Clarifying Distributional Tax Incidence: Who Pays Current Taxes vs. Tax Reform Analysis*

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Abstract

This paper proposes a new way to do distributional tax incidence better connected with tax theory. It is crucial to distinguish *current* distributional analysis from *tax reform* distributional analysis. Current distributional analysis shows the current tax burden by income groups and should assign taxes on each economic factor without including behavioral responses: taxes on labor should fall on labor earners, taxes on capital on the corresponding asset owners, and taxes on consumption on consumers. This allows to distribute both pre-tax and post-tax current incomes and measure the economically relevant tax wedges on each factor without having to specify behavioral responses. Tax reform distributional analysis shows the impact of a *tax reform* and should describe the effect on pre-tax incomes, post-tax incomes, and taxes paid by income group separately and factoring in potential behavioral responses. Various scenarios can be considered given the uncertainty in behavioral responses. We illustrate our methodology using a simple neo-classical model of labor and capital taxation.

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1 Introduction

How the tax burden is distributed between the working class, the middle class, and the rich is perhaps the most important aspect of the tax policy debate. Therefore, it is critical to have a sound and practical way to assign the existing tax burden by income groups, and analyze how proposed tax reforms would affect each group. Theoretically, this is the classical question of tax incidence in public economics (see Fullerton and Metcalf, 2002 for a survey). Empirically, distributional tax analysis of the full tax system was first produced in the United States following the founding work of Colm and Tarasov (1940), Musgrave et al. (1951), and Pechman and Okner (1974). Since then, US government agencies (the US Treasury, the Congressional Budget Office, and the Joint Committee on Taxation) as well as think-tanks (most notably the Tax Policy Center) have developed sophisticated models for distributional tax analysis of all federal taxes.[1]

Distributional tax tables serve two purposes. First, they display the current distribution of income and taxes across income groups. This is crucial information to judge the current level of inequality and how taxes *directly* affect the distribution of income. From now on, we call these tables the *current distributional tax tables*. Second, distributional tax tables are also used to evaluate the consequences of a proposed tax reform. Such tables show how much extra (or fewer) taxes each income group would pay following the tax reform which is important information to assess the tax reform desirability. From now on, we call these tables the *distributional tax reform tables*. In standard distributional analysis, these two tables are typically presented together and the assignment of taxes to individuals follows the same methodology in both cases.

This paper argues that these two tables are conceptually distinct and hence that different methodologies should be used to distribute incomes and taxes in each of the two cases. This new methodology in turn resolves various conceptual and practical issues with current practice.

Current distributional tax analysis should assign current taxes paid without incorporating any behavioral responses. Taxes based on labor income should fall on the corresponding workers, taxes based on capital or capital income should fall on the owners of the corresponding assets, taxes based on consumption should fall on the corresponding consumers. This is the only way to be able to talk coherently about pre-tax, after-tax incomes, and taxes paid as they currently exist and consistent with the actual economic aggregates. This provides distributional information and the economically relevant tax rates imposed on each economic factor, exactly as one writes

[1]The US has the most developed and sophisticated distributional tax models but such models are also used in a number of other countries. There is some work as well on how state and local taxes are distributed (ITEP 2018).

a theoretical model of taxation (Ramsey 1928, Diamond and Mirrlees 1971). There are pre-tax prices (relevant for production) and post-tax prices (relevant for consumption, savings, and work decisions). This is different from just following statutory incidence. For example, both employer and employee payroll taxes are a tax on labor and hence on workers. This analysis obviously does not provide any information on the behavioral responses to taxes and hence about any *indirect* effect of current taxes. But it also has the advantage of not being dependent on assumptions on behavioral responses. For example, the corporate tax is a tax on shareholders and hence on the use of capital in the corporate sector exactly as written in the Harberger (1962) model. The corporate tax possibly reduces wages of workers but any such reduction in wages is obviously factored in the current pre-tax incomes of workers.

