, the U.S. being a notable exception.

regardless of their location. The standard optimal-tax rule in a closed economy depends on the marginal tax rate. Allowing for mobility, the marginal tax rate matters as soon as agents must decide their labour supply. Again, if the two countries are symmetric, in equilibrium the optimal marginal tax rate is the same in the two countries (given agents' skill). However, this does not need to be true when asymmetries are introduced, e.g. when some agents face a cost of moving, or when they are not equally productive abroad. For instance, if an agent of skill $\tilde{\theta}$ has a productivity $\tilde{\theta}$ at home but $\alpha\tilde{\theta}$, with $\alpha < 1$ when abroad, clearly the domestic country can safely increase the tax burden of this agent, who nevertheless will not leave the country.

Hamilton and Pestieau (2005) and Bierbrauer et al. (2013) consider the case of countries competing against each other, all acting strategically. However, most of the theoretical literature (e.g., Wilson, 1980; Simula and Trannoy, 2010, 2012; Lehmann et al., 2014) focuses on the simplified framework of one country (without loss of generality, country *A*) that chooses the optimal tax function, assuming that country *B* adopts a fixed policy, which is often assumed to be *laissez-faire* (i.e., no redistribution).

As discussed in section 2, the social planner's objective function plays an important role in the design of the optimal strategy. Hamilton and Pestieau (2005) consider the case of a Rawlsian planner, the case in which the utility of the bottom-earners is maximised, and finally the utilitarian case. Wilson (1980) and Bierbrauer et al. (2013) restrain the SWF to be a weighted sum of utilities, but while Wilson (1980) uses the citizens principle, the planner in Bierbrauer et al. (2013) accounts only for the utility of residents. Simula and Trannoy (2010, 2012) and Lehmann et al. (2014) focus on the case of a Rawlsian welfare planner who cares only for residents. This should imply that the social planner's best strategy is to push all the unskilled agents to leave the country, as previously explained. In Simula and Trannoy (2010, 2012), the authors avoid this perverse equilibrium by introducing a participation constraint in the social planner's maximisation problem. The participation constraint implies that the planner must ensure that all citizens are willing, in equilibrium, to locate in the home country. Using the previous notation, the participation constraint imposes the condition $R(\theta) \geq 0$ for any and all θ. In Lehmann et al. (2014) some agents have an infinite cost of moving, and so will never migrate, regardless of the tax function chosen by the Rawlsian social planner (who therefore has no shortcut to increase social welfare).

Simula and Trannoy (2010) show that the Mirrlees (1971) results are no longer valid when agents are mobile. In particular, when the participation constraint is binding (i.e., $R(\theta) = 0$) the planner must reduce the tax burden to avoid migration. Analysing the optimal tax formula in Simula and Trannoy (2010), we notice that an increase in the marginal rate of tax at a given level of productivity becomes more costly when some agents are mobile. The standard result implies that a marginal increase in the tax rate for agents with productivity $\tilde{\theta}$ generates an increase in tax proceeds due to the higher rate, that in equilibrium is compensated by a decrease in proceeds due to their elasticity of labour supply. However, in a mobile-labour framework the increase in the tax affects the average tax burden of all agents with skill $\theta \geq \tilde{\theta}$, hence it becomes more costly to retain those agents. As a consequence, the optimal tax rate at all productivity levels is affected by mobility. In the words of the authors "two

qualitative features of the closed-economy optimal marginal tax rates are lost: they can be non-positive at interior points and strictly negative at the top. Consequently, individual mobility does not only render the tax schedule less progressive, but can also make the tax liability decreasing with gross earnings" (pp. 164).

