A Note on the Concept of Excess Burden

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Abstract: It is argued that there has been a shift in the meaning of "excess burden" from Pigou to modern economics, related to what is used as a reference point when the effect of a tax is discussed. Is it the situation before the tax was introduced or what would have happened if a lump sum tax had been used instead? This distinction is important for tax policy, since the latter reference point leads to a larger, sometimes much larger, numerical value for the excess burden. However, the distinction is not often clearly made and this has led to risks for misguided political decisions on taxes. It is further argued that when excess burden and efficiency losses are discussed, economists have neglected to discuss the meaning of "can", or "possible", when the Pareto principle is formulated. Is it reasonable to say that welfare "can" be improved by a lump sum tax instead of a "distortionary" tax if, as most economists seem to believe, such a tax is not a realistic alternative? Since conceptual clearness about the excess burden of taxes is important, some suggestions for improving the situation are also presented.

I. INTRODUCTION

The cost of taxes has been much discussed in recent decades in many countries. A common view among economists is that the marginal cost of taxes is high, because taxes have side effects. Taxes often entail "excess burden", or "deadweight loss". In a previous article (Granqvist and Lind 2005) we pointed out that modern economists do not measure the commonsense interpretation of side effect, for example how actual labour supply would change when an income tax is introduced.[2] Instead they ask what would happen if a lump sum tax is used as an

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[2]   More detailed examples are also presented in that article.

alternative to the actually proposed tax. This means that there can be an excess burden even if nothing else than the level of private consumption would change when a tax is introduced. Since lump sum taxes are not feasible in most practical situations, which is also commonly pointed out by economists, the relevance of the economists' interpretation was questioned.

In this note the argument is further developed in three different directions. In section 2 it is shown that Pigou's interpretation of excess burden is identical to the commonsense view, and that Pigou has been misinterpreted on this point in the modern economic literature. In section 3 it is argued that the same problem with an unclear point of reference can be found when economists argue, for example, that introducing an income tax in a situation with no external effects leads to a Pareto inefficent situation. In section 4 there is a discussion about the arguments presented by the few economists who have noted the two different interpretations of excess burden. In section 5 some constructive proposals are presented.

II. THE PIGOVIAN CONCEPT OF EXCESS BURDEN

Pigou discussed the idea of an excess burden of a tax in the context of the marginal cost of funds for public use. In this perspective, there is an excess burden if the marginal cost for society of raising $1 in taxes is higher than $1. Pigou (1947, pp. 33-34) writes:

> 'The raising of an additional £ of revenue necessitates increasing the rates at which taxation is imposed […] With some sorts of taxes this inflicts indirect damage on the taxpayers as a body over and above the loss they suffer in actual money payment. Where there is indirect damage, it ought to be added to the direct loss of satisfaction involved in the withdrawal of the marginal unit of resources by taxation, before this is balanced against the satisfaction yielded by the marginal expenditure.'

In another passage, Pigou *explicitly* notes that an income tax that would leave labour supply unchanged (the substitution effect is counteracted by an income effect of the same size) would involve *no* "indirect damage". Pigou maintains that a taxpayer's cost ("sacrifice") of an income tax is *equal to* the tax amount ("[t]he amount of satisfaction carried by the money he actually pays over in taxes") if labour supply is unchanged (pp. 42-43, footnote 1).

Pigou also points out that the cost of the tax for a taxpayer is the utility difference between the state *without* the tax and the state *with* the tax, and that the excess burden depends upon actual changes in working hours or effort:

> 'By the sacrifice which a tax system imposes upon any individual I mean the difference between the net satisfaction he would have enjoyed had there been no tax system – it will be understood that benefits arising out of the government's expenditure of tax proceeds are here left out of account – and the net satisfaction which, under the aegis of this tax system, he does enjoy.'
> (Pigou 1947, p. 42).

> 'The reason is that tax systems may cause taxpayers to work more or less hard, and so to have a larger or smaller income (apart from taxation), than they would otherwise have done: and that the effect of this upon their net satisfaction is not represented in

the money paid over in taxation'
(Pigou 1947, p. 42).

