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Theories of optimal taxation and the possibilities of empirical measurements

During the reform of the tax system several, often contradicting aspects (distorting effect, social justice, etc.) need to be considered. The theoretical taxation models used in economics help us understand the trade-offs between the various aspects, and can contribute to the creation of the optimal tax system under the given circumstances. However, the optimal system also depends on the conduct of the economic players (e.g. the elasticity of labour supply) and the choice of value of such players (e.g. their need for equality), therefore it is impossible, or at least very difficult to elaborate an auspicious tax reform.

This study provides a brief overview of the economic theory of the optimal tax system, and outlines the possibilities and difficulties of empirical measurements. Emprical analyses published in this topic are not presented, however a brief reference is made to the most important Hungarian results.

PUBLIC GOOD AND SOCIAL COSTS

The tax system is the basic tool for the redistribution of incomes: on the one hand, it generates revenue for public expenditures, and on the other hand it changes the income of the economic players by itself. The theoretical and eimpirical literature of the efficient tax systems is diverse, however the starting point is usually the same: the tax system is optimal if it ensures the necessary revenue with the least social costs possible.

The necessary revenue depends on the demand for public goods (jurisdiction, law enforcement, administration) and state services (education, healthcare, social benefits). Its level is in part determined by decisions made in the past, and in part by social preferences and the political power relations. The three main sources of social costs are the direct costs of the administration of tax collection, the effects distorting the decisions of the market players, and the justice of distribution. Therefore, except for the early theories, justice also belongs to the criteria of optimality. The only difference between the theories is what they consider as justice.

The different interpretations of justice can be well comprehended by the concept of the social welfare function.[1] This function can be derived from the summation of the welfare of the individuals, however it is already the question of the choice of value how summation is performed. At one extreme is the utilitarian solution, which summates or averages the welfare measured for the individuals. At the other extreme is the maximin (Rawlsian) solution, in which the welfare function is determined as the

welfare of the poorest (min) member of the society, and the objective is the maximisation of that welfare. If the individual preferences are identical, and the utility function is linear, then there is no redistribution in the first solution, while in the latter goods must be evenly distributed (unless non-even distribution would increase the quantity of goods).

The distorting effects basically come from the fact that although the taxes increase the budgetary revenues, they also decrease the consumed quantity (consumption tax), and the level of utilisation of the production factors (taxes on labour and capital). The difference of the two effects is the so called dead weight or welfare loss. In *Figure 1* the supply and demand are in equilibirium (without taxes) in the basic case at the price of p_0, and at this price level q_0 will be the purchased (consumed) quantity. Taxation raises the consumer price (p_1), wherefore the consumed quantity will be smaller $(q_1 < q_0)$. In the figure the triangle shaped area bordered by the demand curve and the current

consumer price shows the consumer surplus, i.e. the utility arising from the fact that some people value the purchased product higher than the current price.[2] Taxation reduces this surplus: this is the consumers' direct loss. The loss is smaller than that in relation to the total welfare, since the tax revenues are returned to us in the form of public goods: in the figure this is expressed by the rectangular area between the comsumer and the producer prices, which shows the product of the quantity sold and the tax. This means that the net loss is the difference between the loss of the consumption surplus and the tax revenue: i.e. the triangle marked with blue in the figure.

The left-hand side and right-hand side panels of Figure 1 present the elastic and non-elastic demand, respectively: the steeper demand curve indicates smaller elasticity, since in this case the amount of the demand hardly changes in response to changes in the price. It can be seen that the dead-weight loss is greater in the case of elastic demand than in the case of non-