Lehmann et al. (2014) advance further in the understanding of the shape of the optimal tax schedule in the presence of mobility. Denoting $\eta = \frac{\partial \varphi(R(\theta),\theta)}{\partial R(\theta)} \frac{1}{\varphi(R(\theta),\theta)}$ as the semi-elasticity of migration, the authors show that the optimal tax schedule implies that $\frac{T'}{1-T'} = \xi \frac{X(\eta)}{\varphi}$, where ξ is the ratio between the elasticities of gross earning with respect to productivity (θ) and the retention rate ($1 - T'$), while $X(\eta) = \int_{\theta}^{\overline{\theta}} (1 - \eta T)\varphi(\theta) d\theta$ is the intensity of the tax liability effects for all skill levels above θ, that is, the overall impact – through the average tax rate – of a change in the tax level at productivity θ for all agents with productivity above this level. Lehmann et al. (2014) show that the shape of the tax schedule is hence characterised by the semi-elasticity of mobility (as opposed to its elasticity). Even under a monotonicity assumption on the elasticity (increasing in productivity), the semi-elasticity can be increasing or decreasing, and this factor determines whether the marginal tax rates are always positive or if they become negative at the top of the skill distribution.

The results in Lehmann et al. (2014) represent a challenge for the empirical analysis of top-earner mobility. Indeed, even the most recent analyses of Kleven et al. (2013, 2014), which are reviewed in section 4, study the elasticity of mobility. A new empirical approach, based on the semi-elasticity is therefore compelled.

3.1. Productivity

A maintained assumption in the theoretical literature on optimal taxation under mobility is that the production function exhibits CRS and there are no peer effects or spillovers. This is the case in, among others, Wilson (1980); Osmundsen (1999); Hamilton and Pestieau (2005); Simula and Trannoy (2010) and Lehmann et al. (2014).

These assumptions, combined with the competitive labour market assumption that implies that wages are equal to marginal productivity, are at odds with what is observed empirically. Indeed, especially when thinking of highly skilled workers, it is natural to expect some bar-gaining power at the wage negotiation stage. Furthermore, skilled workers are likely to be highly productive, to produce positive externalities (by increasing others' productivity), and possibly to modify the internal labour demand (displacement effect).

These factors are particularly important in the context of tax avoidance: the empirical results in Kleven et al. (2014) suggest that both employers and employees enjoy some market power and that mobile highly-skilled workers bargain for their wage. Within this framework, any difference between the tax systems of different jurisdictions alters the bargaining power of agents. Indeed, any opportunity to avoid taxes or to change the after-tax wage of an agent inevitably affects the willingness to accept a contract of a worker and his/her willingness to relocate. In the context of

high-skilled workers (but without considering mobility) Kreiner et al. (2016) show, for instance, clear evidence of intertemporal bargaining that allows tax-avoidance.

Either a non-linear production function or the presence of peer effects and spillovers would affect workers' productivity and wage and thereby impact upon both the level of mobility and mobility-related tax-avoidance. Meanwhile, the positive effects of the brain drain (to those where brain drains towards) make governments willing to compete harder to attract skilled workers. This is likely to result in tax policies that allow top-earners to avoid taxes in their origin country.

The theoretical literature on optimal taxation with mobility and tax avoidance or evasion should explore the consequences of relaxing the assumption of competitive labour markets. Our guess is that peer-effects and increasing returns to scale amplify the negative impact of mobility for countries that are not able to reach a sufficient mass of skilled agents, and relax the constraint for those countries that are able to attract the most productive agents.

4. Empirical literature

Mobility – or at least its threat (Brueckner, 2003) – is largely ignored in the empirical work on taxation, despite being a key issue for tax policy design. Empirical analyses are crucial to estimate the real response of taxpayers, which can then be used to calibrate optimal tax income formulae (see, e.g., Slemrod, 2010, section III.A). In this section, we focus on the empirical analysis of two issues related to individual taxation and mobility.

The first issue concerns the relocation of taxpayers. High levels of mobility erode the tax base of sovereign governments. This effect is amplified by the fact that capital and high-skill workers are the most mobile factors of production. Therefore, mobility constraints the ability of the public sector to redistribute income, with the consequence that, in the long run, taxes tend to be borne by the most immobile factors: that is, workers instead of capital, and in particular, low skilled workers. It should be noticed that the movement of both capital and labour will be a function of "effective" tax rates, which may differ from statutory tax rates when accounting for differences in the level of enforcement in alternative jurisdictions.