Distributional tax reform analysis in contrast should incorporate behavioral responses and indirect effects of the proposed tax reform on pre-tax income to the best of our knowledge. However, it is crucial that indirect effects be presented as such: pre-tax incomes change relative to baseline rather than taxes are shifted and paid by another factor or income group. For example, a corporate tax cut is a reduction in the tax paid by shareholders but it might increase the capital stock and hence increase wages (and reduce the return on capital). The prospective table of pre-tax income, after-tax income, and taxes paid in the tax reform scenario can then be compared side to side to the current distributional tax table. This comparison provides the key information on the economic consequences of the proposed tax reform. Naturally, because there is uncertainly about the effects of tax reforms on the economy, it makes sense to consider sensitivity to various scenarios.

Our approach has three decisive advantages relative to current distributional tax practice. First, current practice distributes current taxes with the thought experiment: what would incomes be if all taxes were removed. In that scenario, incomes might well be higher (for example if people work or save more). Such "pre-tax incomes" do not sum up to actual aggregate income as defined in national accounts. For example, a person making $100,000 pre-tax today and paying $30,000 in taxes might have made $120,000 absent taxes and hence actually pays $50,000 in taxes. But this $120,000 hypothetical income is an abstract construct quite sensitive to assumptions. Second and recognizing this first difficulty, current distributional tax practice is done assuming that taxes do not affect GDP (so that income aggregates remain the same) but it still assumes that that taxes are partly shifted to other factors (e.g., the corporate tax is shifted partly to labor). But such shifting originates from behavioral responses that would affect GDP. Hence, the methodology is not conceptually coherent with economic theory modeling. Third, the tables commingle the tax burden with changes in pre-tax incomes through tax incidence.

For example, a corporate tax cut is seen (partly) as tax reduction on workers. We think it is more useful to say that cutting corporate taxes could increase workers' wages rather than say that the tax burden on workers would fall.

This paper will use a simple model of labor and capital taxation to illustrate the differences between current practice and the new methodology we advocate.

2 Current Distributional Tax Tables

Simple model. To develop our argument, it is useful to consider a simple model of labor and capital taxation to illustrate the issues. The model is chosen for its simplicity but also for its economic substance. The model can be extended along various dimensions to consider specific issues.

On the production side, the model is competitive with an aggregate production function $Y = F(K, L)$ with constant returns to scale where K is capital and L is labor. We denote by w the pre-tax wage rate and by r the pre-tax rate of return on capital. Profits maximization leads to the standard conditions: $w = F_L$ and $r = F_K$. Because of constant returns to scale, there are no pure profits and $F(K, L) = rK + wL$ so that output can be simply divided into capital income rK and labor income wL. We denote by σ the elasticity of substitution between capital and labor in the production function and by $\alpha = rK/Y$ the share of capital income in the economy.[2]

On the supply side, we assume that labor and capital incomes are taxed at constant rates τ_L and τ_K so that the net of tax returns to labor and capital are $\bar{w} = w \cdot (1-\tau_L)$ and $\bar{r} = r \cdot (1-\tau_K)$. Labor and capital supply depend solely on their net-of-tax returns so that $L = L(\bar{w})$ and $K = K(\bar{r})$. We denote by e_L and e_K the corresponding labor and capital supply elasticities with respect to the net-of-tax returns $\bar{w}$ and $\bar{r}$.

This could be micro-founded with a simple two class economy. Workers have individual utilities of the form $u^L(c, l) = c - l^{1+1/e_L}/(1 + 1/e_L)$ (c is consumption and l is labor supply) which they maximize under the budget $c = \bar{w} \cdot l + R$ (R denotes government transfers). Capitalists have similarly a (reduced form) utility function of the form $u^K(c, k)$ increasing in consumption $c = \bar{r}k$ and declining in k (reflecting the cost of supplying capital to production). The idea is that if the net-of-tax return increases, capitalists are willing to supply more capital (either by saving more, by bringing capital from another sector–e.g, housing–into the production sector,

[2]With Cobb-Douglas production functions of the form $F(K, L) = A \cdot K^{\alpha} L^{1-\alpha}$ then $\alpha = rK/Y$ is constant and $\sigma = 1$ is also constant. With a CES production function $F(K, L) = [\mu K^{(\sigma-1)/\sigma} + (1-\mu) L^{(\sigma-1)/\sigma}]^{\sigma/(\sigma-1)}$ the elasticity of substitution σ is constant.

