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The Impact of Budgets on the Poor: Tax and Benefit Incidence

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I. Policy Significance of the Distributional Impact of Fiscal Systems

One of the most important goals of government policy is to address inequalities in the distribution of income and to try to improve the welfare of the poor. An important part of the theory and practice of public finance is dedicated to conceptualizing and measuring how the revenue and expenditure sides of government budgets affect the distribution of income among households. This is known as tax and expenditure incidence, or in short, fiscal incidence. This body of research allows us to understand how government policies change the distribution of income, how equitable these changes may be, and, in particular, how government policies actually help the poor.

Establishing the incidence of taxes is important because who actually bears the burden of taxes is generally quite different from those legally liable to make payment to the tax authorities. Establishing the incidence of government expenditures is important because not all expenditures benefit households of different income levels to the same extent. Even those government expenditures intended to benefit low income households may not do so because poor targeting or difficulties exist for the poor to have access to the public services. In short, the impact of government budgets on the distribution of income and the status of the poor is not immediate and general impressions regarding what the impact may be can be quite mistaken.

Incidence analysis is not only important but also, if done correctly, complex and difficult. Incidence analysis contains a blend of positive and normative issues. Asking the question of who benefits from and who pays for government services is eminently a positive question. However, judging the adequacy, desirability or rightness of these results is a normative question. Normative values are likely to differ, sometimes quite significantly across individuals, so we should not expect to always find consensus on the desirable degree of redistribution. Nevertheless, it would be a mistake to shy away from distributional and equity issues because they cannot be scientific. The distributional impact of government policy is in the core of what policy makers and ordinary citizens expect economists to do.

Ultimately, tax and benefit incidence analysis is an effective tool to review whether government tax policies and expenditure programs have the desired impact on income distribution and on the poor. Major tax reforms and large government expenditure programs are routinely undertaken in many countries with specific redistributive objectives, including lifting tax burdens borne by lower income groups and directly helping the poor. For example, understanding the incidence of expenditures on education and health vis-à-vis the poor is important because improved health and education status have been shown to be the most effective means of escaping poverty. Tax policy and public expenditures, especially the latter, are potentially powerful tools to combat poverty. Thus, an important question is whether government tax and expenditure policies have the intended effects. This is what benefit incidence analysis does.

Seen from a proactive perspective, one main goal of fiscal incidence analysis is to contribute to the design of good government policy. The right policy choices require information on which groups are likely to pay particular tax changes and which groups are more likely to benefit from expenditure programs. Policy makers have many questions about how to lighten the

burden of taxation for lower income groups and about how to increase the effectiveness of public expenditures. Is it possible to broaden the bases of a value added tax or flatten the rate structure of income taxes without decreasing the overall progressivity of the tax system? What is the better way to target public spending to improve the condition of the poor? Incidence analysis provides some critical information to help policymakers achieve a more equitable distribution of income and to improve the effectiveness of public policy.

Because of the large size of the literature related to distribution and equity issues in public finance and the many incidence studies that have been conducted, it is literally impossible to offer in this module more than an overview of the main issues. The main objectives of the module are to provide an adequate background on the conceptual bases of incidence analysis, highlight some of the key measurement issues, review the main techniques used to estimate tax, benefit and fiscal incidence, and summarize the empirical results that have been obtained for developing countries.

II. Concepts of Welfare and Equity and their Measurement

Since we are interested in measuring the incidence of taxes and government expenditures, we first need to agree on how we should evaluate the fairness of tax and expenditure outcomes.¹

Horizontal and vertical equity

Traditionally the two most accepted principles of fairness or equity in public economics are the principles of horizontal and vertical equity. The principle of horizontal equity calls for equal treatment of equal individuals, while the principle of vertical equity calls for the unequal treatment of unequal individuals. Vertical equity issues are at the center of tax and benefit incidence. The unequal treatment of equals may reflect different levels of tax enforcement, by source of income, for example. Perhaps wage income may be subject to withholding and other types of income not. Unequal treatment can also be the consequence of discrimination in public expenditure programs. The unequal treatment of equals is some times intended, as in the case of promoting savings for retirement or encouraging home ownership.

However, by themselves the principles of horizontal and vertical equity cannot help us evaluate the fairness of tax and expenditure outcomes unless we: (i) specify a way to measure equality, and (ii) define criteria for equal or unequal treatment. The first requires adopting a measure of individual welfare. The second requires the adoption of explicit fiscal criteria.

¹See for example Musgrave and Musgrave (1989), Zee (1995) and van de Walle (1998). The review of the philosophical foundations of fairness or equity is beyond the scope of this module. See Young (1994) for an interesting review of the different aspects of implementing the concept of equity. Our interest in equity is focused on the impact of government tax and expenditure policies.

Measuring individual welfare: utility, income, and capabilities

Economists typically approach the measurement of individual welfare by using the subjective concept of *utility*. This is an abstract concept that orders from best to worse all the possible states of the world in terms of the individual's preferences.

Given the general impossibility of measuring subjective utilities, in practice, we use *income* or other objective measures such as consumption or wealth to measure individual welfare. Income is the most frequently used concept and it is sometimes used as the equivalent of utility, but more often as a different alternative from the perspective of command over commodities and, therefore, a sufficient measure on its own. However, even these objective measures are not entirely free of ambiguity. There are many different concepts of income depending on what is included (e.g., do we include self-production of commodities or a value for leisure?) and when is income measured (e.g., annual income versus lifetime income).² This means that we always need to be careful with and explicit about the measurement that is being used.

Recently, Sen (1999) has proposed measuring individual welfare in terms of individual "*capabilities*." Sen argues that welfare should be assessed by the attainments of some basic capabilities, such as avoiding hunger or illiteracy, while income and individual preferences matter but only as influencing capabilities along with other things. This concept of individual welfare has not been widely used to this point.

In general and for practical reasons income measures of individual welfare are most commonly used. However, we must note that the choice of welfare measurement standards carries significant implications. For example, van de Walle (1998) describes the consequences on labor supply of a food program in Sri Lanka, where it was found that both men and women reduced their hours worked. Was this outcome good or bad? Clearly, the answer depends on the welfare measure adopted. By an income measure, it was bad. But by a utility measure, where additional leisure time is valued, the outcome may have been good.

Specifying fiscal criteria for equal treatment

The most general criterion for defining equal treatment is in terms of net changes in utility as the result of taxes and benefits received from public expenditures. Because in most situations changes in utility cannot be measured,³ the net equal fiscal change criterion is defined in terms of income changes. This criterion is more commonly known in a tax context of as the net equal sacrifice criterion.

²Income can also be measured with respect to the initial state, as proposed in the endowment or entitlement theories of social justice. These theories that if the unequal distribution of income is due to unequal endowment to which individuals are entitled (how smart you are) or to fair processes (such as the market mechanism) then there is no reason for redistribution. Or income can be measured with respect to end-state, as proposed in traditional welfare economics and in the contractual theories of social justice, in which case redistribution may be called for.

³Utilities can be explicitly specified in the context of a computable general equilibrium (CGE) model and changes in utility from government taxes and expenditures can be measured. This approach is discussed below.

Whether the net equal fiscal change criterion is measured in utility or in terms of income, the actual measurement needs to be further specified. In particular, we need to make a choice whether or not to measure equal changes in absolute terms or in terms relative to total utility of total income. When a relative measure approach is adopted, an additional choice needs to be made defining equality on average, or in marginal terms.

Two fiscal principles: Benefit versus Ability to Pay

Benefit and ability to pay are two commonly invoked principles of comparative treatment used in the context of tax incidence alone but which can be naturally extended to the context of fiscal —tax and expenditure benefits— incidence.

The benefit principle states that individuals should pay taxes according to the benefits they receive from public expenditures. This principle fits naturally within the context of fiscal incidence since it looks at both sides (revenues and expenditures) of government budgets, and is consistent with the concepts of horizontal and vertical equity. If this principle is obeyed, it means that no individual will bear any sacrifice from taxes since in the margin the net loss in utility or income from taxes would be equal to the net gain from government expenditures. If such a correspondence between taxes and benefits from expenditures were possible (and desirable), there would be little need for tax and benefit incidence analysis. However, this does not mean that there is no room for progressive taxation under the benefit principle.

From a policy standpoint, the benefit principle is applied in the application of tariffs or user charges for public services at the local level. As we will see in our discussion of tax incidence analysis, tariff and user charges for direct government services are excluded from consideration precisely because those payments are assumed to⁴ be offset in terms of individual welfare by the benefits received from those services.

Hence, what makes the benefit principle attractive, tying taxes to government expenditures, also makes it less useful because in reality just a small portion of government budgets employ this explicit linkage. To make the benefit principle operational we may have to guess how individuals benefit and use, for example, a head tax if we guess that they receive the same benefit. Another approach is to ask individuals how much they are willing to pay. This latter is also problematic because individuals would have an incentive to lie and act as free riders. In theory we can estimate individual demands for public goods (as in Bergstrom and Goodman , 1973) and use them to estimate willingness to pay for actual public services provided (Martinez-Vazquez, 1982). In reality most taxes are designed in isolation of the expenditures they will finance and most expenditure programs are implemented independently of particular taxes or who has paid them. The most fundamental problem with the benefit principle is that if those that benefit most from public expenditures are the poor, it may not be reasonable to demand that they pay for it.

⁴Buchanan (1964) shows that under the benefit principle progressivity is determined by both the income and the price elasticity of demand for public services. The greater the income elasticity and the smaller the price elasticity, the more progressive the tax price structure should be.

According to the “ability-to-pay” principle, individuals should pay taxes according to their abilities to bear the tax burden. Thus, this is a principle that is applied directly only to the revenue side of the budget and it severs any links between tax and expenditure policies. However, it would be possible to apply the ability to pay principle to the expenditure side of the budget by paraphrasing it as the “need-to receive” principle. That is, individuals should be the recipients of government services according to their needs for public services. Clearly, the ability to pay principle is also compatible with the notions of vertical and horizontal equity. But, in practice what the ability to pay principle means depends on how we measure ability to pay. Most of the time income is chosen as the indicator of the ability to pay. However, one more decision needs to be made. Should higher ability to pay of higher income individuals mean that they should pay higher absolute amounts or higher relative (to income) amounts? And if the latter is chosen, should it be expressed in average or relative terms? Typically, the progressivity of taxes is associated with average amounts that increase with income levels.⁵

Defining equity through redistribution and the use of social welfare functions

A concrete way to interpret equity is in the context of the redistributive impact of government policies. Accordingly, a tax-expenditure package or a tax and an expenditure program in isolation are equitable if the resulting distribution of income is less equal than it was before the policy was implemented. Given that income is chosen as the measure of individual welfare, this approach would appear to solve the ambiguities surrounding the measurement of equity. Unfortunately, things are not that simple.