THE DEAD-WEIGHT LOSS OF TAXATION IN THE CASE OF ELASTIC AND NON-ELASTIC DEMAND
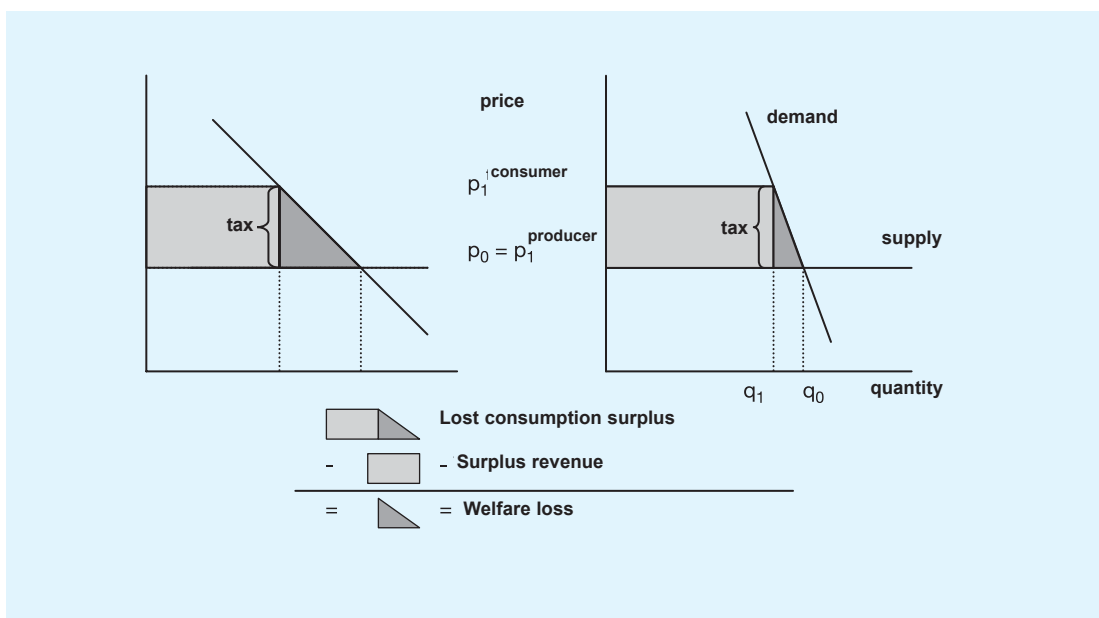
elastic demand, wherefore as a general rule, it is reasonable to impose higher taxes on the non-elastic factor or product.

THEORETICAL MODELS

The early optimal taxation models examine how the tax burden should be distributed among the individuals to minimise distortion arising from taxation, provided that there are neither administration costs, nor tax evasions (Sandmo, 1976).[3] In these models the optimum solution is that each inividual should pay a lump sum tax depending on his or her skills: since this tax does not grow with rising incomes, it does not restrain surplus performance, and therefore everybody works as much as he/she would work, let there be no taxes. However, this model cannot be implemented since the state has no information on the abilities of the individuals, and the taxpayers would be interested in manifesting less than the existing ability. The second best solution that counts with the shortage of information, too also depends on the assumptions on which the model is built. One of the main approaches uses only consumption taxes, while the other only income taxes: when examined separately, both can be sufficent and optimal by themselves. In both approaches, the optimal tax is determined how flexibly the consumption of the different products and the labour supply of the individuals react to the changes in the tax rate. The significance of social preferences is given attention at a later stage: on the one hand, the value that the society attributes to equality or equitable distribution, and on the other hand to what extent the state is expected to ensure welfare services.

Assuming households with the same taste – the consumption tax is optimum if it is inversely proportional to the price elasticity of the product:[4] it can be seen intuitively, too that the difference between consumer decisions made on the basis of taxed or un-taxed prices is the smallest in this case (Ramsey, 1927). In the case of households with different tastes the consumption tax can be optimum if on top of the price elasticity it also takes into account that the tax on products consumed by poor households (that have a major weight in the social welfare function) must be relatively low.