Subsection 4.1 reviews the most recent literature that has estimated the elasticity of mobility for top-earner taxpayers due to statutory tax differentials. The focus is on individual mobility, as opposed to corporate mobility, and in particular on labour income. The empirical analyses estimate the degree of mobility of relatively rich taxpayers, which are usually assumed to be the most mobile within the population. Therefore, the estimated response of this group of taxpayers should reasonably constitute an upper bound, and so be indicative of the importance of mobility for tax policy design. This group of taxpayers is a relevant target for the public sector in terms of tax collection but are also a potential source of economic spillovers within a jurisdiction, for they are likely to be the most skilled agents. This explains the preferential tax regimes that some countries have enacted to attract this taxpayer group. Indeed, these preferential tax regimes constitute an interesting source of tax policy variation for identification purposes.

The second issue concerns the difficulty of enforcing the residence-of-the-taxpayer principle (henceforth RTP). Mobility makes it difficult to tax revenues: leaving aside tax havens, taxing income obtained outside the jurisdiction under the RTP principle crucially depends on the existence of information sharing among tax administrations both at an international level and within federations with independent federal tax administrations. In section 4.2, we focus on the importance of cooperation and data sharing amongst tax administrations in order to guarantee the effectiveness of tax enforcement and to reduce the possibilities of tax avoidance.

4.1. Mobility elasticity

It is widely accepted in the literature that labour migration is a non-negligible phenomenon, and that its extent may vary depending on several factors, including the regional area and the skill level (Acemoglu, 2002; Bhagwati and Hanson, 2009). This constitutes a major obstacle to any empirical analysis, for results may lack external validity when the sample is homogeneous, while results may be diluted when the sample is broader.

The most recent literature on mobility and/or on top-income avoidance has focused on homogeneous groups of agents. For instance, Kleven et al. (2013) consider football players, Kleven et al. (2014) and Kreiner et al. (2016) look at top-income earners in Denmark, while Akcigit et al. (in press) and Moretti and Wilson (2015) focus on scientists and inventors. Some studies focus on one country (e.g., Liebig et al., 2007; Kleven et al., 2014; Moretti and Wilson, 2015; Kreiner et al., 2016), while others consider several countries (e.g., Kleven et al., 2013; Akcigit et al., in press). Despite the very different setting and the differences in samples, the results in terms of the mobility elasticity of top-income tax payers are non-negligible and quantitatively similar across studies.

The analysis of Liebig et al. (2007) considers tax-induced mobility within Switzerland and shows that tax-related mobility varies significantly by age and education. In particular, younger, educated agents tend to be more mobile. This is not surprising, because young age and education are both likely to be correlated with lower costs of mobility, furthermore, education is likely to be positively correlated with wages. Therefore, the expected net-gains from mobility are larger for them.

“Superstars” are another category of agents for whom mobility is likely to be particularly high (Rosen, 1981). This category includes football players. The so-called Bosman rule (1995) significantly reduced barriers to movement within the European Union for any worker, and in particular for professional football players. Furthermore, extensive cross-country differences in tax policies (from preferential tax regimes to variation in tax rates) make this labour market especially suitable to analyse the impact of taxation (personal income tax, payroll tax and VAT) on mobility. Kleven et al. (2013) show extensive empirical evidence about how taxes have affected the allocation of football players in 14 European countries since 1985.

A different category of top-income earners are innovators and scientists. This group is analysed by Akcigit et al. (in press) and Moretti and Wilson (2015). Both focus on star inventors. Scientists are ranked according to their patent productivity. While Akcigit et al. (in press) uses data both for north America and Europe, Moretti and Wilson (2015) focus on inter-jurisdictional migration within the

U.S. Innovators, in Moretti and Wilson (2015), are assumed to relocate as a consequence of differences in state personal-income tax rates (neither consumption taxes nor other local taxes are considered, although there might be differences between states), controlling for differences in amenities, wages and shocks that might also condition location. The labour supply of star scientists is the share of star scientists of a given origin state who move to another state, compared to all those who remain in the origin state. Firms represent the labour demand side, for their production function requires them to employ a scientist. Labour demand variations are therefore computed as the percentage of firms moving from a given origin state to a given destination state with respect to those remaining in their origin state. Labour supply is a function of wage and productive amenity differentials between states, but also of corporate income tax rate differentials. In equilibrium, demand and supply of scientists must be equal. From this equilibrium condition, the authors derive the reduced model to be estimated, which includes all variables conditioning both supply and demand. This model is then used to estimate the impact of corporate income tax and personal income tax differentials on location between pairs of states.