or by bringing capital from abroad). In the two standard economic models, this elasticity e_K is infinite. In the infinite horizon consumption model, in steady-state, $\bar{r}$ has to be equal to the discount rate δ which means that any deviation of $\bar{r}$ from δ leads to an explosive or implosive long-run capital stock. In the open economy model where capital moves freely and costlessly from country to country but capital is taxed where it is used (as is the case with standard territorial corporate taxes), capital must earn the same return (net-of-tax) everywhere so that $\bar{r}$ has to be equal to the world wide net-of-tax return, creating again an infinite elasticity. An infinite elasticity is obviously not realistic. If people care about wealth per se (in addition to consumption) when making savings decisions, then the supply of capital is finite even in the long-run (Saez and Stantcheva, 2018). If there are costs in moving capital across countries, or people care about where their capital is used or worry about country risk, then the supply elasticity of capital will be finite in the open economy model.

The following four equations determine the equilibrium (w, r, K, L) of the model as a function of the tax rates τ_L, τ_K, the production function $F(.,.)$ and the supply functions $L(.), K(.)$.

$$r = F_K(K, L), \quad w = F_L(K, L), \quad L = L(w \cdot (1 - \tau_L)), \quad K = K(r \cdot (1 - \tau_K)). \tag{1}$$

If we make the additional assumption that labor supply L is inelastic ($e_L = 0$), then it is convenient to express everything in terms of capital per unit of labor $k = K/L$. As L is fixed, the supply of k depends solely on $\bar{r}$: $k(\bar{r}) = K(\bar{r})/L$. We can define $f(k) = F(1, K/L) = F(K, L)/L$ as output per unit of labor. We have $F_K = f'(k)$ and $F_L = f(k) - kf'(k)$ so that the complete equilibrium (k, w, r) is determined by the three equations:

$$r = f'(k), \quad w = f(k) - kf'(k), \quad k = k(r \cdot (1 - \tau_K)). \tag{2}$$

This simple model has the advantage of being representable in a standard demand and supply for capital diagram as depicted on Figure 1. Even though this is a general equilibrium model, the diagram is the same as the standard textbook one market model of tax incidence. The demand for capital is equation $r = f'(k)$ and is downward sloping (as $f''(k) < 0$). The supply for capital is equation $k = k(r \cdot (1 - \tau_K))$ and is upward sloping (it would be flat if $e_K = \infty$). $w = f(k) - kf'(k) = \int_0^k f'(k')dk' - rk$ is the surplus accruing to workers and can be read off as the area below the demand curve and above the horizontal line at r. Correspondingly, the surplus accruing to capitalists is the area above the supply curve and below the horizontal line at $\bar{r} = r \cdot (1 - \tau_K)$. Capital taxes are the rectangle $(r - \bar{r})k$ and the triangle pointing toward the no tax equilibrium $f'(k^*) = r^*, k(r^*) = k^*$ is the usual deadweight burden. It is the loss in surplus of workers and capitalists created by the tax τ_K over and above its revenue yield $(r - \bar{r})k$.

Proposed *current* distributional tax analysis. How should we describe such an economy and represent it in a current distributional table? wL is obviously labor income and rK is capital income in the economy as would be measured in national accounts. While it is true that τ_K affects w negatively, w is the actual pre-tax wage rate in the economy. Similarly, τ_K affects r positively, but the actual pre-tax rate of return is r and not the lower r^*. Hence, in this case, the natural description of the pre-tax and post-tax incomes, and tax paid is the following: pre-tax labor income is wL, post-tax labor income is $\bar{w} = w(1-\tau_L)L$, workers pay $\tau_L wL$ in taxes. Pre-tax capital income is rK, post-tax capital income is $\bar{r}K = r(1-\tau_K)K$, and capitalists pay $\tau_K rK$ in taxes. Naturally, this description of incomes and taxes is silent on how taxes affect the economy.

It is important to emphasize that our assumption is more than "accounting" because it respects the relevant economic incentives of producers and individuals. In our economy, w and r are indeed the relevant prices for production decisions. $\bar{w}$ and $\bar{r}$ are indeed the relevant prices for supply decisions. We define taxes as the wedges between this production and supply prices. We will see below indeed that optimal tax analysis is about determining these tax wedges τ_L and τ_K.