Mirrlees (1971) examines whether it is reasonble to use the progressive tax system applied in most countries. He concludes that the more flexibly the individuals react to changes in the net income, the less important solidarity is for the society, and the less revenue the budget requires, the smaller the tax rates should be. In search of the optimum ratio of direct and indirect taxes, *Atkinson* and *Stiglitz* (1976) show that the exclusive use of income taxes is optimal, i.e. there is no need for consumption taxes, provided that there is no interaction between the utility of labour and consumption, i.e. they are separable. In *Diamond's* model (1998) the income tax is optimal – assuming individuals with the same taste, but different productivity – if the marginal tax rate of the most productive (richest) and that of the poorest individuals is relatively smaller: it is better for everyone if the activity of higly productive individuals is not restrained by high taxes, and the tax allowance for the poor is desirable since it supplies resources to places the relative utility of which is the greatest.[5]

In addition to the distorting effects and the aspect of redistribution, the newer theories also count with the administration costs of tax returns and collection, and tax evasion, too. These models come to the conclusion that it is more reasonable to use several (a small number of) tax types and less differentiated tax rates than a single, finely differentiated tax rate. Simplicity reduces the costs of collection and

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facilitates inspection, which restrains tax evasion. On the other hand, through the application of more than one tax types marginal tax rates can be kept lower, which increases the willingness to pay taxes. Having revised their own, former model, Atkinson and Stiglitz (1980) came to the conclusion that the reduction of administrative costs may after all justify the application of indirect taxes. *Slemrod* (1990) also draws attention to the fact that in addition to equitableness and efficiency considerations the administrative costs of tax payment and collection, as well as tax evasion must also be taken into account, since these costs significantly modify the tax revenues.

In the newer models that take tax evasions and administration into account too, a combination of indirect and income taxes is the optimum solution in general (e.g. Boadway et al, 1994; Alm, 1996 or Sorensen, 2007). According to *Alm* (1996), in the optimum case the consumption tax rate is identical in the broadest spectrum of products. It is worth imposing higher than standard tax rates only on those goods that are less sensitive to price changes (e.g. basic consumption goods), that have negative external effects (e.g. alcohol), that are consumed by high income people (e.g. luxury articles), or in the case of which taxes can be easily enforced and collected (goods versus services). In the case of income tax a single marginal tax rate is suggested with a tax base defined as broadly as possible, since it minimises both the administrative costs and tax evasion. In this case justice can be ensured by exempting incomes from taxation up to a relatively high level.

A separate field of literature on optimal taxation deals with the growth related impact of taxation. This requires the modelling of the future consequences of the one-time decisions of the economic players: e.g. the impact of current savings on next year's investments and production. According to the classic conclusion, assuming an indefinite time horizon, the optimum tax rate of capital income is zero percent. The intuitive explanation is that while the consumption tax affects decisions made within the given time period, the tax on capital distorts present and future decisions on consumption, which causes a greater welfare loss even with a low tax rate (Valentinyi, 2001). The models that assume players with a definite lifetime and different productivity may also lead to other consequences. For example, *Conesa et al* (2007) present that the optimum tax rate of capital incomes is not zero, but rather a significant percentage, if most of the taxpayers react sensitively to the tax on labour income, while they are less elastic in relation to taxes on capital: this time taxes on capital cause a relatively smaller total welfare loss.

In endogenous growth theories that count with human capital investments too, the growth restraining effect of labour taxes can be larger or smaller than that of capital taxes, depending on the assumed parameters (Babiker, 2002).

The models mentioned so far are usually based on the assumption that the mobility of capital among the countries is zero or at most negligible. This assumption is rejected by the theory of the international tax competition, which examines which tax system can ensure concurrently the capital attracting ability of the country and the required revenues. These models typically conclude that in countries that are exposed to the tax competition both the level of taxation and the supply of public goods will be smaller than the optimum in terms of social welfare (Fuest et al, 2003). In the newer models the relative level of taxes adjusts the capital attracting ability of a given country not by itself, but compared to the level of public services. As a result, the tax competition does not necessarily forces the introduction of decreasing rates (e.g. Ivanyna, 2007; Görg et al, 2007).