Kleven et al. (2013) examine the fraction of foreign football players as a fraction of the total number of players playing in the top league of a country. They show, by means of a cross-country correlation analysis, that immigration depends on top tax rates (the results are independent of whether marginal or average tax rates are employed), with an elasticity of 1.22.[4] Before the Bosman rule – which liberalised the market for footballers in such a way that it eliminated the quota of foreign players per team – this elasticity was not statistically different from zero.

Although the pre-Bosman period looks a good placebo test to identify the particular effect of taxes on mobility, these authors provide further empirical evidence for the purpose of identification. In particular, they take advantage of preferential tax regimes enacted in two countries, Spain and Denmark. From 1st January 2004 foreign workers (not only football players) moving to Spain could opt for a preferential flat personal income tax rate of 24% (for up to 5 years) instead of the standard tax piece-wise schedule with marginal rates (and also average rates, for top income earners) that exceed 40%.[5] To be eligible, workers could not have been Spanish tax resident within the previous 10 years. Similarly, Denmark enacted a preferential tax regime for foreign taxpayers in 1992. Individual taxpayers (re)locating in Denmark – including native taxpayers having lived for up to three years outside the country – with earnings approximately at the 99th percentile of the distribution of individual earnings and with most of their work within the Danish borders would enjoy a 30% flat tax rate for a period of up to three years. Absent this preferential tax regime, these taxpayers would face an average tax rate of around a 60%. Therefore, both tax regimes constitute a quasi-experiment, which is an ideal setting to test for the sensitivity of (top) taxpayers to tax differentials.

4 As is common in this literature, the variables are expressed in logs to estimate an elasticity; this is why, in order that the log of the tax rate be defined at zero, the authors work with the net-of-tax rate. This point also applies to the other papers we review.

5 This so-called “Beckham” law was revoked in 2010.

The empirical analysis for each one of these two countries follows a difference-in-difference approach before and after the reform, and is estimated by two-stage least squares. The endogenous variable is the same as in the cross-section analysis of Kleven et al. (2013), the treatment group is the country under analysis (Spain or Denmark), and the control group is obtained using the synthetic control approach of Abadie et al. (2010). In Spain, the estimated elasticity is around 1.5 for top football players (defined as those that at least have played once for their national football team). In Denmark, again for top football players, the elasticity is twice the elasticity obtained for Spain, 3.01, which can be explained by the observation that prior to this reform the number of foreign players in the Danish league was very small.

Finally, these authors estimate a multinomial logit regression model for the post-Bosman period exploiting simultaneously all sources of variation in top earnings tax rates in all 14 countries over time, and using micro data. The elasticity obtained is around one. For domestic taxpayers, the elasticity with respect to the net-of-tax rate is much smaller, 0.15, which is consistent with the fact that most of these players play in their home country.

A similar difference-in-difference analysis using two-stage least squares is Kleven et al. (2014). The authors take advantage of the Danish quasi-experiment, but they consider all top-income earners in Denmark instead of focusing on football players. This preferential tax regime, that has been created to attract top taxpayers, provides an ideal setting to analyse mobility due to taxation for high-income earners. The treatment group is composed of those foreign taxpayers with earnings above the threshold set in law, while the control one consists of those foreign taxpayers with earnings between 80% and 99% of the threshold. The authors employ alternative definitions of the endogenous variable, as the number of foreigners, the number of arrivals, and the number of foreigners with less of three years of presence in the country. They obtain elasticity estimates of between 1.5 and 2; the long term elasticity (1992-2005) being slightly higher than the short term elasticity (1992-1996).