Contrast this with actual distributional tax analysis. Actual distributional analysis would ignore the deadweight burden and consider that capital taxes $r\tau_K K = (r-\bar{r})K$ are shared by capitalists who pay $(r^*-\bar{r})K$ and by workers who pay $(r-r^*)K$. Pre-tax income of workers is $wL+(r-r^*)K$ and pre-tax income of capitalists is $rK+(r^*-\bar{r})K = (r^*-\tau_K r)K$. These concepts are neither the actual incomes going to workers and capitalists pre-tax nor the incomes that would go to workers and capitalists absent taxes (as the change in K and deadweight burden are ignored). This might be an defensible assumption for small taxes (where deadweight burden is second order), in practice, actual taxes are large. Of course, if the supply of capital is inelastic, then there is no deadweight burden and no change in K and hence the actual analysis boils down to the analysis we propose. However, if the supply of capital is perfectly elastic, then the capital tax is borne fully by labor and would be equivalent to a tax on inelastic labor, even though the two taxes have drastically different efficiency implications.

Side of the market irrelevance. Tax incidence almost invariably starts from the fact that which side of the market has to legally remit the tax is not relevant so that the question "Who pays the tax?" does not have an obvious answer. The canonical example used is the employer vs. employee payroll taxes. We fully agree. Indeed, in our model, both employer and employee payroll taxes are a tax on the labor income factor and hence should both be assigned to labor

income. On the production side, what matters is the full pre-tax price of labor w including employer payroll taxes. On the supply side, what matters is the net-of-tax price of labor $\bar{w}$ net of employer and employee taxes on labor. The wedge between w and $\bar{w}$ should include all taxes falling on the labor income factor. But our approach does not require to further understand the behavioral responses to taxes, and hence is applicable broadly.

Corporate tax. The corporate tax is the tax whose incidence has been the most debated. In our approach, the corporate tax is a tax on profits earned by the shareholders of corporations. Therefore, the corporate tax should be assigned fully on them in the current distributional tax table, regardless of its wider economic consequences. In particular, with our assumption, corporate profits are indeed taxed twice by the corporate income tax and by any additional individual income tax paid when profits are distributed to shareholders.

Taxes on mixed business income. Business income is a mix of labor income (the labor effort of the owner) and capital income (the return on the business assets). National accounting or income tax data cannot separate cleanly the two components. How then should we assign the corporate income tax on a closely held business or the individual income tax on pass-through businesses? With our methodology, such taxes are assigned directly on the owners themselves who supply both the labor and the capital so we do not need to separate labor and capital to assign taxes either.

Consumption taxes. Consumption taxes can be defined as taxes that are paid on the basis of consumption. Excise and retail sales taxes being the simplest cases. In this case, we assign the tax fully on the final consumer of the good regardless of whether the tax is paid by the consumer itself or the retailer. With a value-added-tax (VAT), final consumers face a price that includes the VAT while all producers face prices (either when buying inputs or selling output) that exclude the tax as taxes paid on inputs are refunded when selling output.

Progressive consumption tax. A progressive consumption tax that exempts net savings from taxation and adds net dissaving to the tax base (i.e., that extends the traditional pension treatment to all forms of savings) falls on individuals based on their consumption. As savings are concentrated at the top of the income distribution (Saez and Zucman, 2016) with negative savings at the bottom and positive and large savings rate at the top, moving to a progressive consumption tax would be regressive when distributional impacts are assessed relative to income

percentile.[3]

Another form of consumption tax with some progressivity has been proposed by Bradford (the X-tax) and Hall and Rabushka 1985 (the flat tax). This "flat tax" is a tax on wage income combined with a cash flow tax on business profits with full expensing of investment instead of depreciation of capital assets over their lifetime as in regular corporate taxes.[4] Using our methodology, the flat tax would be assigned on the corresponding wage earners and the corresponding business owners.