As argued in Granqvist and Lind (2005) it is crucial to make a distinction between the concept of excess burden in modern welfare economics, which compares the actual tax to a hypothetical lump sum tax, and a "commonsense" concept, which compares the actual tax to the situation before the introduction of the tax. As mentioned in the introduction, the latter concept is identical to the Pigovian concept of excess burden.[3]

Ballard and Fullerton (1992) is one of the few articles in which the above crucial distinction between the two meanings of excess burden is explicitly discussed, but they are mistaken when they see Pigou as the one who introduced the modern concept of excess burden. The modern approach is called "the Pigou-Harberger-Browning approach" by Ballard and Fullerton, and they maintain:

> Essentially, Pigou's conjecture is that the marginal cost of public funds is greater than one [for a tax system that distorts relative prices] (p. 119).

The marginal cost of public funds (MCF) is one if the cost of the tax is equal to the tax amount. As shown above, Pigou explicitly noted that the cost of an income tax is equal to the tax amount if labour is unchanged.[4] The same misinterpretation of Pigou appears in two of the articles Ballard and Fullerton refer to: Stiglitz and Dasgupta (1971) and Atkinson and Stern (1974). For example, Atkinson and Stern claim that, if lump sum taxation is not feasible, Pigou "[…] argued that the cost to consumers of the public good would be larger than just the necessary resources on account of the 'indirect' damage caused by taxation" (p. 119).

Unfortunately, this misinterpretation of Pigou's view on the efficiency loss of taxes seems to have become established in the economic literature.[5] Here are some recent examples:

> […] as Pigou (1947) emphasized […] it is necessary to add up direct and indirect costs of provision, when assessing the optimal scale of government activities. The

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[3]   According to the conventional view, there must, given the standard assumptions (rational behaviour, no externalities, etc.), be an excess burden of a tax whenever there is a substitution effect. It is also a common view in the economic literature that this (modern) excess burden is a cost that should be kept as small as possible. See, for example, Auerbach and Hines Jr (2002) who maintain, in the conclusions of their review of taxation and efficiency: "Fundamentally, it remains true that departures from marginal cost pricing are associated with excess burden […] and that efficient tax systems are ones that minimize excess burden subject to achieving other objectives" (p. 1415).

[4]   The "sacrifice" of the taxpayer is equal to the "[t]he amount of satisfaction carried by the money he actually pays over in taxes" (Pigou 1947, pp. 42-43, footnote 1). Such an income tax would undoubtedly "distort" relative prices, since marginal income is reduced by the tax, and there is a substitution effect, even if this is exactly counteracted by an income effect.

[5]   This is sometimes directly related to the above misinterpretations. For example, in their account of the above article by Atkinson and Stern, Gronberg and Liu (2001) refer to "Pigou's assertion that the [marginal rate of transformation] should always be adjusted upward to accommodate the distortionary effects of a non-lump-sum tax […]" (p. 431). See also Lau, Sheshinski and Stiglitz (1978, p. 269), Auerbach (1985, pp. 110-112), King (1986, p. 273), Batina (1990, p. 125), Boadway and Keen (1993, pp. 463-464), Kaplow (1996, pp. 513,522), Feldstein (1997, p. 198), Gaube (2000, pp. 151-152), Auerbach and Hines Jr (2002, p. 1385), Kaplow (2004, pp. 169-171), Jones (2005, p. 234), Kaplow (2006, p. 1631), Wendner and Goulder (2008, p. 1969).

indirect costs are those associated with the excess burden of taxation (Afonso and Gaspar 2007, p. 486).[6]

[…] Pigou […] stated that the benefits of public goods must exceed their direct costs by an amount sufficient to outweigh the distortionary cost (also called deadweight loss or excess burden) of taxation (Ng 2000, p. 124).[7]

It was pointed out by Pigou (1947) that the financing of public expenditure by distortionary taxes imposes an efficiency loss on the economy, and this efficiency cost should be added to the direct resource cost of public expenditure (Sandmo 1998, pp. 365-366).[8]

Notice that "distortionary" here refers to all taxes that are not lump sum taxes. If "distortionary" were *defined* as having efficiency losses, the statements by Ng and Sandmo would of course be trivial because they would be true by definition.