To get an idea of its quantitative meaning, for the lower bound of the estimated elasticity, this means that a 1% decrease of the tax rate (from 60% to 59%) implies a 3.8% increase in the number of foreign taxpayers. This is quite a high response, but compatible with what is observed in the data, for after having decreased the tax rate by up to 30%, the number of foreign taxpayers slightly more than doubled. Using the standard formula for the linear tax rate, τ, that maximises revenue from this group of taxpayers, $\tau = (1 + \varepsilon)^{-1}$, the revenue-maximising (effective) tax rate would be between 0.4 (for an elasticity, ε, equal to 1.5) and 0.33 (for ε = 2).[6] These tax rates are not far from the effective tax rates that once residing in the country these taxpayers should pay, which includes not only the personal income tax rate, but also consumption taxes.

6 Note, though, that according to the theoretical framework developed by Lehmann et al. (2014), to obtain optimal tax formulae it is necessary to estimate the semi-elasticity of migration, defined as the percentage change in the mass of taxpayers of a given skill level when their consumption is increased by one unit, which cannot be derived from the elasticity of migration. This will therefore require further empirical analysis.

From the two studies on inventors we learn that their elasticity is comparable to the one of the Danish top-income earners and, therefore, slightly below the one of football players. This could be explained by either unobserved idiosyncratic differences, or maybe by the difference in age (football players are likely to be younger than inventors), income levels (likely to be larger for football top players) and in the expected flow of income (likely to be spread over a longer period of time, in the case of inventors). In the case of Akcigit et al. (in press), the estimated elasticity of top inventors is around 1.3, while Moretti and Wilson (2015) obtain an elasticity of 1.6 for personal income taxes, that is, a 1% decline in after-tax income in the destination state relative to the origin state is associated with a 1.6% increase in the number of star scientists who leave the origin state and relocate to the destination state. Or to make it comparable with the previous calculations, if California decreased its 2010 marginal tax rate from 9.5% to 8.5%, it would obtain a 1.8% net increase in star scientists.

This estimated elasticity, as previously mentioned, is in the range of values obtained by Kleven et al. (2013). Thus, not unreasonably, the revenue-maximising personal income tax rate, which includes the federal income tax rate, is similar to the one obtained for Denmark. As the impact of tax differentials on mobility are typically higher within a country (namely, the US) than across countries, one might expect this elasticity to be higher than the (cross-country) elasticity measured for Denmark. In spite of the similar findings, we note that the two empirical analyses may not be fully comparable: Moretti and Wilson's results are obtained using the marginal tax rate instead of the average tax rate, and in any case, the response of star scientists does not have to be representative of the response of all top-income taxpayers.[7] It is also interesting to notice that the analysis of the inventors' behaviour allows one to observe a decrease in mobility along the inventors' fame. For corporate income taxes, they estimate an elasticity of 2.3.

In all the papers reviewed, despite following slightly different empirical approaches, the estimated response of top-income workers to differences in tax levels is substantial, being between 1 and 2. This mobility undoubtedly tames the capability of sovereign governments to expand the size of the public sector, or at least to pursue a complete redistributive policy, as the mobile factors are precisely those at the top of the income distribution. Empirical results at the international level and within a federation are similar. However, still further empirical analyses would be interesting to confirm the robustness of these results and gauge potential heterogeneity. For example, it would be interesting to ascertain whether all taxes (payroll, personal income or VAT) have the same effect on mobility, whether the elasticity is higher for small countries (the result obtained for Denmark vs. Spain regarding football players might point to this) or whether these preferential tax regimes are justified on the grounds of the spillover effects top-income taxpayers might generate on the national or on the regional economy. All these pieces of information should be useful for a better design of tax

7 In particular, inventors may consider spillovers from other inventors when deciding their location, and furthermore the labour demand for a very specialised research profile may not be uniformly distributed over the country. It may then be that a top inventor has more location restrictions than an average top-income earner.

systems.