TAXES, CONTRIBUTIONS AND SOCIAL BENEFITS

In general, three types of tax revenues are differentiated: *indirect taxes,* direct taxes and social security contributions. Indirect taxes are imposed on consumption and not incomes, their administration is less expensive and tax evasion is more difficult. *Direct taxes* are levied directly on income from investments and labour, wherefore they are more suitable for redistribution. On the other hand, their distorting effect is usually greater. *Social security contributions* are similar to direct taxes, however, while the latter are not directly linked to services in return, the payment of contributions creates a certain eligibility (e.g. pension, unemployment benefit, child care allowance) on the basis of the insurance relationship.

The markedness of the boundary between contributions and taxes primarily depends on the characteristics of the insurance system: for example, in Hungary the job-seeking benefit or the childcare allowance are based on insurance relationship, yet their amount depends on the size of the last income[6] and not on payments made earlier. On the other hand, pensions are calculated with consideration of all contributions paid. Contributions payable on wages influence the labour supply similarly to income taxes, their effect is smaller if the correlation between the contributions and the cash benefits that can be claimed later on is stronger (since in this case emloyees regard contributions as savings instead of taxes). The essence of the contribution based insurance system is that certain welfare benefits are available only for those people, who have contributed to the financing of such benefits, while in the case of taxes all taxpayers contribute to the funding of public goods, independent of the extent to which they used a certain state benefit or service. This means that the choice between the two solutions is not only a question of efficien-

cy, but is also about how responsibility is shared by the individuals and the community in solving certain life situations (illness, unemployment, child rearing, old age).

The primary objective of taxes and contributions is to ensure the revenues required for public expenditures, while the objective of subsidies is to correct the primary (market) income distribution. The tools used by the two systems overlap to some extent: certain subsidies can be replaced with tax allowances or differentiated tax rates, and vice versa.[7]

The redistribution of incomes can also be achieved through taxes, contributions and subsidies: when choosing among the three different tools, it is worth considering more or less the same aspects that determine the selection of the optimum tax. This means that in terms of the total social utility the best tool is the one that can be administered less expensively, that is more difficult to abuse, and that distorts the decisions of the economic players to a smaller extent. This means that it is not necessarily efficient to deprive the tax system of all elements of redistribution,[8] if the differentiation of the tax rates or the administration of the allowances is cheaper, if the possibility of abuse is smaller, or the labour supply related distortion is smaller than in the case of subsidies.

Taxes and subsidies are not always independent of each other in terms of administrative costs either. In certain countries the tax system and the subsidy system function independent of each other, most subsidies are tax exempt (the recipient receives the net amount of the subsidy), subsidies are not included in the tax return and the tax system, and typically, the tax system does not contain discounts that serve social purposes. The advantage of such a system is its transparency: the revenue and redistribution objectives are clearly separated, and the actual effect (net amount) of the subsidies does not depend on other incomes.[9] Since the subsidies are paid net, there are no unnecessary

money movements between the state agencies. The disadvantage of the system is that it doubles administration: both the tax authority and the institution evaluate eligibility for the subsidies collect information on incomes.

In the fully integrated system subsidies function as negative taxes or tax allowances. The administration of the entire system is performed by the tax authority (expanded by the local network of institutions). Its advantage is that there is no double administration, and the tax authority can determine eligibility for subsidies on the basis of more accurate information. Its disadvantage is that two contradictory objectives are mixed up in the tax authority: realisation of the revenues and social security.[10] The extreme case of the fully integrated system is family taxation, in which married couples apply the tax rates and calculate the payable tax on the basis of their collective income. This system reduces the tax of families with children – which can be supported by arguments of equity –, but it also gives more to better-off families with children than to poor people without children. The other disadvantage of this system is that it strongly reduces the labour supply of the second earner in the family.[11] Finally, in terms of administration, family taxation is significantly more complicated than individual taxation, which increases the operational costs both for the taxpayers and the tax authority, and may give rise to tax evasion.