While economists often assume that the "flat tax" is equivalent to a flat consumption tax (such as a VAT), the distributional impact is actually quite different when measured on an annual basis. A worker who saves most of his income consumes little and hence pays no consumption tax. In contrast, the worker would pay the "flat tax" on wage earnings. The "flat tax" exempts investment while the consumption tax exempts savings. Investment is made through business owners who might be quite different from savers. We think that this practical distinction is more important than the economic equivalence of both taxes.

3 Distributional Tax Reform Tables

Let us now turn to distributional tax reform tables. We are now considering a specific tax reform (say a change $d\tau_K$ in τ_K). How should the consequences of such a tax reform be presented in distributional tables? In this case, we think it makes full sense to incorporate behavioral responses to the best of our knowledge but it is crucial to make clear what changes are the mechanical consequence of the tax reform–the change in post-tax incomes keeping pre-tax incomes constant–vs. the indirect consequence of the tax reform through behavioral responses affecting pre-tax incomes.

Tax incidence analysis. Let us illustrate the analysis of tax incidence in the simple model we have laid out above. Let us consider a small increase in the capital tax rate $d\tau_K$ and trace out the effects dK, dL, dr, dw. Differentiating the 4 equations in (1), we have two equations on the production side:

$$\frac{dK}{K} - \frac{dL}{L} = \sigma \cdot \left[\frac{dw}{w} - \frac{dr}{r}\right], \quad L \cdot dw + K \cdot dr = 0.$$

[3]Proponents of consumption taxation might argue that individuals should be ranked by consumption rather than income when assessing progressivity. To our knowledge, such distributional tables have not been produced, in large part because there is no good micro-data in the United States measuring both income and consumption especially at the top of the distribution.

[4]TCJA provides full expensing for five years 2018-2022 with a phased-in return to depreciation over the next five years.

The first equation is the definition of the elasticity of substitution σ between labor and capital. The second equation is obtained by differentiating $F(K,L) = rK + wL$ and using $F_K = r$ and $F_L = w$. The second equation is very important and states that the factor price effects sum to zero: what labor loses due to reduced wages is exactly what capital gains through a higher return.

On the supply side, we have two equations:

$$\frac{dK}{K} = e_K \cdot \frac{d\bar{r}}{\bar{r}} = e_K \cdot \left(\frac{dr}{r} - \frac{d\tau_K}{1-\tau_K} \right), \quad \frac{dL}{L} = e_L \cdot \frac{d\bar{w}}{\bar{w}} = e_L \cdot \frac{dw}{w}.$$

Combining and rearranging, we obtain on the capital side:

$$\frac{dr}{r} = \frac{(1-\alpha)e_K}{(1-\alpha)e_K + \alpha e_L + \sigma} \cdot \frac{d\tau_K}{1-\tau_K}, \quad \frac{dK}{K} = -e_K \cdot \frac{\alpha e_L + \sigma}{(1-\alpha)e_K + \alpha e_L + \sigma} \cdot \frac{d\tau_K}{1-\tau_K},$$

and on the labor side

$$\frac{dw}{w} = \frac{-\alpha e_K}{(1-\alpha)e_K + \alpha e_L + \sigma} \cdot \frac{d\tau_K}{1-\tau_K}, \quad \frac{dL}{L} = -e_L \cdot \frac{\alpha e_K}{(1-\alpha)e_K + \alpha e_L + \sigma} \cdot \frac{d\tau_K}{1-\tau_K},$$

These equations display the usual lessons from tax incidence. First, if $\sigma = \infty$, then by definition there is no effect on factor prices r and w and a capital tax increase affects solely capital through pure supply side responses: $dK/K = -e_K d\tau_K/(1-\tau_K)$. Second, if $\sigma < \infty$, then capital supply responses affect factor prices, spreading partly the incidence of the tax on labor. Third, the fraction of the tax shifted on labor is defined as $(dr/r)/(d\tau_K/(1-\tau_K))$, i.e., the factor price percent change relative to the percent change in the net-of-tax rate change. It is equal to $s_{L\tau_K} = (1-\alpha)e_K/[(1-\alpha)e_K + \alpha e_L + \sigma]$. The shift on labor increases with e_K and decreases with e_L (as elastic factors avoid the burden and inelastic factors bear them). The shift on labor is 100% when $e_K = \infty$. The shift on labor is small whenever e_K is small relative to σ. Symmetrical equations could be written for a change in the labor tax $d\tau_L$. The general lesson is that if supply elasticities are small relative to σ then there is little shifting and each factor bears its own tax. Empirically, as $\sigma \simeq 1$, it would take a large e_K to see significant shifting of $d\tau_K$ on labor. For example, with a capital share $\alpha = 1/3$, $e_L = 0$, it takes a value $e_K = .5$ to get a 25% shifting of $d\tau_K$ on labor, the assumption currently made in distributional tax models.