In practice, changes in the distribution can be measured with basic descriptive indexes. The most commonly utilized index, which is discussed below, is the Gini coefficient. The problem arises because even these descriptive measures can be shown to make use of an implicit set of weights or relative importance for individuals on different income levels. For example, the Gini coefficient implicitly provides higher weights for changes in income for individuals that are closer to the mode of the distribution.

Thus, rather than using accidentally chosen weights for individuals of different incomes in judging the equity of government policies, it is generally preferable to explicitly choose those weights. But, this means that normative values are introduced in the measures of equality for income distributions. The Atkinson index,⁶ discussed below, is one of such normative measures, and attractive because it allows for many different profiles of individual weights. The Atkinson index also has the capability of representing a broad range of equity values (theories of distributive justice).

⁵One interpretation of the ability to pay principle is that everyone should bear an equal burden or be subject to an equal “sacrifice.” The classical economists understood this to mean an equal absolute sacrifice or an equal loss in utility for all income classes. Because it was accepted back then that the marginal utility of income is decreasing (one additional dollar adds less total utility the higher the initial level of income), then equal sacrifice meant that higher income groups should pay a higher tax. But it did not mean that taxes would need to be progressive. Actually the tax can be regressive or proportional and still meet the criterion of an equal absolute sacrifice.

⁶See Atkinson (1983).

Theories of distributive justice and their representation in social welfare functions

Social welfare functions are conventionally used in the theory of public finance to represent different approaches or views to income distribution.⁷ One of the most recognizable social welfare functions is the “utilitarian social welfare function” given by:

$$W = F(U_1, U_2, \dots, U_n),$$

It is assumed there are n individuals in society, and U_i represents the utility of the i th individual. The general guidance for income redistribution in this general formulation is that income should be redistributed, for example, through tax and expenditures policies for as long as W increases. The true implications for actual income distribution depend on the specific form the social welfare function takes and the weights attached to each individual’s utility. For example, if we assume that

$$W = U_1 + U_2 + \dots + U_n,$$

the level of social welfare does not change if we redistribute income. All individuals count the same regardless how rich or poor they are. A slight modification of the social welfare functions allows us to attach different weights to individuals as below

$$W = \delta_1 U_1 + \delta_2 U_2 + \dots + \delta_n U_n,$$

so that social welfare increases when income is distributed toward individuals with higher weights. This is why the δ receive the name of social weights. One extreme example of social welfare function known as the “maximin” criterion of income distribution is given by

$$W = \text{minimum of}(U_1, U_2, \dots, U_n),$$

where social welfare increases only when the welfare of the poorest individual increases. So in effect the weights attached to all individuals except the poorest individual are equal to zero.⁸

⁷A completely different approach is taken by positive or “public choice” models of income redistribution. These models focus on the determinants of redistribution of income through public policies. Classical studies by Peltzman (1980) and Meltzer and Richard (1981) find that the level of redistribution depends on the relative political/economic power of the rich and the poor and basically the costs and benefits to each group of changing the distribution. One basic prediction of these models is that the more unequal the income distribution, the larger the demand for redistribution. Other insights provided by the “public choice” approach to taxes include the fact that dominant economic groups can be more effective in protecting their interests (Best, 1976) and that politicians will implement tax reforms that maximize their political support (Hettich and Winer, 1999).

⁸The philosopher John Rawls (1971) popularized this social welfare function by arguing that individuals in an original position (impartial and fair) surrounded by a “veil of ignorance” would choose this approach to the distribution of income because it would offer insurance against possible disastrous outcomes.

III Measurement Issues: Changes in the Distribution of Income and Progressivity

As we have discussed in the previous section there are definitional and measurement issues surrounding the concepts of individual welfare and equity which researchers interested in incidence analysis need to know. In this section we review two other sets of measurement issues that are also important to the discussion, evaluation and presentation of fiscal incidence results. These are, first, the measurement and comparisons of different distributions of income, and second, the measurement of progressivity. Because these issues relate directly to both tax and expenditure benefit incidence, it is preferable to discuss them here prior to our in-depth discussion of incidence later on.

Measuring changes in income distribution

The Lorenz curve and the Gini coefficient: As we have seen in the previous section, we generally use the distribution of income as a way to identify inequality.⁹ In addition, the overall incidence of taxes and/or expenditures is generally measured via changes in the income distribution. One of the most commonly used approaches to measuring changes in the income distribution is the *Lorenz curve*, as depicted in Figure 1. The curve shows the relationship between the cumulative percentage of income on the vertical axis with the cumulative percentage of individuals on the horizontal axis. The Lorenz curve in effect maps the cumulative share of income received by the bottom X percent of individuals against X, where X is a scalar with range 0-100. Figure 1 also shows a straight line with a 45 degree angle that joins the southwest and northeast corners of the square. This straight line indicates a perfect equality in the distribution of income. The more bowed downward the Lorenz curve is the more unequal the distribution of income. Figure 2 shows two Lorenz curves. The more bowed curve (N) shows more inequality income distribution than the less bowed curve (M). Thus the comparison of Lorenz curves give an unambiguous reading of higher or lower inequality, for the same total income. But as we discuss below these straight comparisons are not generally possible when the curves cross each other.

A convenient way to summarize the information conveyed by the Lorenz curve is through the *Gini coefficient*, which graphically is the ratio of the area between the straight line and the Lorenz curve (area A in Figure 1) to the total area under the straight line (the sum of areas A and B in Figure 1).¹⁰ The value of the Gini coefficient is bounded between zero, for the case of full equality where the Lorenz curve coincides with the 45 degree straight line, and one, for the case where there is complete inequality and all income accrues to a single individual. The comparison of Gini coefficients for the distribution of income before and after tax reform can be used to analyze the incidence of tax or public expenditure changes. If the new income distribution is less bowed or closer to the 45 degree line the incidence of the fiscal change is progressive (or pro-poor). It is also possible to compare the Gini coefficient for the distribution of tax burdens, as represented by a concentration curve, and the Gini coefficient for the

⁹We should note that income and poverty are not necessarily identical concepts. As a general rule there is always some degree of inequality in the distribution of income but poverty will be present only if there are households whose entire incomes do not permit them to cover some minimum basic needs.

¹⁰Formally, the Gini coefficient is computed as half of the arithmetic average of the absolute differences between all pairs of income levels in the income distribution.

Figure 1

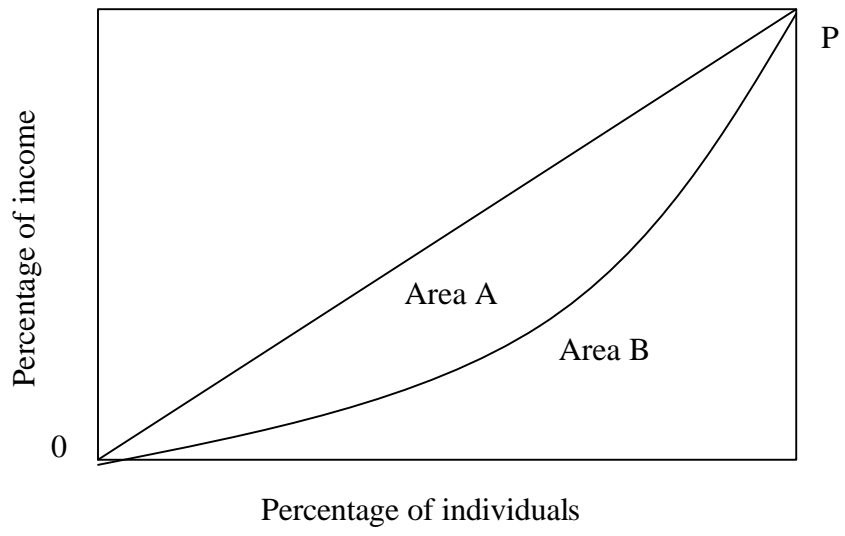
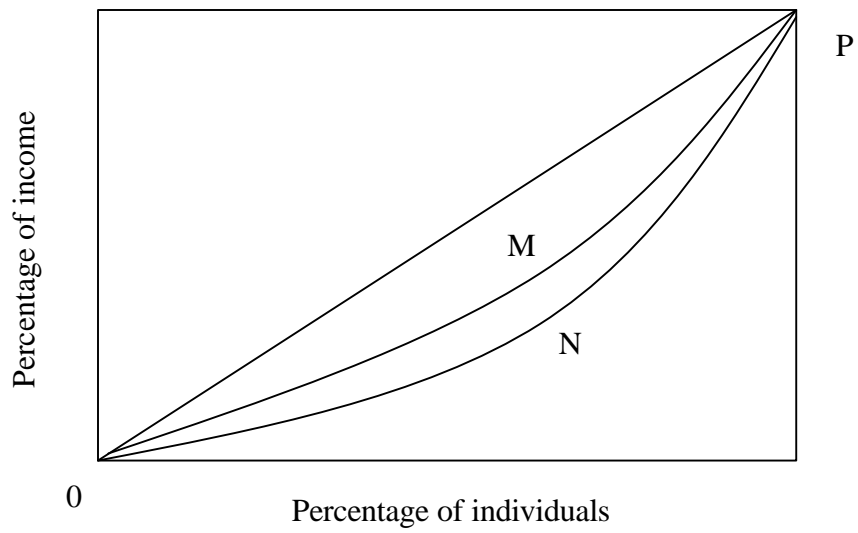


Figure 2
Comparison of Income Distributions



distribution of per capita income.¹¹ Thus, for example, if the Gini coefficient for the tax burdens is larger than that for per capita income, the tax is said to be progressive.

The expanded Gini coefficient and the Atkinson index: Several issues complicate the use of Lorenz curves. First, the Gini coefficient is not always an unambiguous measure of the changes in income distribution. Second, the straight forward use of Lorenz curves is not possible when the curves cross each other.¹²

Let us tackle first the issue of ambiguity. The general problem with the Gini coefficient, or similar measures of inequality, is that it implicitly provides weights to individuals of different income levels, or in other words, it assumes a particular form of the social welfare function. In particular, the Gini coefficient implicitly applies weights to each income group equal to their rank order.¹³ These weights may not at all reflect social values or even policy-makers' preferences toward inequality. Two solutions have been offered to this problem. The first proposed by Yitzhaki (1983) consists of using an "extended Gini" coefficient which allows for explicit weights for different income groups via a weighting parameter. A second, much more general, approach is to use inequality indexes that use explicit weights which are derived from explicit social welfare functions. One of the most accepted such indexes is the Atkinson (1983) inequality index. This Atkinson index uses an "inequality aversion parameter" which captures social aversion to inequality in the distribution of income.¹⁴ The Atkinson index in substance measures how much total income could be reduced if with the remaining income equally distributed society as a whole would have the same level of aggregate welfare as it does have now with the current distribution of income.