4.2. Tax Enforcement

The above-mentioned papers estimate large responses of taxpayers relocating from one jurisdiction to another due to tax differentials. As previously suggested, though, mobility might not only be a threat for sovereign jurisdictions due to differential statutory parameters, but also due to differentials in the level of tax enforcement. If mobility were only caused by differences in statutory tax parameters then to maximise global welfare tax harmonisation would be called for, so as to avoid beggar-thy-neighbour policies (see, e.g., Kanbur and Keen, 1993). In the absence of a common tax administration, however, observability and enforcement difficulties with respect to the setting of a harmonised level of tax enforcement might make it impossible for independent tax administrations to credibly commit to a coordinated policy in order to avoid the negative effects of beggar-thy-neighbour policies (Cremer and Gahvari, 1997, 2000).

The empirical relevance of this setting has been recently tested by Durán-Cabré et al. (2015). In contrast to the previous papers, due to the lack of data on physical mobility for a sufficiently long time span, these authors test to what extent the tax enforcement policy of a region is affected by the enforcement policy carried out by its competitors identified by the neighbouring jurisdictions. The analysis is carried out for Spain, where regions administer the inheritance and gift tax (IGT). Up until 1997, regions were only responsible for administering the tax, but since then – and especially from 2002 on – they gained the power to modify legal elements of the IGT. There is anecdotal evidence about the incentives that this has provoked on mobility of tax bases across regions. To test to what extent (the threat of) mobility conditions tax policy, the authors estimate a spatial autoregressive panel model. Results point to the existence of interdependence in tax enforcement, such that a region decreases its tax auditing probability by around 0.6% if its neighbouring jurisdictions decrease their tax auditing probability by 1%. Thus, implicitly, regions are encouraging tax evasion as a way to attract tax bases. This interdependence in tax enforcement – albeit still present – became less important when regions also achieved legal tax power after 2002. That is, there was a switch in the nature of interdependence. Although from a normative point of view, this switch looks welfare-enhancing due to the gain in transparency, the main conclusion from this empirical analysis is that the design of tax enforcement is also conditioned by mobility, and so confirms the theoretical framework set by Cremer and Gahvari (2000). This seems a fruitful field of research in the future, given the particular lack of similar empirical analyses for major taxes.

Mobility might also impede the complete realisation of the RTP principle unless independent tax administrations collaborate to share relevant information. Durán-Cabré et al. (in press) test the existence of collaboration between independent tax administrations taking again advantage of the Spanish institutional framework. In particular, corporations and individual taxpayers may submit their tax declaration – and so pay taxes – to the wrong tax administration. This could occur by honest mistake or it could reflect an intention to take advantage of statutory tax differentials between regions. To which administration agents should properly submit their declaration depends on the whether the residence or the territorial (or source) principle applies. When a tax declaration is

submitted to the wrong tax administration, the receiving administration should automatically inform the legitimate receiver, and also tax proceeds should be transferred. However, there is ample evidence that this collaboration is far from being automatic. Such a setting is used to test whether there exists some room for a mutually beneficial agreement to cooperate between administrations.

In the authors' empirical analysis, the endogenous variable is the amount of tax revenue transferred by region *i* to region *j* conditional on pair-specific variables (related to both regions) and specific control variables of region *i*; similar results are obtained when the endogenous variable is defined as the number of tax returns submitted from one tax administration to another. The model is estimated through a Tobit random effects model. From the results, the authors conclude that cooperation crucially depends on the existence of reciprocity, that is, *ceteris paribus*, a one-euro increase in the tax revenues received by region *i* from region *j* in year *t* results in an increase of 0.4 euros of tax revenues being transmitted from *i* to *j* in year *t* + 1. Hence, once tax administrations engage in cooperative behaviour, it is maintained, fostering even closer cooperation between them. This is a crucial point because it suggests that once regional tax administrations become aware of the potential benefits of cooperation, they do not deviate from this equilibrium. The positive effects of reciprocity, though, become weaker when region *i* is financially constrained (measured by its public finance deficit). Again, this looks a promising field for future research.