One reason why this misinterpretation has been frequent among economists could be that the distinction between different reference points related to excess burden rarely has been explicitly made. We have only found one example where Pigou's view on this issue is *not* misinterpreted, and that is in Musgrave (1985).[9]

III. THE INTERPRETATION OF EFFICIENCY LOSS

When an income tax is introduced, the economy would, given the standard assumptions, move from a Pareto efficient state into a Pareto inefficient state. The income tax creates a wedge between the after tax marginal income of the individual and the value of the good that the individual produces. This is the starting point for a modern way to define excess burden. An example is Krugman, Wells and Graddy (2007, p. 105) who write:

The excess burden […] from a tax is the extra cost in the form of inefficiency that results because the tax discourages mutually beneficial transactions.[10]

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[6]   See also Florio and Colautti (2005) who refer to "[…] Pigou's conjecture that the excess burden of taxation constrains the growth of public expenditures" (pp. 355-356) and Bird (2005) who maintains that Pigou argued that the excess burden of taxation should "[…] be taken explicitly into account in determining the appropriate level of public expenditure" (p. 85). In all these three articles "excess burden" refers to the modern concept, and *not* to the Pigovian concept.

[7]   See also Ng (2004, p. 170).

[8]   See also Sandmo (1998, p. 371, italics added): "The Pigovian reasoning suggests that with distortionary taxes the MCF [marginal cost of public funds] would *necessarily* be greater than one."

[9]   "[…] Pigou expects labor supply to be relatively inelastic and concludes that distributional considerations should be given the major weight" (Musgrave, 1985, p. 27). This is in agreement with our account of Pigou's view on the efficiency loss of income taxes, as previously described in this section, but *not* with the common representation of Pigou in the modern economic literature. Modern excess burden could be large for an income tax, even if labour is unchanged.

[10] See also Krugman and Wells (2005, p. 102). Krugman and Wells maintain: "[…] if the goal, in choosing whom to tax is to minimize [excess burden], then taxes should be imposed on those who have the most inelastic response – people who will change their behaviour the least in response to the tax" (p. 495). However, this is not correct. For example, modern excess burden, as Krugman and Wells refer to, of an income tax is smaller for a taxpayer who would decrease labour than for a taxpayer who would not change labour if both the substitution effect and the (counteracting) income effect are smaller for the first taxpayer than for the second.

The loss from being in a Pareto inefficient state is, in the same way as discussed in the introduction, related to a situation with a lump sum tax. The "mutually beneficial transactions" not carried out is the increase in working hours that would result if there were a lump sum tax instead of the income tax. It is a fact that an income tax leads to a tax wedge, and that this, given the standard assumptions, leads to Pareto inefficiency. However, as argued above, this tax wedge does not necessarily lead to an "extra cost", compared to the initial situation, if the substitution effect is counteracted by an income effect of the same size.

The idea in the quotation above is that there is an excess burden if the economy moves from a Pareto efficient state to a Pareto inefficient state in which one *can* increase – in which it is *possible* to increase – welfare for one individual without reducing welfare for another. This leads to the next conceptual issue that is crucial in the discussion about excess burden – what does "*can*" and "*possible*" really mean here?

In more advanced textbooks it is proven mathematically that it is possible, given the standard assumptions, to increase welfare in this sense by introducing a lump sum tax instead of an income tax. "Can" might then be interpreted as "there is a model in which, etc.", or more generally as "there exists a world in which welfare would increase if an income tax is replaced by a lump sum tax". This interpretation of "can" is here something like "logically possible".

In an interesting article, Beyth-Marom (1982) has tried to quantify what she calls "verbal probability expressions", for example when a weather forecaster says that it "can" rain tomorrow or that it is "probable" that it would rain. Her conclusion is that in the first case it means that the probability that it will rain is between 0.3 and 0.5, and in the second case between 0.5 and 0.7. The exact figures does not matter for the discussion here, but it raises the issue what economists actually mean when they say that an income tax leads to a Pareto inefficient state in which welfare "can" be increased. Are they saying that the probability is 0.5 that an alternative tax, which leads to higher welfare, can be implemented? Or are they only claiming that this is logically possible?