The problem that arises when the Lorenz curves intersect each other is that the curves are not directly comparable. The different shapes of the curves reflect the fact that they arise from different distribution processes, so in general it is not possible to move from one curve to the other by simply shifting income among different groups. In order to compare these distributions it is necessary to use an inequality index such as one of those discussed in the previous paragraph. But again, we need to be aware that different indexes in general will rank income distributions (as more or less equal) differently.

Other methods for comparing distributional impact: welfare dominance, concentration curves, and statistical testing: There are several methods for analyzing and comparing the

¹¹A concentration curve is a parallel concept to a Lorenz curve with households ordered from poorest to wealthiest on the horizontal axis and on the cumulative percentage of taxes paid on the vertical axis.

¹²An additional issue that will not be discussed here is that the shape of the income distribution may affect total income. For example, a more equal distribution of income may be achieved at the cost of lower average income. In this case, in order to compare distributions of income, the measure of inequality would need to account for changes in average income.

¹³This can be seen if the algebraic expression for the Gini coefficient is written as :

$$G = 1 + \frac{1}{n} - \frac{(y_1 + 2y_2 + \dots + ny_n) * 2}{(n^2 * \mu)}$$

where n is the number of individuals and y_i is the income of the i th individual, μ is average income, and where the subscript 1 indicates the highest income and n the lowest. Note that the size of the weights moves inversely with income.

¹⁴The Atkinson index, A , is defined as $A = 1 - y_e/\mu$, where y_e is the "equally distributed income," that is, the amount of income which if distributed equally would produce the same level of social welfare, and μ is average actual income. The definition of y_e uses an inequality aversion parameter z which is less or equal to one, as follows: $y_e = \{[(y_1)^z + (y_2)^z + \dots + (y_n)^z]/n\}^{1/z}$

incidence impact of taxes and expenditures. One of the most widely used methods is known as “welfare dominance.” This methodology, developed by Yitzhaki and Slemrod (1991) uses concentration curves. As remarked above, concentration curves are similar to Lorenz curves with households ranked from poorest to wealthiest on the horizontal axis and the cumulative percentage of taxes paid or benefits received on the vertical axis. In the case of taxes, the more bowed or further from the straight 45 degree line the concentration curve, the more progressive the tax. In the case of benefits from public expenditure, a progressive distribution of benefits implies a curve above the 45 degree straight line. The more progressive the distribution of benefits the more of a hump the curve will have. To be more precise, what does “welfare dominance” mean for example in the case of tax incidence? For any social welfare function that favors an equitable distribution of income, introducing a revenue neutral tax change by reducing taxes on good x (for example, food) and increasing taxes on good y (for example, jewelry) will improve social welfare when the concentration curve for the tax on food is everywhere above the concentration curve for the tax on jewelry.¹⁵

One attraction of the welfare dominance criterion is that the rankings it yields are valid for any social welfare function as long as it favors progressivity or a more equitable distribution of income. Thus the welfare dominance criterion is more general than the Gini coefficient, which is based on a social welfare function that also favors progressivity but it is restricted to a set of particular weights.¹⁶ However, the statistical tests for welfare dominance can be inconclusive. In that case we need to use a more general index of inequality such as the Atkinson index discussed above and assume particular weights for households in the social welfare function.

Measuring progressivity¹⁷

Progressivity is a key concept in analysis incidence. But, as in the case of income distribution comparisons, and as we will see not unrelated, there is much ambiguity that surrounds comparisons of relative progressivity. The issue is not with the definition of progressivity but with its measurement.

It is commonly accepted that a rate structure is progressive when the average tax rate rises with income, or what is the same, when the marginal rate exceeds the average rate).¹⁸ The rate structure is proportional when the average rate is constant and regressive when the average rate decreases with income, or what is the same, the marginal rate is less than the average.¹⁹

¹⁵Note that in the example the concentration curve for food is above the concentration curve for jewelry, because higher income households spend a larger share of their budgets on jewelry vis-à-vis the poor, while the poor spend a higher share of their budgets on food.

¹⁶Another attraction of the welfare dominance criterion is that statistical tests can be used to determine whether the concentration curves for different taxes are everywhere above one another. For example, Younger et al. (1999) use the Davidson and Duclos (1997) variance-covariance technique to test for differences in the ordinates of two concentration curves.

¹⁷The discussion in this section is based on Kiefer (1984) and Musgrave and Thin (1948).

¹⁸Let $T = f(Y)$ represent the tax T as a function of income Y . The average tax rate is the tax divided by income of T/Y and the marginal tax rate is $\Delta T/\Delta Y$. Progressivity can also be defined for benefit incidence. The incidence of an expenditure program is progressive when the average benefit decreases with income, or what is the same, when the marginal benefit is less than the average benefit as income increases.

¹⁹We need to be reminded that, of course, the actual redistribution associated with progressive taxes depends not only on the degree of progressivity of the tax system but also on the overall tax burdens. That is, highly progressive

The definition of progressivity, to focus on the most relevant case, is compatible with many different measures of the degree of progression and there is no generally accepted measure in practice. In fact, not only can different measures give different readings in the degree of progressivity but they can also yield readings in opposite directions: both increased and decreased progressivity.²⁰ Kiefer (1984) after reviewing the different indexes that have been used in the literature finds that those indexes are not consistent with one another and that, in many cases, their social welfare and policy implications are subject to serious question. When changes are introduced in the tax system and/or the income distribution, the indexes used give different and inconsistent readings about changes in progressivity.

Following Kiefer (1984) we can classify indexes of progressivity into two general groups.

The first group comprises indexes that just measure the distribution of tax burdens. These indexes, also known as “*structural*” indexes, are just a function of income (y) and the tax ($T(Y)$) paid on that income. The general form of a structural index of progressivity is $P_s = P_s(T(Y))$, where P_s is the structural index and $T(Y)$ is the tax function. Musgrave and Thin (1948) discuss the following structural indexes, where subscripts indicate time periods:

- Average rate of progression: the rate of change in the average rate of tax expressed as $(T_1/Y_1 - T_0/Y_0)/(Y_1 - Y_0)$
- Marginal rate of progression: the rate of change in the marginal rate expressed as $\{(T_2 - T_1)/(Y_2 - Y_1) - (T_1 - T_0)/(Y_1 - Y_0)\} / Y_2 - Y_1$
- Liability progression: the ratio of the percentage change in tax liability to the concurrent percentage change in income or $\{(T_1 - T_0)/T_0\} * \{Y_0/(Y_1 - Y_0)\}$
- Residual income progression: the ratio of the percentage change in income after tax to the percentage change in income before tax.

The second group of progressivity indexes measures the effect of the tax system on the distribution of income. These are called “*distributional progressivity indexes*” and their numerical value is a function of the tax structure, $T(Y)$, and also the distribution of income, $f(Y)$. Their general representation is given by $P_d = P_d(T(Y), f(Y))$. As Kiefer finds, the distributional progressivity indexes used in the literature are not consistent with one another and often their policy implications are subject to question. Two general groups of distributional progressivity indexes are found in the literature:

a. *Indexes Based on the Gini concentration index.* Examples include:

- The Effective Progression (EP) Index (Musgrave and Thin) expressed by $EP = (1 - G_a)/(1 - G_b)$, where G_a is the Gini index for after-tax income and G_b is the Gini index for before-tax income and when $EP > 1$ indicates progressivity.

taxes may achieve in reality little redistribution if overall tax burdens are light. See, for example Martinez-Vazquez (2001) discussion for Mexico.

²⁰As Musgrave and Thin (1948) have remarked this has left the field open for lobby groups to use the definition that most favor their position. Higher income groups would like to use measures that makes progressivity look the highest while low income groups would like to use measures that make progressivity look the lowest.

- The Pechman-Okner (PO) Index expressed by $PO = (G_a - G_b)/G_a$ and with $PO < 0$ indicating progressivity.
- The Reynolds-Smolenski (RS) Index expressed by $RS = G_a - G_b$ and with $RS < 0$ again indicating progressivity.

The main difficulty with this family of progressivity indexes is related to the problems associated with the use of the Gini coefficient to measure changes in the distribution of income, which was discussed above. The social welfare function associated with the Gini coefficient gives most weight to income transfers among individuals in income brackets close to the mode of the income distribution as opposed, for example to providing equal weights or providing higher weights to transfers in income at the tails of the income distribution. More generally, it is preferable to be explicit about the social welfare function used to provide weights for different income groups. This is, of course, the same conclusion we reached in our review of measures of changes in income distribution.

Indexes based on the concept of “Equally Distributed Equivalent “ level of income. The best known of these indexes is the Atkinson index, which we defined above as $A = 1 - y_e/\mu$, where y_e is the “equally distributed income,” that is, the amount of income which if distributed equally would produce the same level of social welfare, and μ is average actual income.²¹

Several lessons can be extracted from existing practices in the measurement of progressivity. First, since indexes used in the literature are based on particular measurements, the results in general are not directly comparable. Second, in applied analysis of tax incidence it should not be sufficient to choose arbitrarily a tax progressivity index, or several indexes with the hope that they will yield consistent results. Instead, it is preferable to rather choose among the existing progressivity indexes on the bases of their characteristics and implications.

Other measurement issues

Income versus consumption. The measures of progressivity above are defined in relation to income. Often income data are not available. Most household surveys report expenditure data and, much less frequently, income data. Income data, when reported, can be less reliable because households have greater incentives to hide income over expenditures. For practical reasons therefore many tax and incidence studies end up using household expenditure rather than income as their measure of individual welfare. However, using expenditures may be theoretically justified if expenditures are a better approximation for lifetime or permanent income than current income. This latter is generally subject to large fluctuations. The existing theories of household consumption behavior, such as the life-cycle hypothesis and the permanent income hypothesis, argue that expenditure tends to be a better representation of permanent income over time and perhaps a better proxy for a household’s long term welfare.²²

Unit of analysis. The choices are between individual, family, or the household. Although the selection of the unit of analysis can have important implications, there is not an optimal

²¹See Kieffer (1984) for other examples of these indexes.