All in all, although the empirical evidence is scarce, as expected, the impact of mobility on the tax system is not constrained to its legal elements, but also to its administration. While harmonisation of statutory tax parameters is a difficult task (countries and regions fear losing fiscal sovereignty, and there will be winners and losers), harmonisation of tax enforcement or, in general, of tax administration processes seems simply impossible. Given the empirical evidence we have reviewed in this section, collaboration might naturally arise – leaving aside tax havens – once independent governments realise the long run benefits of such collaboration. But whether this will be enough as to impede beggar-thy-neighbour policies in tax enforcement is unclear.[8] This would naturally call for more ambitious processes of integration by tax authorities, such as a World Tax Administration. This, however, seems quite unlikely in the medium run.

5. Conclusion

The taxation of high-income earners is of importance to every country and has been the subject of a considerable amount of recent academic research. Top income earners are crucial in tax design because (a) they represent a large share of the total wealth; (b) they are more mobile (more educated, better language skills and outside options); and (c) countries must compete for them.

8 For example, this is in the line with the partially optimistic description of the recent evolution in international cooperation of Atkinson (2015). "Although with a good deal of fine rhetoric" (p. 276), there are some small steps as the Global Forum on Transparency and Exchange of Information for Tax Purposes for OECD and non-OECD economies, the OECD Common Reporting Standard, the OECD Base Erosion and Profit Shifting Project, and the Joint International Tax Shelter Information Centre (JITSIC). This remains a nascent area, though.

Capital and labour mobility are intrinsically different, so one cannot simply assume that the large literature on the former has applicability to the latter. There is ample evidence of uncertainty among policy-makers over this aspect of tax policy. Spain initiated and subsequently repealed the Beckham law designed to attract foreign talent, while the UK initiated a 50% income tax on top-earners, before quickly moving to lower it to 45%.

In this chapter we reviewed research into taxation of high-income earners with the aim of providing a synthesis of existing theoretical and empirical understanding of this issue. Theoretical approaches seek to understand the optimal tax scheme from the perspective of maximising societal welfare. While models are becoming increasingly sophisticated, a fundamental problem remains that results are very sensitive to the choice of social welfare function. The optimal behaviour depends crucially on whose welfare the social planner has at heart (citizens, residents, the sum of the two, the intersection of the two, or the world population). The Rawlsian social welfare function, which is popular in the literature, yields tractability, but is normatively questionable. Other choices of the social welfare function give the social planner seemingly perverse incentives, and the present approach to mitigating this issue – imposing ad hoc constraints on the planner – is clearly unsatisfactory.

Empirical approaches have examined the behaviour of particular groups of high-earners (footballers, scientists) exploiting heterogeneity in income tax rates either across countries or within a country over time. Strictly speaking, however, the relevant tax rate is not the statutory one, but the effective rate, accounting for the easiness of evasion. Top income earners display a considerable elasticity of mobility, possibly with jumps, and within top-earners, it is those with the very highest earnings that are the most mobile. Moreover, observed mobility may be very different from (and substantially understate) the threat of mobility. It is truly the threat of mobility that is matters to policy-makers, for if the threat of mobility is credible there are constraints on the extent to which taxes can be raised before everyone (rich) will leave.

We have identified a number of directions for future research. From a theoretical perspective, there is further scope for positive insights to inform the normative assumptions made in theoretical work (particularly around the choice of the SWF). Second, the assumption of constant returns to scale in the production function should be relaxed. From an empirical perspective, there is an apparent disjunction between the sole focus on elasticities in the empirical literature and recent advances in the theoretical literature (in which the optimal tax schedule depends on the semi-elasticity of migration and not just on the elasticity). More research to clarify this issue is therefore called for. Also, as most studies consider specific groups of top-earners (scientists, football players) work is needed to test the external validity of these findings in other occupations. It might also be interesting to understand whether it is earnings in an absolute sense or in a relative sense (relative to one's peers/colleagues) that drive mobility. It might be that (relatively badly paid) top university professors are as mobile as top football players, for instance.

Last, although we have focused on the mobility of individuals, there are also clear links to the mobility of firms. For, in particular, small firms, the distinction between mobility of the firm and the

mobility of its directors become very heavily intertwined. We see scope for more theoretical and empirical work in this area.

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