One "can" increase welfare by using lump sum taxes in *the models*, but many seem to believe that this cannot be done in *the real economy*. But if this cannot be done in reality, would it not be wrong to say that (in reality) there is a cost of not using lump sum taxes? If it is not feasible to introduce lump sum taxes, then the welfare enhancing transactions that such taxes would entail are not feasible and it does not seem reasonable to say, as in the quotation above, that the income tax "discourages mutually beneficial transactions". What would be correct to say is that, *if* the world would be as in the models, *then* the probability is 1 that welfare can be increased by using lump sum taxes instead of income taxes.

IV. TWO CONCEPTS – IS ONE MORE INTERESTING THAN THE OTHER?

The difference between the Pigovian concept and the modern concept of excess burden is that they have different points of reference. The Pigovian concept compares the situation after the increase of the income tax to the situation *before* the increase in the tax, while the modern concept compares the situation after the tax to a *hypothetical* situation with a lump sum tax. As previously mentioned, this distinction is seldom clearly made in the modern economic

literature, and therefore there is rarely any explicit discussion about the importance of each of the concepts in the economic literature.

The choice between the Pigovian and the modern concept of excess burden has, however, surfaced in debates about the cost of public funds, where the modern concept has been questioned in the well-known article by Ballard and Fullerton (1992).[11] They formulate their conclusion by saying that the tax is distortionary (by using the lump sum tax as the reference point), but they also say that the marginal cost of fund need not be higher than 1 (and now they use the situation before the tax as the reference point).[12]

A plausible reason why this article has had no effect on the general definition of excess burden is that Ballard and Fullerton accept the lump sum tax as the point of reference when a tax is classified as distortionary. Modern economists may therefore have taken for granted that their way of looking at excess burden was accepted. As we will come back to, using the modern definition in more general texts, without explicitly mentioning the point of reference (and the alternative point of reference), is bound to cause misinterpretations.

Should instead the modern concept be replaced by the Pigovian concept? This issue is explicitly discussed by Browning and Liu (1998) in a comment to Kaplow (1996), who implicitly used the Pigovian concept. Browning and Liu (1998) write:

> 'To hold that the income tax is nondistorting, it seems to us, must mean that there is no alternative method of financing G_1 [the quantity of a public good] that is better (higher utility) for the taxpayers' (p. 104).[13]

The point is the same as discussed in earlier sections: the income tax is distortionary, even if labour supply is unchanged, because the same tax revenue could be raised by a lump sum tax with less welfare loss for the taxpayers. In other passages, Browning and Liu describe the modern concept of excess burden as "the best meaning" (p. 104), "the most reasonable interpretation" (p.104), "the accepted interpretation" (p.104), "the relevant interpretation" (p. 104), "the appropriate [interpretation]" (p. 105) and "the commonsense interpretation of the meaning of distortion" (p. 106).

At least the last statement – that the modern concept is the "commonsense interpretation" of the meaning of distortion/excess burden – must be questioned. It can, for example, be noted that the following explanation of excess burden (or deadweight cost/loss) is presented on the

[11] Ballard and Fullerton (1992, p. 119) note that the relative merits of many different measures of the excess burden concept, mostly the modern, have been discussed in the literature, and they suggest that "[t]his plethora of definitions may have helped to obscure the very basic distinction between the two approaches described in this paper" (p. 119, footnote 1). They also give references to some other articles in which the two approaches are discussed (p. 124, footnote 7).

[12] Ballard and Fullerton (1992, p. 122). This can be reconciled with a classic formulation by Samuelson (1954). Samuelson suggested that a public good should be introduced if the benefits of the public good are larger than the marginal cost of the public good. Samuelson explicitly assumed lump sum taxation (p. 388), in which case the marginal cost of the tax is equal to the tax amount, since the reference point obviously is a lump sum tax. Given the standard assumptions, if taxation is "distortionary", i.e. if there is a substitution effect, the marginal cost of the tax is equal to the sum of the tax amount and the modern excess burden, if the reference point is a lump sum tax. However, if the reference point is the situation before the tax and if labour is unchanged, the marginal cost of an income tax is equal to the tax amount.

[13] On p. 108 they give an example, in which they show that a lump sum tax would make the taxpayer better off compared to an income tax.

website of the journal *The Economist*:

> 'The extent to which the value and impact of a tax [...] is reduced because of its side-effects. For instance, increasing the amount of tax levied on workers' pay will lead some workers to stop working or work less [...]'.[14]

This "commonsense interpretation" is clearly in line with the Pigovian concept and not with the modern one, as there can be an excess burden according to the modern interpretations even if the workers continue to work in the same way.