In the special case where L if fixed, $e_L = 0$, and $k = K/L$, the equations simplify to:

$$\frac{dr}{r} = \frac{(1-\alpha)e_K}{(1-\alpha)e_K + \sigma} \cdot \frac{d\tau_K}{1-\tau_K}, \quad \frac{dk}{k} = -e_K \cdot \frac{\sigma}{(1-\alpha)e_K + \sigma} \cdot \frac{d\tau_K}{1-\tau_K}, \quad dw = -rdk.$$

This is illustrated on Figure XX2 again in the special case where $e_L = 0$. The increase in τ_K shifts the equilibrium. The reduction in $\bar{r}$ along the supply curve is attenuated by an increase

in dr along the demand curve. Hence, the response dk is attenuated (relative to the case where r is fixed). Capital tax revenue is $\tau_K rk = (r - \bar{r})k$. Its change can be decomposed into three terms depicted on the graph:

$$d[(r - \bar{r})k] = -kd\bar{r} + kdr + (r - \bar{r})dk. \tag{3}$$

The first term $-kd\bar{r} > 0$ is the direct effect due to a lower net-of-tax rate of return $\bar{r}$. The second term $kdr > 0$ is due to a higher pre-tax rate of return r. Importantly, this term is exactly equal to $-dw$, i.e., what is lost by workers due the reduction in the wage rate w. Hence, this extra tax revenue is shifted onto workers in the form of reduced wages. Rather than saying that workers pay part of the capital tax, it is more accurate to say that the capital tax affects negatively workers' pre-tax income. The third term is the tax revenue lost due to the supply side response of capital (itself triggered by $d\bar{r}$). This tax revenue loss is exactly equal to the increase in the deadweight burden triangle of the tax.

Optimal tax analysis. Optimal tax theory aims at determining whether a given tax reform is desirable and ultimately what is the best tax system (i.e., the tax system that no further reform can improve upon). Optimal tax analysis follows from tax incidence analysis by simply aggregating the welfare gains (or losses) of a given tax reform across all individuals. These welfare gains/losses are aggregated using *social marginal welfare weights*. The social welfare weight on a given individual measures the social value of one additional dollar of disposable income to this individual. For example, if the social objective is utilitarian (the most widely used objective among economists), the social marginal welfare weight is simply the marginal utility of disposable income of the individual. If the aggregate welfare gains of the tax reform is positive, the tax reform is desirable. Hence, at this high level of abstraction, tax incidence can be seen as providing the *positive* analysis of the consequences tax reform. Optimal tax theory adds a *normative* objective that states how gains and losses should aggregated across individuals so that we can decide whether a tax reform is desirable or not.

Optimal tax theory can equivalently be seen as solving an equity-efficiency trade-off. If social marginal welfare weights are decreasing with income (for example if the objective is utilitarian and marginal utility decreases with disposable income), then taxing the rich to redistribute toward the poor is desirable. However, taxing the rich might reduce their economic activity so that less revenue is collected and redistributed than a static calculation implies. The analysis of such behavioral responses is precisely what tax incidence is about. Whether the tax is nonetheless worth it is what optimal tax analysis is about.