²²See, for example, Younger et al. (1999)

choice. It depends on what we are trying to measure. However, it is important to be aware of the implications of each choice. If we are concerned with the analysis of poverty using households as the unit of measurement we must be aware that this can hide important information since needs vary with household size and poor households tend to be larger. An alternative approach is to a “per adult equivalent” measure which gives children a lower weight than adults (for example, a child is the equivalent of half an adult) but still captures the implications of households of different size. See the discussion in Demeri (2000).

Average versus marginal measures. The standard measure of benefit incidence presents average benefits within each income group, for example, quintiles or deciles. However, average benefits are not always helpful to policymakers to understand what will happen if some expenditure categories are expanded. Marginal benefit measures can convey this information and often marginal measures are quite different from average measures (Demery, 2000). As an example, Lanjouw and Ravallion (1999) used cross-section data to investigate how marginal benefit measures of incidence from primary school programs may differ from average incidence. Children from higher income groups are more fully enrolled than children from lower income groups so that average benefits are higher for upper income groups. However, additional funds, if spent in increasing enrollments, would benefit the poor more. In particular, Lanjouw and Ravallion (1999) found that the marginal incidence for the poorest would receive 22 percent of the spending where on average they received only 14 percent of the existing spending.

Implicit tax rates. It is important to realize that even if the poor pay little tax and the tax system is highly progressive, the poor may still face very high implicit tax rates. In many countries with generous welfare programs the poor face marginal tax rates of 100 percent for any amount of income they make working because they lose an equivalent amount of income in welfare payments. Because of this extreme disincentive to work, some countries lower the implicit rates to, for example, 50 percent: individuals only lose one dollar in welfare payments for every two they earn as laborers.²³ Even then, the implicit marginal rates can be quite higher than the explicit rates faced by high-income households.

IV. Tax Incidence Analysis.

Tax incidence is the analysis of who ultimately bears the burden of government taxes in the economy. At first glance, tax incidence analysis appears to be deceptively simple. Since the tax laws are explicit as to who has to pay taxes, why couldn't we just use the information gathered by the tax administration authorities as to who paid taxes and by how much to establish tax incidence? As we discuss immediately below, generally there can be large differences between who the law says is obligated to pay taxes and who ultimately in the economy bears the burden of taxes. If we acknowledge that we need to look at how private markets react to taxes, then in theory we should be able to find equilibrium prices and quantities before and after the tax changes and their comparison should give us the information needed to establish the incidence impact of any tax changes. This exercise, however apparently simple, would require a vast amount of information on preferences of consumers, technology used by producers and so on, which is not available. Therefore, the theory and practice of tax incidence encompasses a series

²³See OECD (2000).

of methodologies, from the simple to the complex, which focus on the key elements in the response of economic agents to taxes and leave out the rest.

Tax incidence analysis is a well-developed area in the field of public finance and the literature is vast. Therefore, it will not be possible to cover in this module more than some of the most significant contributions.²⁴ Despite this vast literature, establishing firm evidence on the distributional impact of taxes remains a difficult activity because of the need to allow for general equilibrium effects in the whole economy. Because of these difficulties, there has been always a grain of skepticism about the accuracy and even meaning of empirical findings in tax incidence.²⁵

However, our better understanding of key economic issues in incidence analysis, greater data availability including household income and expenditure surveys in many countries, and more powerful computational techniques such as microsimulation models and computable general equilibrium models, have significantly advanced our knowledge of tax incidence. Although far from perfect, the evidence produced by tax incidence studies is invaluable to policy makers and governments always fiddling with tax reform. At any rate, as Musgrave et al. (1951) have put it, policy makers always make assumptions on tax incidence in the formulation of tax policy, so the real question is whether or not economists can improve on the guesses of policy makers. The answer to this question is unequivocally yes. Tax incidence analysis has moved forward on different fronts. First, there have been “conventional” studies of incidence that use a priori reasoning based on economic theory to ascertain the final incidence of taxes and then allocate those tax burdens to households, which have been pre-ordered by income level. Classical examples of this approach include Musgrave et al. (1951, 1974) and Pechman and Okner (1974). In recent times, this approach has benefited from the use of microsimulation models, which allow the computation of tax liabilities employing thousands of actual tax return data. Second, there is a “general equilibrium” approach to tax incidence, pioneered by Harberger (1962), who assumed a small number of economic sectors and consumers to arrive at general equilibrium price changes in response to new taxes. The information we are able to obtain from this approach has been enormously enhanced by the application of powerful computation techniques in numerical general equilibrium models, which allow us to solve for equilibrium prices with many economic sectors and consumers. See, for example, Ballard et al. (1985).

Statutory (Legal) Incidence versus Economic Incidence: Tax Shifting

The first step in tax incidence analysis is that we need to distinguish between statutory incidence (also called legal or nominal incidence) and economic incidence. The first refers to those taxpayers that are by law required to pay the tax. The second refers to those taxpayers who ultimately bear the tax burden. Intended by policy makers or not, tax burdens in general can be shifted to other agents in the economy different from those legally responsible to pay the tax. This happens because the agents statutorily responsible to pay the taxes can alter their economic behavior and transfer or shift the burdens of taxes to other agents. The shifting of taxes takes

²⁴For fuller reviews of tax incidence see for example Newbery and Stern (1987), Shah and Whalley (1991) and Musgrave and Musgrave (1989).

²⁵See the early work by Bird and de Wulf (1973) for a particularly skeptical perspective.

place through changes in prices that firms pay to suppliers such as labor and landowners, the return they receive on capital, and the prices they charge to consumers. Thus the economic incidence of a tax refers to who finally experiences a decrease in real income.²⁶

The degree of shifting depends on the elasticities of demand, supply and substitution in the use of inputs of production among the economic agents interacting in the activity or market being taxed. Those economic agents with lower elasticities, that is with less flexibility to react, are more likely to ultimately bear the burden of taxes. Because it generally takes time to react and adjust behavior in markets, long run elasticities tend to be higher than short run elasticities, so the full degree of tax shifting can take some time to be completed. In this sense, the economic incidence of taxes will tend to be different in the short and the long runs.

Tax burdens and Excess Burdens

Conventional studies of tax incidence commonly assume that total tax burdens coincide with the revenues collected by government. The equivalence between tax burdens and revenues collected is convenient within the context of conventional tax incidence analysis because the essence of this methodology is to allocate the taxes collected among the different income groups of taxpayers.

Thus, the equivalence of tax burdens with taxes is a simplifying assumption, but it may not always be accurate. As remarked above, tax incidence works through changes in prices of inputs (wages, return on capital or land rents), and through changes in the prices of commodities or the uses of income. Therefore, the resulting change in real income for households or the actual burden of taxes may be larger than the actual taxes collected by government.²⁷ General equilibrium approaches to tax incidence are much better equipped to account for these burdens as measured by the impact of changes in prices. Conventional studies cannot in general do that.

In addition to ordinary tax burdens, taxes generally impose on consumers excess burdens, also known as deadweight losses. These excess burdens arise because taxes lead to less efficient use of resources by distorting the choices of economic agents. For example, the consumption bundle chosen by consumers after a sales tax is levied may be different from that before the tax. The change in behavior by consumers is a reaction to the different relative prices they face. The change in individual welfare beyond the taxes actually paid is the excess burden of taxation. With the exception of lump-sum taxes, all taxes cause larger or smaller excess burdens. For example, income taxes distort labor-leisure choices and saving and investment decisions. Conventional tax incidence studies as a rule ignore excess burden losses and total burdens are equated to total revenues collected by government. This is an acceptable approach as long as we are aware that we are differentiating between the equity impact (tax incidence) and the efficiency

²⁶Prices of assets may also change as a consequence of taxes because future tax liabilities get incorporated into the price of the asset. This is known as the “*capitalization*” of taxes.

²⁷For example, customs tariffs or taxes on imported goods drive up domestic prices, but these revenues go to domestic producers and not to government.

impact (excess burden losses) of taxation. Numerical or computable general equilibrium models of tax incidence can account for excess burden losses in the overall distribution of tax burdens.²⁸

The counterfactual

In order to establish the incidence of taxes we need to compare the distribution of income that results from the presence of taxes with some initial benchmark distribution of income, or the counterfactual. One approach is to use a “differential incidence approach” by comparing the new results to a distribution of tax burdens that would have taken place if revenues had been collected in the same amount with a proportional income tax. The assumption is that a proportional income tax would be the most neutral tax alternative to finance the budget. However, truly the counterfactual would need to be the distribution of income that would have taken place in the absence of taxes as well as the behavioral responses to them. This is, of course, a tall order since we have never observed an economy without taxes. In practice, several compromises are made to arrive at the counterfactual. As we see below, general equilibrium approaches are better equipped to address this issue.

Conventional models of tax incidence²⁹

The basic methodology behind conventional models of tax incidence is to allocate tax burdens to different income groups, ordered from rich to poor by deciles or quintiles of the population, on the basis of a series of assumptions about who bears the final burden of taxes. For each tax, a portion of the revenues collected is imputed as tax burden to each income group in a way that exhausts the total revenues collected. For example, the revenues from excise taxes on tobacco products are allocated to different income groups in proportion to their relative share in the consumption of tobacco products. To arrive at an estimate of the incidence for the entire tax system, the incidence for each tax is calculated separately for each income group. These results are added up across all taxes for each income group to arrive at the total burden for each income group. Typically, the total burden is expressed as an average total tax rate, that is, the proportion of income paid in taxes by each income group. The information on total income, sources of income and expenditure patterns are typically obtained from data in household or consumer income and expenditure surveys. Taxes collected are obtained from the tax administration authorities. This methodology is presented in more detail in Appendix I.

Other approaches have been used in the estimation of conventional incidence. Perhaps the oldest methodology is the “*representative (or typical) household approach*.” Here incidence estimates are made on the basis of computing taxes for a relatively small number of artificial households, whose composition, income sources and expenditure patterns are assumed to represent the rest of the population. These households may also be assumed to live in different

²⁸Excess burden losses can be quite small when calculated in static one-period models but can become significantly large when inter-temporal dynamic effects of taxes on saving and investment and work effort are allowed to impact the rate of economic growth.. See, for example, Fullerton and Rogers (1991).

²⁹Devarajan et al. (1980) call this approach the Pechman, Musgrave and other (or the PM) approach because of the prominence of those two economists in its implementation.

geographical locations.³⁰ The representative household approach can use the same assumptions for tax shifting as the conventional approach based on a distribution of income. But, in its crudest form, the representative household approach just computes taxes according to the provisions in the tax laws and on the bases of the assumed income source and consumption patterns. In this case, the results are just a statement of statutory or legal incidence.