If the taxes and subsidies function in separate systems, it must also be decided which subsidies and how should be taxed. Contrary to the market incomes, subsidies expressly serve the objective of redistribution, they come from taxes collected from market incomes, wherefore it is reasonable to use the same theory in their taxation as justified by their functions. Another aspect is that the subsidies further reduce the labour supply, which would be further increased if they were subjected to tax payment, and finally that the administration costs can be reduced if people

in need receive after-tax, net amounts. This leads to the conclusion that subsidies for the needy should not be taxed at all, while the other revenues should be taxed as allowances exempted from the tax burden.[12] Contribution payment can be justified if the subsidy is similar to labour income, i.e. it acts as a supplement. However, payment can be made directly in this case, too (the Treasury may transfer the amounts to the social security funds) in order to reduce the administration costs.

POSSIBLE EMPIRICAL MEASUREMENTS

The distoring effect of taxes can also be examined with simple indicators: for example, high implicit tax rates usually indicate significant distorting effects and a high rate of tax evasion. The comparison of the average tax burden on the forms of businesses or income deducting possibilities is also informative: it shows the opportunities for legal tax avoidance in the system.

Bakos et al (2008a) examine the Hungarian tax system with such simple methods. They find that in Hungary the implicit tax rate is high both in terms of labour income and consumption by EU standards. At the same time, the ratio of tax revenues to the GDP is closer to the average, in part due to tax evasion and the many exemptions. However, since withholdings on labour have a more significant distorting effect than taxes on consumption, the selective reduction of the former is the most desirable since the demand for unskilled labour is more elastic than the average. The most important consequence of selective reduction would be the growth in employment. Tax evasion could be reduced if the taxes on the various employment relationships were approximated, and the tax system was simplified. The authors conclude that the introduction of the flat-rate property tax would be desirable not

for the reduction of tax evasion, but rather for the encouragement of productive investments.

On the basis of the macrolevel data of several countries the correlation between the tax level (or changes thereof) and the economic indicators can be suitable to point out the average effects. For example, according to the analysis prepared by the World Bank on the new Eastern European member states, with a fix growth rate the increase of the tax wedge by 1 percentage point reduces the growth in employment by 0.5–0.8 percentage points (World Bank, 2005). Presumably, this explains to a greater extent that in these countries the increase of the distorting taxes (taxes on labour and especially social security contributions) by 1 percentage point (measured relative to the GDP) reduces the growth rate by around 0.4 percentage point (World Bank, 2006).

However, the size of distorting or tax evasion encouraging impacts can differ from country to country, wherefore the macrolevel estimates cannot be linked to a concrete country. The thorough estimation of distortion requires microlevel information on individuals or businesses.

Empirical examinations measure how the tax rates or the changes thereof affect the decisions of the economic players. The measurement is never absolutely accurate, since even in the case of microlevel data there are many factors that influence the individual decisions, but cannot be measured, or cannot be well measured. The most accurate measurements are made possible by those tax reforms in which the changes affect several taxpayer groups to different extents, and in which detailed information is available both on the pre-change and post-change incomes.

Several elements of the Hungarian tax system have been analysed on the basis of microlevel data. One of the first attempts was the study written by *Semjén* (1998), which examined the tax evasion behaviour of businesses broken down by type of business, on the basis of the

consolidated figures of tax returns. Vidor (2005) examined how the tax allowance on the payment of pension fund contributions affected the savings related decisions of households by estimating the difference in differences on the basis of the Household monitoring data collected by TÁRKI Social Research Institute, and by cohort analysis. He found that savings linked to tax allowances do not squeeze out other types of savings, i.e. new savings may also appear as a result of the tax allowance.

Bakos et al (2008b) measured the impact of the abolishment of the middle personal income tax rate in 2005 on the declared income on the basis of individual level data from the Hungarian Tax and Financial Control Administration. The estimate was based on the fact that during the tax changes introduced in 2005, the marginal or average tax rate of different individuals changed differently. According to the authors' findings, tax sensitivity is higher among higher income people. However, this sensitivity is not so strong that it could fully compensate the direct budget revenue loss incurred due to the reduction of the tax rate affecting higher income people.