Let us again illustrate this with our example. Suppose the social marginal welfare weight on capitalists is zero (e.g., all residents are workers only and the country needs to attract capital from abroad). Suppose for simplicity that $e_L = 0$. In this case, workers set τ_K in order to maximize their income $w + (r - \bar{r})k$ where w is the wage and $(r - \bar{r})k$ is the tax collected from capitalists. The first order condition for the optimum τ_K is such that

$$dw + d[(r-\bar{r})k] = -kd\bar{r} + (r-\bar{r})dk = -kd\bar{r} \cdot \left[1 - \frac{r-\bar{r}}{\bar{r}} \cdot \frac{\bar{r}}{k}\frac{dk}{d\bar{r}}\right] = -kd\bar{r} \cdot \left[1 - \frac{\tau_K}{1-\tau_K} \cdot e_K\right]. \quad (4)$$

The first equality comes from equation (3) combined with $w + rdk = 0$. At the optimum, this should be zero leading to the usual inverse elasticity rule optimal tax rate $\tau_K^* = 1/(1+e_K)$. One key thing to note is that the optimal tax rate depends solely on the supply side elasticity e_K and not at all on whether the tax on capital is shifted on workers. In other words, the supply side elasticity is a sufficient statistics for the optimal tax rate (and the elasticity of substitution σ is irrelevant). The intuition for this result can be seen on Figure XX2. The workers welfare is the wage area w plus the tax rectangle. When increasing τ_K, the reduction in wages dw is directly compensated by the increase in tax revenue kdr so that this nets out. As a result, the tradeoff is solely about the mechanical increase in tax revenue $kd\bar{r}$ vs. the revenue loss due to the supply side response $(r - \bar{r})dk$. Another way to put it is as follows: if τ_K is bad for w, it is good for r, and hence the wage loss dw is entirely recouped by taxing this extra return kdr 100% keeping the incentive for capitalists $\bar{r}$ unchanged.

This result is a special case of a much more general result first developed by Diamond and Mirrlees (1971) in their pathbreaking optimal tax study. Optimal tax formulas can be expressed solely in terms of supply side elasticities (for input factors such as labor) or demand side elasticities (for consumption goods), and social marginal welfare weights. Conditional on these statistics, elasticities of substitution across factors in production are irrelevant. Diamond and Mirrlees (1971) did not connect their result to tax incidence analysis and the tax incidence literature does not seem to have realized the importance of the result for their analysis either. The result implies that the effects of taxes on production prices that are at the heart of tax incidence analysis since Harberger (1962) are actually not normatively relevant.

How can such a result be squared with the usual intuition that if the tax on capital hurts wages, it makes the tax less desirable to workers? The reasoning is the following. If the tax on capital hurts wages, it also means that it increases the rate of return, hereby transferring pre-tax income from workers to capitalists. However, this zero-sum transfer can be undone by reducing the tax on workers (and correspondingly increasing the tax on capitalists).

Distributional tax tables. Distributional tax tables show how actual taxes paid are distributed across income groups. For example, CBO constructs series of pre-tax incomes and taxes paid by quantiles of the distribution. Distributional tax tables are also created to assess how the level and distribution of taxes would change following a specific tax reform. JCT (and TPC outside government) create such tables systematically for proposed legislation. These two types of distributional tables are conceptually distinct but methodologically blurred together. Let's call the first type *current distributional tax table* and the second type *tax reform distributional table*. Both play a significant role in the tax policy debate.

Assigning taxes to individuals requires making assumptions. E.g., who pays the corporate income tax? This is also called tax incidence but although it differs greatly conceptually from the tax incidence from public economics described above often leading to confusion.

Current distributional tax tables aim at distributing the actual taxes paid across income groups. This is a very different question from the true tax incidence question: what would happen to incomes and welfare if all taxes were eliminated?

First and most obviously, eliminating all taxes is not a realistic scenario as taxes collect a large share of national income and are used to fund vital government activities and programs. Eliminating all taxes and transfers would lead to chaos. If such chaos could be described, one would find that the current system of taxes and spending is preferable to this chaos for most. Hence taxes and government spending increase welfare for most which is why we have them in the first place.

Second, one might argue that the exercise is instead about considering an abstract scenario where all taxes are eliminated but somehow all government functions and spending remain in place so that the economy can keep going. In this case, if there are behavioral responses of taxes, economic agents will change their behavior, and disposable incomes would grow not only by the amount of taxes that used to be paid but also by the excess burden that such taxes used to create. Hence, the tax burden lifted out of taxpayers is more than the amount of taxes they paid. Hence, the tax burden is not consistent with taxes actually paid.