Several other conventional approaches to the estimation of conventional tax incidence include³¹: (a) classifying income distribution and estimating incidence by factor shares in income (labor, capital and so on); (b) estimating incidence as effective (average or marginal) tax rates by main economic sector (agriculture, industry, services) or at a much more disaggregated level, or even subnational jurisdictions.³²

Assumptions used in conventional models of tax incidence³³

Conventional tax incidence studies compute tax incidence on the bases of annual data for income sources and expenditure patterns and also on the basis of several assumptions concerning how the different taxes are shifted to households either because they are consumers, producers or owners of factors of production (labor, capital and land). These shifting assumptions allow for the impact of taxes on sources of income or their impact on the uses of income or expenditures. These assumptions are known in the literature under different interchangeable terms: “shifting assumptions,” or “incidence assumptions” or “sources and uses side effects.”

The role of the incidence assumptions is to facilitate the allocation of the burdens of each to different income groups. This process builds on the fact that the composition of income on the sources side and the composition of expenditures on the uses side vary by income group. For example, income from capital tends to be concentrated in the highest but also lowest tails of the income distribution. This latter is due to the presence of retired workers who are living off their past savings. On the other hand, labor or wage income tends to be proportionally distributed along all income groups. On the uses side, households of different income groups have different spending profiles (basic commodities versus luxury items and so on), plus savings tend to be concentrated in the highest income groups. When there are no different rates or exemptions for necessities, sales or consumption taxes tend to be regressive.

Although the incidence results can be quite sensitive to the shifting assumptions, typically there has been wide agreement on the assumptions used:³⁴

³⁰Wasylenko (1986) uses the representative household approach together with conventional results based on the distribution of income for Jamaica. See also Bird and De Wulf (1973) for other studies that have used this methodology.

³¹See Bird and De Wulf (1973) for a description.

³²See OECD (2000).

³³See Shah and Whalley (1991) and Browning (1978).

³⁴See for example Musgrave et al. (1974), Pechman and Okner (1974), and Gillespie (1980). The assumptions still used have not changed much since the original work by Musgrave (1959).

- The individual income tax is typically assumed not to be shifted and thus it is assumed to be paid by the recipients of income.³⁵ So in the presence of progressive tax rates this tax usually has a progressive incidence.
- Payroll and social security taxes are typically assumed to be fully shifted to workers, regardless of who is legally liable to pay the tax. Most, or at least a portion of this tax is paid by the employers. In the presence of a ceiling for contributions, a frequent feature in tax systems, this tax tends to be regressive. However, in developing countries where only workers in the formal sector pay this tax, its final incidence can be progressive.
- With corporate income taxes there tends to be more disagreement. A variety of shifting assumptions have been proposed and analyzed for this tax. These assumptions include: (i) no shifting at all so that shareholders pay the full tax; (ii) the shifting to all capital owners through a leveling off or equalization of after-tax rates of return for all capital; (iii) the forward shifting to consumers in the form of higher consumer prices in varying proportions of the tax burdens (one-third, half, two-thirds) depending on the degree of monopoly power assumed to exist in the markets. Perhaps the most commonly used assumption is that half of the tax burden is paid by all owners of capital and the other half is paid by consumers. It is less common to assume backward shifting to other factors of production. However, the backward shifting of the corporate income tax to labor suppliers and capital owners can be the proper assumption for small open economies facing a highly elastic supply of capital. An increasing number of developing countries fit this profile in recent times. The corporate income tax becomes less progressive as more of the tax is assumed shifted forward to consumers or backward to workers.
- Consumption taxes, including several forms of sales taxes, value-added taxes, and excises, are practically all the time assumed to be shifted forward to consumers.³⁶ Incidence studies typically find sales taxes and value-added taxes to be regressive. However, in the case of value-added taxes, regressivity is reduced when multiple rates (lower for necessities and higher for luxury items) are used or basic goods and necessities exempted. The incidence of sales taxes is complicated in many countries by the presence of cascading and multiple rates and exemptions.³⁷ The regressivity conclusion for sales and value-added taxes may not be correct for developing countries where only households operating in the formal sector, typically those with higher incomes, may pay those taxes. Excise taxes are also typically assumed to be shifted forward to consumers. Excise taxes can have a progressive impact as in the case of luxury goods (gasoline, cars, expensive liquor, or perfumes) and also a regressive impact (tobacco products and cheap liquor). Customs tariffs or taxes on imports are typically assumed to have the same incidence as sales and value-added taxes for lack of better information regarding which income groups end up consuming the imported goods.

³⁵Most often tax evasion issues are ignored. The possible impact of tax evasion on incidence results is discussed below.

³⁶However, there exists some econometric evidence supporting the view that some producers use a markup pricing system and absorb part of the tax

³⁷Some conventional studies have used an input-output framework to establish effective rates in the presence of cascading and multiple rates and exemptions. See for example, Bird and Miller (1991) and Ahmad and Stern (1989).

- Export taxes are still common among some developing countries despite the recommended best policy of abolishing them unless the country has a monopoly power in international markets. If the country has monopoly power in international markets part of the export tax may be in effect exported by shifting it to foreign consumers. Without monopoly power, export taxes are assumed paid by the exporter/producers. The final incidence of export taxes is regressive if the producers/exporters are small farmers of traditional export crops, or progressive if the producers/exporters are wealthy farmers or international companies.
- Property tax incidence is typically more controversial. Some studies assume no shifting with the tax paid by the owners of the property or shifted to all owners of capital. Others assume the forward shifting of property taxes to renters with the proportion shifted forward varying across studies. There are three formal theories of property tax incidence. In the “traditional view,” the property tax is a combination of a tax on land and structures. In this view, the tax on land is paid by landowners and the tax on structures may be paid by owners or shifted to renters. In the “new view” the tax is interpreted as a combination of a uniform national tax on all capital owners and an excise tax on local capital in the amount that local taxes differ from the national average. In the “new view” the national tax is paid by all capital owners while the excise tax is paid by local capital owners or shifted backward to other factors of production. The third is the “benefit view” in which the property tax is perceived as a benefit tax or a payment for the benefits property owners receive from local public goods and services. The validity of the benefit view depends critically on several assumptions about land zoning by local governments and the mobility of taxpayers, which are unlikely to be met in most developing countries. The incidence of the property tax can be regressive if under the traditional view we assume that at least part of the tax is shifted to renters. The actual incidence of the property tax on renters is complicated by the dynamics of housing markets and public choice processes at the local level.³⁸

In summary, as a bit of a generalization, conventional incidence studies assume that the final burden from direct taxes is born by owners of the factors of production (taxes on labor income are paid by workers and taxes on capital income are paid by capital owners) and that the final burden from indirect or consumption taxes is born by consumers. This set of assumption has been criticized for its extremeness and asymmetry. In effect, it is assumed that owners of factors of production have perfectly inelastic supplies and that consumers have perfectly inelastic supplies for commodities. However, in practice, these assumptions have been justified because the conventional incidence results obtained with more realistic and laborious assumptions on elasticities tend to yield quite similar results.

³⁸See for example Martinez-Vazquez and Sjoquist (1988).

General Equilibrium Approaches to Tax Incidence

The general equilibrium approach to tax incidence was pioneered by Harberger (1962).³⁹ The essence of the approach is to study the incidence of taxes within the context of a simplified general equilibrium model of the economy. Tax incidence is established by comparing the vector of equilibrium prices before and after the tax change. This may be done in the context of “differential” tax incidence where one tax is substituted for another while keeping government expenditures constant, or in the context of “absolute” tax incidence, where a tax is introduced holding government expenditures constant. In this case, the additional revenues collected by government may be rebated to taxpayers in a lump-sum fashion.⁴⁰ A simple version of the Harberger model assumes two goods or sectors in the economy with their respective production functions and two factors of production, labor and capital. These factors of production are also assumed to be fixed in total supply and mobile across sectors. In addition, one can also assume several households with different endowment of labor and capital. Producers are assumed to maximize profits and consumers to maximize utility. The structural system is solved without and with taxes, or with two different taxes, for prices so that all markets are in equilibrium. The comparison of pre- and post-equilibrium prices reveals the distribution of tax burdens. Hence it could occur that as a result of a tax on company profits, the return to capital is lower in the post-equilibrium. One of the greatest insights from these simplified general equilibrium models is that the final incidence of taxes depends on the values of several critical parameters in the economy, such as capital-labor ratios in different sectors and the elasticity of substitution in the combination of inputs in the production functions.⁴¹

A second more recent stage in the general equilibrium approach to tax incidence has been the development of numerical or computable general equilibrium models. These are complex models, which attempt to capture in more detail the general equilibrium responses to taxes in the economy. The models are numerically solved using data from the national income accounts, household expenditure surveys, and taxpayer data from the Ministry of Finance.⁴² General equilibrium models capture all the parameters that should play a role in final tax incidence among different income groups: different demand patterns, different endowments in resources, and variations in capital-labor ratios in different economic sectors.

To give some flavor of the structure of these models, let us briefly describe the model used by Devarajan et al. (1980) It consists of 19 industries, which use two inputs, labor and capital, and also outputs of other industries as intermediate inputs, with production functions that exhibit constant elasticity of substitution. The producer goods are used directly as intermediate inputs, by government and foreign traders, and also indirectly for final consumption by households through a fixed coefficient matrix of transition into 16 consumer goods. They assume 12 consumer groups differentiated by income with different endowment of labor and income and with utility functions defined over 16 consumer goods. The government collects taxes on many

³⁹See Mieszkowski (1969), McLure (1975), Bovenberg (1987) for applications and expansions on Harberger’s model.

⁴⁰See Musgrave and Musgrave (1989) for a discussion of these two alternative concepts of tax incidence. A third concept of incidence also introduced by Musgrave is that of “budget” incidence, where the combined effects of tax and expenditure incidence are considered simultaneously.

⁴¹See Boadway and Wildasin (1984)

⁴²See Fullerton et al. (1978, 1979) and Ballard et al. (1985).

of the activities and spends the revenue on producer goods and on direct transfers to consumers. Producers maximize profits and consumers maximize utility. In a competitive equilibrium, demand equals supply in all markets. Given the endowments, the utility and production parameters, and the government taxes, the model is solved numerically by the algorithm yielding a price vector that satisfies equilibrium in all markets and the consumer and government balanced budget constraints. The base solution to the model is an equilibrium that replicates the data available. Tax incidence results are derived by changing taxes and comparing the new equilibrium solution to the base solution. The comparison allows us to establish utility or income changes for each income group, i.e., tax incidence, as well as changes in total income, new factor allocations across industries and so on.