Little empirical research was conducted on the redistribution impact of taxation on the basis of Hungarian figures.[13] The most important research is the one conducted by *Gál et al* (2005), which examines the balance of tax payment and welfare transfers broken down by age. However this research does not focus on the justice of redistribution among the people of our age, but rather on the implicit indebtedness of the next generations, i.e. the sustainability of the entire system of redistribution.

SUMMARY, CONCLUSIONS

It can be seen from the above summary that the theories do not provide clear orientation on the optimal tax system. There are still several obstacles to the practical application thereof.

Just like any theory, these theories are also based on assumptions that simplify reality, and the conclusions are valid only if the underlying assumptions come true in reality, too. This can be checked with empirical examinations, and policy conclusions can be drawn only afterwards. However, most empirical analyses pertain to the US, and conclusions that are valid for a large, closed economy are not necessarily valied for a small and open economy.[14] The optimal tax system also depends on the scale of

values of the given society and on the behaviour of the economic players, i.e. it can only be determined on the basis of such information. Therefore, the successful transformation, and especially the radical reform of the tax system can be hardly imagined without the knowledge of the economy and society of the given country on the basis of detailed empirical examinations. As we could see, such analyses have already been prepared in a few tax fields in Hungary, too.

NOTES

[1] The theoretical background is introduced in detail in Hungarian by Csaba and Tóth (1999).

[2] The shape of the demand curve also depends on this: when the price is falling, more people are willing to buy, while with rising prices fewer and fewer people are willing to do so. At any price level, there are people who did a good bargain, i.e. obtained greater utility than the price of the product, but the higher the price the smaller the number of people who can do so. For the sake of easy illustration, we presumed that the demand is fully elastic.

[3] A Hungarian language introduction to the literature of optimal taxation is given by Cullis and Jones, for instance (2003).

[4] This is the Ramsey rule. A product's own (cross) price elasticity indicates by what percentage consumption of said product changes if the price of the product (other products) is raised by one percent.

[5] These models assume that a unit income (HUF) is valued higher (increases utility to a greater extent) for a poor than for a rich household. These models do not necessarily define the social welfare function mentioned in the first footnote concretely – they only conclude that the tax burden of households that play an important role in this function should be smaller.

[6] However, both are preconditioned by the fact that the insured person paid contributions for a certain period of time before claiming annuity/allowance.

[7] For example, this happened in Hungary in 2005, when the family tax allowance was abolished for fam-

ilies with one or two children, however this was compensated by the increase of the family allowance.

[8] And it is not possible either: it can be seen theoretically, too that the lump sum tax is not operational. On the other hand, according to the definition the single rate tax must be paid proportionately to the income, i.e. the rich pay more than the poor.

[9] The targeting of social subsidies can be better, since targeting is not distorted by the tax system (which usually considers the number and income of family members to a smaller extent), but can be worse too, if the authorities are unable to check the information required for the evaluation of eligibility.

[10] This may increase the underpayment error of subsidies, i.e. people otherwise in need of the subsidies would not receive subsidies due to their stigmatising effect or the lack of information.

[11] According to the standard labour supply model, if a household is based on the traditional division of labour, then women can choose from among paid work, housework and free-time activities, while men can choose between paid work and free-time activities. Since in the case of women paid and unpaid work are close substitutes, they react more flexibly to changes in market wages, which is confirmed by most of the empirical estimates (Evers et al, 2006).

[12] In the case of subsidies given to the needy (e.g. subsidies linked to means testing) there is no point in imposing taxes with a view to improving vertical targeting, since eligibility is determined with a method that ensures much more subtle targeting than taxa-

tion (on the basis of the income of the household), and in many cases the recipients do not have other taxable incomes.

13 The first question of the examination of redistribution is who actually bears the burden of the tax: the tax not necessarily reduces the welfare of the taxpayer, since in many cases the tax burden can be trans-

ferred to other entities. This question is investigated by the economic theory of the distribution of the tax burden (tax incidence), of which a Hungarian language overview is given by Szabó (2005).

14 See for instance Hartman's (1985) analysis on the taxation of capital incomes.

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