Third, one might argue that behavioral responses to taxes are sufficiently small that the excess burden is negligible relative to tax revenue. In this case, the tax burden is approximately equal to taxes actually paid. This is conceptually sound but creates two additional issues: (1) if behavioral responses are negligible then redistribution using taxes is costless which is a very strong statement that government agencies might not want to make, (2) if behavioral responses are negligible then effects on pre-tax prices are going to be negligible as well in the standard competitive model. If the supply of capital and labor is inelastic, then the pre-tax factor prices:

rate of return on capital and wage rates are not affected with taxes. Hence, taxes cannot be shifted either. In particular, the corporate tax cannot be shifted partly to wages as current modeling assumes.

Therefore, based on all those issues, the current approach does not make sense. One has to step back and ask the question: what are we trying to achieve with distributional tables? Distributional tables should inform tax policy making and there are 2 crucial (but currently conflated) steps in this process.

First, distributional tables should describe the current situation: what is the current distribution of income both on a pre-tax basis and on a post-tax basis and how much each group currently pays in taxes. This analysis informs the public and policy makers on the current state of affairs and how much redistribution the current tax system is already doing, and the average tax rate that various income groups are currently paying. It is also useful to carry out this exercise systematically to follow evolutions overtime (and possibly predict evolutions in the future). This is in principle what the CBO attempts to do. For this analysis, it does not make sense to include behavioral responses. Current taxes should be assigned to individuals in the way that makes most sense to inform policy making which we will tackle below.

Second, tax reform distributional tables should describe how a specific (and in principle doable) tax reform would affect the economy overall and various income groups: how pre-tax, post-tax incomes, taxes paid, and welfare would change for each income group. Ideally, such tables include all behavioral responses and tax incidence analysis to the best of our knowledge. Such a distributional table effectively gives the public and policy makers the key information needed to decide whether the reform is desirable. For example, if we believe that the corporate tax is shifted on wages, then a corporate tax cut would show pre-tax income of wage earners increase. Instead of saying that the corporate tax cut reduces taxes paid by workers, it would explicitly say that wages are increasing. Obviously, because there is significant uncertainty in tax incidence, various scenarios might be provided.

4 Practical Objections

In this section, we discuss potential objections to our simple tax incidence proposed methodology.

Taxes on close substitutes. In empirical tax analysis, capital income taxes are spread on all capital assets because investors arbitrage across different assets. For example, an increase in

the tax rate on interest income should reduce the rate of return on tax exempt municipal bonds. In our proposed current distributional tax methodology however, interest from municipal bonds does not bear any tax. As a result, if wealthy individuals are fully invested in munis, they escape entirely income taxes. However, their rate of return is going to be low (relative to taxable investments), and hence their pre-tax incomes are nonetheless depressed. Our methodology would capture that the pre-tax incomes of the wealthy are depressed but would not single out taxes as the culprit, while current methodology would impute higher incomes (and higher taxes) to the wealthy. In our view, it is safer to be descriptive rather than blindly trust perfect arbitrage. Naturally, when discussing the policy option of eliminating the tax exempt status of munis, it is expected that the rate of return on such bonds would increase, affecting pre-tax incomes and local government budgets, and this should be taken into account in the economists best prediction of the outcome.

Corporate tax: Harberger meets Diamond-Mirrlees. Harberger (1962) developed the canonical model of corporate tax incidence which has had an enormous influence. In the Harberger model, capital can be used either in the corporate sector and in the non-corporate sector with perfect substitution. Therefore, the net-of-tax rates of return on capital must be equalized across the two sectors (as investors care only about the net return). The corporate tax is modeled as a tax on capital used in the corporate sector. Therefore, the corporate tax creates a production inefficiency (as too little capital is used in the corporate sector relative to the non-corporate sector). As we know from Diamond and Mirrlees (1971), an optimal tax system should have production efficiency. Hence, the corporate tax, as modeled by Harberger, is a particularly inefficient form of taxation. Replacing it with a lower tax on *all* capital uses would create a Pareto improvement.[5]

[5]In optimal tax theory language, the corporate tax is second-best Pareto inefficient. This point does not seem to have been noted in the literature because of the chasm between applied tax analysis and theoretical optimal tax analysis.

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