Conventional versus General Equilibrium Approaches: Advantages and Disadvantages⁴³

There is no ideal or unique approach to the study of tax incidence. All approaches used present advantages and disadvantages.⁴⁴ In the case of the conventional approach, the methodology is relatively simple and easy to implement, the underlying assumptions are transparent and the implications of alternative assumptions can be easily compared. The conventional approach can also use detailed data by incorporating micro-simulation models for large samples of taxpayers. The micro-simulation model is a computer program with a tax calculator, which makes a pass through the data for each household, calculates income and then taxes, and finally adds the computed taxes to arrive at the tax burden for each income group.

On the minus side, there are some practical limitations to conventional tax incidence studies. As is discussed in Appendix I, a critical step in the computation of tax incidence is to have good information on income distribution. This information is not always available, especially in developing countries. Household surveys have become more common but often the only reliable data in these surveys is household consumption. In addition, under the conventional approach it is much harder to make the right assumption to get at general equilibrium effects of taxes. As Devarajan et al (1980) point out, the possible effects of sales taxes on factor prices are ignored by conventional studies as typically so are second-round effects on the prices of commodities. Similarly, income taxes may affect households not only through changes in income sources but also through changes in relative prices.

Because of the critical role played by the shifting assumptions, conventional incidence studies have been said to “stipulate” the incidence of various taxes (Devarajan et al., 1980). But on the other hand, numerical general equilibrium models also assume or stipulate a long list of critical values for final incidence such as elasticities of substitution in production and demand and supply (Fullerton and Rogers, 1991).

A general equilibrium approach offers the following advantages: (i) an explicit structural model of the economy with demand functions derived from explicit utility functions and supply functions derived from explicit production functions; (ii) more transparency on how the

⁴³See Fullerton and Rogers (1991) and Devarajan et al. (1980).

⁴⁴See Devarajan et al. (1980).

incidence results are linked to assumptions on particular parameters, such as the elasticity of substitution in production; (iii) more complete incidence results since all taxes are allowed to interact with each other rather than being computed in isolation; (iv) the results expressed in more theoretically correct measures such as the equivalent variation ; (v) incidence results including measures of “ excess burdens,” thus allowing total burdens to exceed total taxes paid.

On the minus side, general equilibrium models are operationally intensive and can take many iterations to find an equilibrium price vector. Because of these computational demands, the number of taxpayers needs to be small.

How do the different approaches compare in terms of their results? Are we bound to get different or even the opposite conclusion about tax incidence depending on the methodology we use? Which methodology should we use? To some extent which methodology we use depends on our goals. If we are simply interested in arriving at estimates on the distribution of tax burdens, a conventional approach is adequate. The general equilibrium approach is best suited to identify the excess burdens of taxation by allowing behavioral responses of economic agents to taxes through changes in consumption, labor supply, savings and investment decisions.

Devarajan et al. (1980) compare the results for tax incidence obtained using the basic methodology in the conventional approach to tax incidence with the results obtained from a Harberger-type model and a computable general equilibrium model. This in effect was a test of the validity of the underlying assumption in conventional incidence analysis that the initial impact of taxes, either on the use side or the source side, dominates other second-round and general equilibrium incidence effects. In the final analysis, the incidence results from the traditional model were quite comparable to those obtained from the general, although not for every tax.

Lifetime versus Annual Tax Incidence⁴⁵

Conventional tax incidence studies and also many of those using a general equilibrium approach use annual income as the benchmark measure for individual welfare. However, a considerable research body in economics has shown that individuals/households make consumption decisions based on their lifetime income as opposed to their current or annual income.⁴⁶ Current or annual income is for many individuals subject to large fluctuations. Individuals with low current income may be there simply because they are in a low-income period of their lives (school age or retirement). Given that individuals will pass through these different stages in their life cycle it is entirely possible that a tax system that is found to be regressive or progressive on an annual income basis is actually proportional or neutral on a lifetime income basis. This different perspective on tax incidence has yielded a number of studies on lifetime incidence.

⁴⁵See Fullerton and Rogers (1991) and Menchik and David (1982).

⁴⁶A complete formal definition of lifetime income is the value of assets held at death plus the present value of the sum of consumption over the lifetime. If one drops the value of assets at death and makes the assumption that consumption is smooth over the life cycle, then annual consumption may be taken as an approximation to lifetime income.

In general, the study of lifetime incidence requires more data but it can yield revealing results. For example, the classification of individuals by annual income is often quite different from that by lifetime income. Annual incidence analysis groups together those with similar annual incomes, which may be the result of different reasons and circumstances such as age. Lifetime incidence analysis groups individuals with the same lifetime regardless of age. However, as Fullerton and Rogers (1991) point out, a lifetime perspective is not in any way superior to an annual income perspective in arriving at a measure of “ability to pay.” What a lifetime incidence approach does is to raise the important issue that it may not be enough to be concerned only with equity or incidence issues on an annual income basis. What may be needed is to think about equity and incidence from both an annual perspective and a lifetime perspective. Tax systems must be equitable on an annual and a lifetime basis.

Given that a lifetime perspective on tax incidence can be illuminating, how different can we expect the conclusions on incidence to be from a lifetime and an annual perspective? Interestingly, what Fullerton and Rogers (1991) find is that the patterns of lifetime incidence are often quite similar but less pronounced than those from an annual income perspective. If taxes are found to be progressive or regressive from an annual perspective, they remain so from a lifetime perspective but in a less pronounced way. .

Tax expenditures.⁴⁷

Tax expenditures are special provisions in the tax laws of many countries, which pursue a variety of policy objectives and take the form of exemptions, special deductions, tax credits or even special lower tax rates. The most immediate impact of tax expenditures is to reduce government revenues. This is where they get their name of “tax expenditures.”

Like taxes and regular expenditures, tax expenditures have an incidence impact on both horizontal and vertical equity. Typically, by design or intent of the law, tax expenditures break with the principle of horizontal equity. The impact of tax expenditures on vertical incidence can go either way -- making a tax system more progressive but also more regressive. This depends first on a variety of public choice issues. For example, richer and more politically active groups may have more success protecting their interests in the national legislation. It depends also on some technical issues. Tax expenditures can have a less progressive or even regressive impact if they are given in the form of exemptions or deductions from income as opposed to credits against tax liabilities. This is so because under a progressive individual income tax, the actual value of the deduction or exemption increases the marginal tax rate taxpayers face, and this latter, of course, increases with income. Higher income groups can also benefit more if the tax expenditures support certain kinds of private expenditures. For example, private education tuition fees may be partly or in full deductible from income under the personal income tax. But the use of private education is likely to increase with income. In addition, tax expenditures cannot help the poor unless they pay taxes. And many of the poor do not pay taxes. This point illustrates well the limitations of re-distributional policies from the tax side of the budget.

⁴⁷See Owens (1983).

The incidence of negative taxes

One can also speak about the incidence of negative taxes, that is the incidence of transfers in cash and in-kind. Those cash transfers that are targeted to the poor are by nature highly progressive.⁴⁸ Even equal per capita transfers are also quite progressive because they decrease rapidly as proportion of income. However, there are caveats on these easy conclusions on the incidence of cash transfers. Often, because of stigma among the recipients and inadequate administration, there is low and uneven take-up of benefits, which may affect the progressivity assumed for this type of transfer.

The analysis of the incidence of in-kind transfers typically allocates to the different income groups receiving these transfers a monetary equivalent to the costs of providing the transfers.⁴⁹ Depending of the degree of participation by income group the transfer program will be more or less progressive. In-kind transfer programs such as food tend to be quite progressive, of course. However, not all in-kind transfer programs are progressive. For example, voucher programs for higher education tend to benefit higher income groups more than proportionally, so in general they are regressive.

The impact of the institutional setting on tax incidence

Particular institutional issues, such as the level of development of private markets, the extent of the underground or informal sector, or particular government policies outside the tax area can have a significant impact on the overall distribution of tax burdens and in some cases reverse the conclusion reached about the final incidence of taxes that we would have reached in the absence of those institution. This point is well made in Shah and Whalley (1991). These authors argue that the mechanical application of tax incidence assumptions and analysis from developed countries to developing countries may be misleading and even completely wrong. Shah and Whalley (1991) provide the following illustrations.

In the case of the external sector, many developing countries still derive an important part of their government revenues from customs tariffs levied on the imports of merchandise. The conventional assumption, as it applies to developed economies, is that import taxes are passed on to consumer so their final incidence is proportional or regressive. However, several institutional factors in developing countries, such as quotas or import licensing restrictions and rationing of foreign exchange, may entirely reverse the final incidence of import tariffs. Since either quotas or foreign exchange rationing constrains the quantity available for national consumption, domestic prices tend to be higher because of the lack of supply and not because of the customs tariff. The higher prices induced by the quotas and foreign exchange rationing benefits the few that are able to obtain the import permits or the foreign exchange. What the customs tariff does is to transfer some of these rents obtained by the wealthy to the government. Under these circumstances, the final incidence of customs tariff would be progressive instead of proportional

⁴⁸ See, for example, Milanovic (1995).

⁴⁹ But it should be noted that in general the benefits to individuals from in-kind transfer programs may be less than the cost, since the willingness to pay for the product, depending on tastes and the availability already of the product, may be less than the market price or costs.

or regressive. A similar case occurs under credit rationing in domestic markets in developing countries. If credit rationing is an obstacle to entry and competition, then economic rents may arise in many economic sectors. The incidence of the corporate income tax in this case will just be a transfer of rent to the government.

Foreign ownership of enterprises may also change how we view the final incidence of the corporate income tax. Foreign owners receive in many cases a tax credit in their country of origin for the income taxes they paid to foreign governments. In these cases, the incidence of the corporate income tax is not what is conventionally assumed. Actually, the corporate income tax paid by the foreign-owned company in a developing country is paid by the treasury department of the foreign country home to the foreign company.

Take two other institutional facts also more common in developing countries: price controls and black markets. If price controls exist, sellers may not be allowed by law to pass higher taxes on to consumers. Therefore, the incidence of a sales tax may not be so regressive because part of the tax burden may be paid by enterprise owners.⁵⁰ In the presence of black markets, higher taxes may drive more economic activity underground so only consumers buying in the formal sector will pay the tax. Another differential fact of tax systems in developing countries is that tax evasion is more widely spread. Tax evasion has many sources including black markets and the corruption of public officials. Whatever the cause, the conventional assumption for developed countries that income taxes are fully borne by the recipient of income can be inappropriate when applied to developing countries.