As previously argued, the *relevance* of the modern concept for the purposes it is commonly applied to, can be questioned. For example, to include modern excess burden as a cost in the social decision whether to raise the revenue from an income tax to finance G_1 in the case discussed by Browning and Liu in the quotation above, could be questioned because this concept depends on what is an "irrelevant" alternative in Arrow's sense.[15]

Our impression from numerous discussions of this issue in recent years is that non-specialists take it for granted that economists compare the situation *after* the introduction of the tax with the situation *before* the introduction of the tax, i.e. that economists use the Pigovian concept. However, the main argument of Browning and Liu (1998) is that the modern concept is more interesting because it is focused on the issue whether there is a better alternative than the proposed tax. There is an excess burden if the proposed tax leads to a lower welfare than the best possible alternative, which, given the standard assumptions, is a lump sum tax. As previously mentioned, most economists seem to believe that lump sum taxes are not feasible in practice. This is explicitly pointed out by Browning and Liu:

> 'Economists use lump sum taxes as benchmarks to test the efficiency of various taxes all the time, knowing that they may not be politically feasible. The point is that they are used to identify an alternative resource allocation that is possible (not politically feasible) and that is a Pareto improvement over some other' (p. 110).

A major problem with this argument is that, if we assume that there is some rationality in the political decisions, lump sum taxes is in reality not an obviously better alternative. There might, for example, be various problems related to enforcement. The quotation above is an example of the confusions concerning "can" and "possible" discussed above: In what sense is it "possible" to introduce lump sum taxes if they are so problematic that no government wants to introduce them?

This raises the issue how one should argue if we are talking about a real economy in which lump sum taxes, for a number of reasons, are not feasible. There seems to be two possible views:

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[14]   www.economist.com (Economics A-Z, "deadweight cost/loss"), January 4, 2010.

[15]   More precisely, it would conflict with the condition "independence of irrelevant alternatives" as formulated by Kenneth Arrow in his General Possibility Theorem, also called Arrow's Impossibility Theorem (Arrow, 1951/1963). Sen (1970/1979, pp. 89-92) identified two different aspects of this condition: the "irrelevance" aspect, according to which the social choice between two alternatives should not depend on any other alternative, and the "ordering" aspect, according to which the social choice should depend only on individual preference orderings. The conventional approach, as described above, conflicts with both these aspects, but it can be argued that it is the conflict with the "irrelevance" aspect that is problematic, because this conflict leads to an overestimation of the cost of income taxes, given the standard assumptions, whenever labour is affected by an income effect. This conflict was identified by Granqvist and Lind (2001).

1. The modern concept of excess burden is uninteresting as the reference point for the comparison cannot be implemented.
2. The modern concept could be broadened in the way implicitly suggested by Browning and Liu. It is interesting to know how much welfare could be increased if the "best possible tax" was used, but it is an empirical issue in each specific case what this "best possible tax" is. In most cases it would *not* be a lump sum tax, since that is usually not a practically feasible alternative.

Our conclusion from this is that there are two complementary approaches that seem fruitful. The first is to use the Pigovian approach and look at the proposed tax in isolation from any other alternatives, and simply compare the situation after the tax with the situation *before* the tax in the dimensions that are judged to be of interest. The second is to compare alternative feasible taxes and evaluate the actual situations with these different taxes in the dimensions that are judged to be of interest.[16]

However, a statement that there is a (serious) excess burden of an *actual* income tax, because the same amount of money *can* be raised with a lower welfare loss by a lump sum tax, seems to be rather uninteresting, if this is possible only in certain very simplified model-worlds.

V. CONCLUSIONS

When we have discussed the different possible interpretations of excess burden with "mainstream" economists, we have several times received a comment like the following:

'In moderns economics there is a clear definition of excess burden where the point of reference is a lump sum tax. As there is a clear meaning in modern economic theory, the other interpretation is simply a misunderstanding, or just a completely different interpretation. Why should we economists worry about such an alternative when we have our own clear formal definition?'