Tax Incidence and Fiscal Decentralization

In countries with a significant level of fiscal decentralization, regional or state governments and local or municipal governments may exercise considerable tax autonomy. This means that the study of tax incidence exclusively at the central government level may yield a misleading picture of the overall distribution of tax burdens. Unfortunately, it is generally much harder to obtain full information on subnational taxes. Not surprisingly, incidence studies including subnational taxes, or focusing only on subnational taxes, are much less common

In general, the omission of subnational taxes from incidence analysis is likely to portray a picture of incidence that is more progressive (or less regressive) than is actually the case. This is because regional and local taxes tend to be more regressive than central taxes. This is evidenced in the tax incidence studies conducted at the state and local levels in the United States, which have found the overall distribution of tax burdens to be regressive.⁵¹ In countries where subnational income taxes are not as common as in the United States more regressivity may be expected. The wider use of sales and property taxes at the subnational level tends to contribute to the regressive distribution of tax burdens. Charges, tariffs and cost recovery fees are also important in many fiscally decentralized systems. However, as we have discussed above, these charges are generally assumed to be distributionally neutral under the benefit principle.

⁵⁰Of course, sellers may still shift part of the tax to consumers by other means, such as reducing the quality of the product. Another possibility is that the tax is shifted backward to workers

⁵¹See Phares (1980), Pechman (1985), and Citizens for Tax Justice (1996).

An important aspect of tax incidence at the subnational level is the ability a jurisdiction may have to shift the burden of some taxes to residents of other jurisdictions. This phenomenon is known in the public finance literature as “*tax exporting*.” The shifting of regional and local taxes can take place because the final consumption of commodities and therefore the sales and excise taxes falling on them are paid for by residents outside the jurisdiction levying the tax. Exporting can also take place if part of the tax is actually paid by owners of factors of production, such as capital, who reside outside the jurisdiction collecting the tax. This may be the case, for example, when the incidence of the tax implies reduced capital earnings. But some of the local income taxes can be exported also if, for example, the national income taxes allow a deduction for the payment of local and regional income taxes. This deduction means that in effect the rest of the nation helps pay for the subnational income tax by reducing the actual burden of local residents. Because of the possibility of tax exporting, one of the basic principles of tax assignment in the theory of fiscal decentralization is that regional and local taxes should be levied on tax bases that cannot be exported. Of course, in reality this principle is not always followed. If not prohibited, subnational governments have powerful incentives to levy taxes that are paid by non-residents.

How important is tax exporting at the subnational level? A classic estimate is by McLure (1967) for the United States.⁵² McLure finds that tax exporting among states in the United State ranged between 17 and 38 percent of public expenditures. But these rates were significantly higher for taxes with exceptionally high export rates such as corporate income taxes, gambling taxes, and taxes on petroleum and other mineral resources. But, McLure did not find any significant relationship between the level of per capita income and the portion of taxes exported in a given state. Therefore, there was no tendency for tax exporting to be either progressive or regressive between states.

Tax evasion and the incidence of tax evasion⁵³

Most conventional and general equilibrium studies of tax incidence ignore tax evasion. When tax evasion is allowed for,⁵⁴ the general assumption is that “statutory” tax evaders, those legally responsible for paying the tax and who fail to do so at least in its entirety, are the exclusive beneficiaries of tax evasion.

However, in general, the incidence of tax evasion is a more complex phenomenon. A helpful way to interpret many forms of mostly undetected or un-enforced tax evasion is to view them as *de facto* tax advantages (or tax expenditures) that are there for the taking by those willing to incur some risk of detection, if any. From this perspective, it is clear that market responses, when feasible, may compete away the value of those tax advantages. This means that

⁵²His methodology involves first, using conventional assumptions on the theoretical analysis of the incidence of different taxes, second allocating each tax to the consumer or producer groups hypothesized to bear the tax burdens, and third imputing the part falling on each group to the jurisdictions where the groups reside. The taxes not borne by the residents of the taxing jurisdictions are those exported.

⁵³See Martinez-Vazquez (1996).

⁵⁴Some conventional studies allow for tax evasion by lowering the effective tax rates applied to certain categories of taxpayers in the computation of tax liabilities in the microsimulation models.

any benefits of tax evasion may be shifted to other agents through market forces similar to those responsible for the shifting of tax burdens. This basic principle may be illustrated with a couple of examples. If taxi drivers or waiters are more able to evade income taxes because they work for cash, should we expect them to fully benefit from tax evasion and as a result enjoy higher after-tax income than workers in other fields with comparable skills? The answer is that these wage differentials—the benefits from tax evasion—are unlikely to stick with those workers. Entry and competition for those jobs will guarantee that after-tax incomes are more or less equalized in sectors offering different possibilities to cheat on income taxes. In effect, the benefits from tax evasion will get shifted forward to consumers or users of those services if markets are competitive. Otherwise, they could be captured —shifted backward—to employers who own the market-protected businesses. As another example, it is quite unlikely that undocumented or migrant workers in a developed economy will be the ultimate beneficiaries of their evasion of income taxes. The high elasticity of supply of workers should compete away this advantage and the benefits of tax evasion will be shifted forward to employers and/or the buyers of the goods and services produced in those sectors where tax evasion takes place. Of course many other market scenarios are possible, and the market conditions may be such that no shifting of tax evasion benefits takes place. What we need to remember is that the incidence of tax evasion can be quite complex and subject to as many qualifications and shifting mechanisms as the incidence of taxes.

The impact of other government policies on income distribution

Besides taxes and expenditure programs, governments undertake an array of other policies which can have a large impact on income distribution, in particular on the welfare of the poor. Macroeconomic policies can have a significant impact on income distribution, but the channels through which it takes place can be quite complex. At the top of the list are monetary and other macroeconomic policies that can lead to increases in unemployment or inflation.⁵⁵ Inflation is widely recognized as the most regressive tax any government can implement since primarily the poor “pay the tax” via reductions in the real value of their money holdings due to the fact that they cannot hold assets that protect real values.⁵⁶

Understanding the final impact of macroeconomic policies on income distribution gets complicated by the fact that the same budget deficits that lead to accommodating monetary policy and eventually inflation may have their roots in government policies with explicit redistributional objectives such as price subsidies or increased hiring in the public sector (Demery and Addison, 1987).⁵⁷

⁵⁵Several studies have analyzed the impact of inflation and unemployment on income distribution. See for example Heller et al. (1988).

⁵⁶For example, see Blejer and Guerrero (1990) for evidence that inflation was a highly regressive tax in the case of the Philippines. An example of the complexity of the operating channels is the impact of exchange rates on income distribution. These effects depend on the relative importance of traded and non-traded goods in the sources and uses of income sides of different income groups. In their study of the Philippine economy, Blejer and Guerrero (1990) found exchange rate policies to have a progressive or pro-poor impact.

⁵⁷Of course, government employment policies may benefit more the middle and higher income groups than the poor. See for example Collier and Gunning (1999).

Besides macroeconomic policies, governments do use a variety of other policy instruments that have significant direct and indirect impacts on the distribution of income and the welfare of the poor. These instruments include:

- price controls on goods and services, including house rents
- minimum wages
- foreign exchange rationing
- prohibition on exports and import quotas
- interest rate controls on deposits and other forms of financial repression

The impact of these policies on income distribution is mixed. For example, price controls for farm products tend to hurt the rural poor and benefit the urban poor and rich. Financial repression of interest paid on bank deposits tends to hurt the poor more because of their inability to seek alternative savings vehicles. Foreign exchange rationing and import quotas, as we have seen, tend to be quite regressive and export controls can hurt small traditional crop farmers. It is beyond the scope of this paper to review the intricacies and alternative outcomes of this list of government policies. The important point that needs to be made here is that even though our focus is on tax incidence (in this section) and expenditure incidence (in the next section), we need to be aware that there are many other government policies that have a as large or larger potential effect on the distribution of income and on the welfare of the poor.

Country examples of tax incidence

There is in the tax incidence literature a long list of studies with empirical estimates of incidence going back for over half a century. It is beyond the scope of this study to present an exhaustive review of these papers and their findings.⁵⁸ Instead, we review the incidence results obtained in some recent studies and summarize general trends in the findings of past studies.

Three recent studies of tax incidence in African countries: Ghana (Younger, 1996), Madagascar (Younger et al., 1999), and Uganda (Chen et al., 2001) reach quite similar conclusions. The tax systems of those three countries are found to be progressive or mildly progressive, but two types of taxes were found to be quite regressive. The first is an excise tax on kerosene, which is used by mostly lower income households as a cooking fuel. The second are export duties on traditional agricultural exports (vanilla in the case of Madagascar, cocoa in the case of Ghana, and so on.). The pay-as-you-earn income taxes tend to be the most progressive, but interestingly most consumption taxes, including value-added taxes are also progressive. This is due to the common phenomenon in developing countries that only those transactions in the formal sectors are actually taxed and many low-income households function almost completely within the informal sector.

Several recent incidence studies in Latin America reach also the same overall conclusion of progressivity or mild progressivity of the tax systems, as in the case of Guatemala (Bahl et al, 1986) and Mexico (Martinez-Vazquez, 2001). The majority of other recent studies for

⁵⁸See, for example, Bird and de Wulf (1973), de Wulf (1975), Wasylenko (1986), Shah and Whalley (1991), and Chu, Davoodi and Gupta (2000) for reviews and summary of findings in the literature.

developing countries, reviewed in Shah and Whalley (1991), also find a broadly progressive overall incidence pattern.⁵⁹ Tax incidence studies for OECD also find generally proportional or mildly progressive patterns (Messere, 1997). It would appear that over time OECD governments have always taken steps to maintain proportionality or mild progressivity of the entire tax system. For example, during the tax rate flattening tax reforms of the late 1980s the decrease in progressivity was offset by increasing minimum exempt thresholds, providing more generous family allowances, broadening the tax base by making interest income and capital gains taxable, and by disallowing deductions which tended to benefit higher income taxpayers.

These findings on an overall progressive tax incidence over the last two decades contrast with those found in earlier studies, as reported in Bird and De Wulf (1973). Of the 24 tax incidence studies these authors reviewed for Latin America, only four were to have found some degree of progressivity in the tax systems.

It is unclear whether the move toward progressivity in more recent decades has been due to changes in tax policies or to differences in the measurement of tax incidence. It is not very likely that tax systems around the world have become more progressive on paper. The general nature of tax reforms in developing and developed countries over the last two decades has been first, toward the introduction of value-added taxes on the use of income side, and in substitution for a variety of sales taxes, and second, the flattening of rates and broadening of tax bases on the source of income side, with a decrease in the importance of corporate income taxes. These broad policy changes should not have altered much the overall level of progressivity, as discussed by Messere (1997) for OECD countries. It is more likely that improvements in our understanding of tax incidence issues have affected the conclusions reached. For example, it was typical of earlier studies to assume that any kind of sales taxes was highly regressive. More recent studies have taken into account that in developing countries, for example, lower income groups may not pay consumption taxes because they live mainly outside the formal system.