However, this is a too simple way out of the problem. The conceptual confusion described above is important for several reasons:

1. The size of the excess burden will greatly depend on the definition chosen. It is, for example, well known that the *total* effect on labour supply of an income tax increase is much smaller than the *substitution* effect.[17] The Pigovian excess burden would therefore in most cases be much smaller than the modern excess burden.
2. Excess burden is a value-loaded concept. It sounds as something evidently bad and harmful. However, it is not obvious that excess burden, given the modern definition, is harmful. It is, for example, very unclear why a tax with a large excess burden would

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[16] It can be noted that this is *not* what is done in the conventional approach. For example, in the design and evaluation of tax reforms in many countries during the recent decades, decreased (modern) excess burden has been an important success indicator. This approach implies that the comparison is *not* made between the actual situations before and after the tax reform, since excess burden depends on the irrelevant alternative with lump sum taxes. This means that one reason why excess burden has decreased by a change in the income tax could be that the overestimation of the efficiency loss is larger before the tax reform than after.

[17] See, for example, Aronsson and Walker (1995, pp. 55-57).

be harmful if there are no observable side effects, as in the case where the income and substitution effects cancel out. Why should the public worry about a situation where the same tax revenue "could" be raised with a lower welfare loss by a lump sum tax, if such a tax is not feasible in practice? We have not found any convincing answer to this question.

3. The tax system is politically controversial and economists have been quite involved in the public debate on tax policy and in such a situation it is especially important to have clear and transparent concepts. If a concept is given a different interpretation by the public than by the economists, there is a large risk that politicians and the general public misunderstand what economists actually talk about and what economists are measuring when they use the concept of excess burden. Some economists have noted that there is such a misunderstanding.[18] This misunderstanding seems to be a world-wide problem.[19] As indicated above, we think that both economists and non-economists commonly believe that economists measure what actually happens when a tax is introduced, i.e. the Pigovian excess burden. It can therefore be argued that the economists, by their move from the Pigovian to the modern interpretation of excess burden, have exaggerated the negative side effects of taxes and have given the public, and the politicians, a misleading picture of the consequences of major changes in the tax systems in many countries during the recent decades.

One simple solution is that economists use longer and more descriptive terms in which the reference point is explicitly stated, as for example:

"Compared to the situation before the introduction of the tax, this tax would lead to …"

"Compared to a hypothetical situation in which the same tax revenue was raised by lump sum taxation, this tax would lead to …"

Explicitly adding the point of reference would make it possible for students of economics and non-economists to make their own judgements about what are the important side effects

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[18] See, for example, Feldstein (1997) who writes: "Although we as economists accept [the modern concept of excess burden] for evaluating the total cost of increased government spending, we have not done a good job of communicating this framework to policymakers and to the broader public […] I have yet to meet a noneconomist outside a classroom who understands that it is the deadweight loss of resource misallocation that we economists think of as the true cost of raising taxes" (p. 209).

[19] For example, in a book published by the World Bank (World Bank Staff, 2003) with the explicit purpose to assist particularly developing and transition countries to "[…] evaluate the cost, efficiency, and equity impact of tax expenditures" (p. xi), the impacts of taxes on efficiency are explained in the following way: "Tax measures that are designed to improve equity also affect economic efficiency, in that they influence behavior […] The issue then becomes how to achieve the desired outcome with the smallest possible loss in economic efficiency" (p. 22). It is pointed out that efficiency is measured by excess burden, which is explained in the following way in the main text: "By influencing prices or costs, tax measures reallocate resources and real income among markets. They also impose compliance costs on taxpayers, as well as administration and financing costs on government. The net effect of these various influences on overall real income, which may be termed the *change in the excess burden of taxation*, signals an improvement or reduction in economic efficiency […]" (p. 21, italics in the original). The (modern) concept of excess burden is explained in an appendix (pp. 33-44), which is too technical for most non-economists. There is no explicit discussion on the reference point of this concept or of the (Pigovian) concept of excess burden. The main text obviously refers to the latter concept; it is, for example, argued that tax measures affect efficiency "in that they influence behavior" (p. 22).

of different taxes, and it would drastically reduce the risks for misunderstanding and unclear arguments in tax policy debates.

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