Two lessons can be extracted from the vast number of studies on tax incidence. First, it is important to look at the incidence of the tax system as a whole. Some taxes, such as consumption taxes tend to be by design more regressive and other taxes, such as income taxes, tend to be more progressive. Looking at tax incidence in a piecemeal fashion is likely to lead to inaccurate conclusions about the impact of the tax system on the distribution of income. It may also lead to abandoning or downplaying certain taxes that can play an important role in revenue mobilization with relative efficiency or excess burden cost or that can be more easily administered. Incidence analysis needs to be performed within the big picture even when there are theoretical and practical difficulties in aggregating the results from the incidence of isolated taxes.

Second, tax systems may not have a large impact on the distribution of income. That is, governments' capacity to redistribute income on the revenue side of the budget is limited. This limitation is more pronounced in the case of developing countries because the overall tax effort

⁵⁹One exception is Wasylenko (1986, 1991) who found an inverted U-shape incidence pattern (income is redistributed from the middle income groups to the poor and the rich) for Jamaica.

as a percent of GDP tends to be significantly smaller.⁶⁰ See for example the discussion for Mexico in Appendix I.

V. Estimating the Incidence of Public Expenditures

As we have seen in the previous section, tax policy has a limited ability to implement significant changes in the distribution of income. This limitation is of more policy significance at the lower end of the income distribution. Even though some countries have implemented a variety of negative income taxes, which are in effect transfers, and provide a variety of tax credits to lower income households through their tax policies, their impact on the welfare of the poor is most of the time quite limited. This is reflected in the old dictum in fiscal incidence that “taxes cannot make poor people rich.” Effective income redistribution to improve the status of the poor, it is generally admitted, has to come from the expenditure side of the budgets.

Even though public expenditure policy is more important for its potential impact on income distribution, unfortunately, it is not in general true that the study of the incidence of public expenditures is easier than tax incidence analysis. The key difficulty in measuring the impact of public expenditure on individual welfare is that, with some rare exceptions, we are not able to measure output from government expenditures. How public expenditures impact different groups depends among other things on the composition of public expenditures: what programs are being implemented and how much funding is going to each, such as basic education versus university level education, or primary health care versus tertiary hospitals with sophisticated in-patient care. The impact of public expenditure on the distribution of income depends also on the efficiency of public expenditures: the cost effectiveness of funds in delivering services and the matching of needs and preferences of taxpayers. Because of the difficulty of measuring public sector outputs, efficiency issues are generally ignored in the study of expenditure incidence. Instead, incidence concentrates on the question of how benefits from certain public expenditures are distributed among different income groups by identifying the cost of the inputs or some derived measure of “willingness to pay” as the benefits.

Government expenditure policies are implemented normally in the pursuit of two general objectives. First, to increase overall efficiency in the allocation of resources by providing certain goods and services private markets fail to provide or fail to provide at an optimal level. These goods and services are non-excludable and show joint consumption. Second, to improve equity in the distribution of income. This is accomplished through income transfers but also through the provision of goods and services that may benefit more the poor in particular. Naturally, the study of expenditure incidence is directly concerned with expenditure programs that have the explicit goal of improving distributional equity. However, many public expenditure programs pursuing efficiency gains and dealing with private market failure also have significant distributional implications.

In reality, it is often difficult to disentangle what objective a particular expenditure program may pursue. For example, public education may be justified because of the failure of private markets to provide an adequate supply, but it can also have a quite significant impact on

⁶⁰ See Chu, Davoodi and Gupta (2000) for the case of developing and transitional countries and Atkinson (2000) for the case of OECD countries.

income distribution. Thus, the scope of public expenditure incidence analysis is not limited exclusively to those government expenditure programs that have an explicitly announced objective of helping the poor or redistributing income. Potentially we need to look at the incidence of many other types of public expenditures. But as we see below, there is also a practical side to the scope of public expenditure incidence analysis. There are some types of public expenditures for which it is not possible or meaningful to study distributional impact.

Information on the distributional impact, and in particular the impact on the poor, of expenditure programs is important to inform the policy debate and ultimately for making the right policy choices.

The Basic Measurement Issue

The basic problem is how to measure the benefits accruing to individuals from public services. The first inclination economists have is to try to use an analogy of private goods provided in private markets. In the case of private goods, individuals maximize utility by consuming private goods to the point where the marginal rates of substitution or their marginal benefit is equal to the market price of the private good. Thus, even though marginal private benefits are not directly observable, we can infer it from market prices. In the case of public services, many are provided without direct charges. But, even if there is a fee or price charge, this price cannot be interpreted in general as the marginal benefit for individuals, because the supply of most public services is rationed or does not respond to demand.⁶¹ That is, individuals cannot adjust consumption up or down so that their marginal valuation of the service equals the price. Thus in the case of public services, prices do not signal willingness to pay or marginal benefits.

In the cases of rationed publicly-provided private goods and pure public goods a theoretically sound measure of individual benefits is the individual's marginal valuation of the good or his willingness to pay for the given quantity that is being provided.⁶² This is also known as the individual's "virtual price" or his "Lindahl price."⁶³ This general approach to measuring benefits from public goods was developed by Aaron and McGuire (1970). In reality, it is possible to derive marginal willingness to pay for public goods by first estimating individual demands for public goods. This was done by Martinez-Vazquez (1982) for local public goods across states in the United States. However, this methodology requires variations in quantities of the public good supplied as well as tax prices and incomes across jurisdictions and therefore is

⁶¹The reality of publicly provided services is a bit more complex (Cornes, 1995). In some cases, governments may supply services at subsidized prices. In this case, individuals can act as in private markets and public prices reflect marginal benefits. In other cases, the publicly subsidized commodity is allocated via non-price rationing, with or without a public fee. In this case, prices, if any, do not reflect marginal valuation. The same is true for the case of pure non-excludable public goods.

⁶²Using elementary demand theory, assume that individuals have downward sloping demand curves for public goods derived, as in the case of private goods, from their maximization of utility (for example, as in Berstrom and Goodman, 1973). Then, the individual's marginal willingness to pay is given by the height of his demand curve at the quantity of the public good actually provided.

⁶³Eric Lindahl, a Swedish economist was a pioneer in the discussion of individual valuation of public goods in the 19th century.

not practical to estimate the incidence of publicly provided commodities by the central government.⁶⁴ Because of the difficulty of estimating marginal willingness to pay, the obvious alternative was to consider under what circumstances it would be possible to use the more readily observable unit cost of provision as an estimate for marginal benefits.⁶⁵

Two general approaches have been widely used in the estimation of public expenditure incidence.⁶⁶ The first methodology and the one most frequently used is known as the “benefit incidence” approach. In essence, this approach uses the estimated inputs costs or marginal costs of provision as the measure for marginal benefits. The second methodology is known as the “behavioral approach.” This approach uses econometric techniques to estimate behavioral demands for publicly provided private goods, which then can be used to derive willingness to pay. In the rest of this section, we review these two approaches, and their respective advantages and disadvantages. In reality, the two approaches are not incompatible; therefore, we also review some recent studies that have combined them. We conclude with a review of country findings.

Before we move on to the review of the benefit incidence and behavioral approaches, it is important to notice that there are some other methodologies in economics that can also be used in the measurement of the incidence of public expenditures. The first of these techniques is the “indirect market technique.” Here one uses the indirect valuation of the public service as revealed by consumers with expenditures on private goods complementary to the public good. The best-known example of this technique is provided by those studies that employ estimates of time and money spent on complementary goods to use public parks.⁶⁷ The second technique, widely used in the field of environmental economics is “contingent valuation.” This technique strives to obtain information on the valuation of environmental public goods through direct questionnaires and surveys of consumers or in an experimental lab setting.⁶⁸ Although the “indirect market technique” may be harder to apply to a wide range of public services, there is no apparent reason why the contingent valuation technique has not been applied outside the case of environmental public services.

The Traditional Approach: Benefit Incidence

⁶⁴An advantage of the incidence approach using demand curves for public goods is that it can be applied to all types of public services provided subnationally, such as police protection, parks and highways. As we see below, traditional benefit incidence studies and the behavioral approach to expenditure incidence can only be applied to public expenditures that have identifiable private beneficiaries: education, health and public utilities. However, these two latter approaches can be applied to central government expenditure programs and the demand for public goods approach cannot.

⁶⁵Brennan (1976) shows that the unit or average cost of provision can be taken as a proxy for the individual’s marginal valuation of the public good if: (i) public goods are optimally supplied so that on average the marginal costs of provision would equal the arithmetic mean of all individual marginal valuations, and (ii) marginal costs and average costs of provision are the same. If these conditions are met, unit costs of provision would represent only average individual valuations for the public services. Thus, even when the above conditions are met, the use of unit costs as a proxy for marginal individual valuations ignores any differences in valuations across individuals.

⁶⁶See van de Walle (1998) and Demeri (2000) for two excellent and complete reviews of the issues.

⁶⁷See, for example, Bradford and Hildebrandt (1977) and Maler (1971).

⁶⁸See, for example, Mitchell and Carson (1989).

The “benefit incidence” approach, also called the classic or the non-behavioral approach, was pioneered by twin World Bank studies by Selowsky (1979) for Colombia, and Meerman (1979) for Malaysia.⁶⁹ The main goal of benefit incidence analysis is to identify who benefits from public spending and by how much. Formally, benefit incidence measures by how much the income of a household would have to be raised if the household had to pay for the subsidized public services at full cost. The essence of the approach is to use information on the cost of publicly provided goods and services together with information on their use by different income groups to arrive at estimates of the distribution of benefits. Individual beneficiaries are typically grouped by income level but they can also be grouped by geographical area, ethnic group, urban and rural location, gender and so on.

Information on individual or household use of the public services is typically obtained from surveys.⁷⁰ By concentrating on different rates of usage of public services, one advantage of benefit incidence analysis is that it allows us to focus on the important issue of how effectively public expenditure programs targeted the poor.

The nature of benefit incidence, requiring information on unit costs in the provision of public services to individuals and the rate of use of those services by different individuals, makes it un-applicable to many, economically important, public expenditures which have no private beneficiaries. The nature of public services and information availability constraints have led benefit incidence practitioners to concentrate on three main categories of public services: education, health and some types of infrastructure. For many other public goods and services, such as national defense, the judiciary, police protection, and so on, the application of benefit incidence may be performed on the basis of two rather extreme assumptions (Hemming and Hewitt, 1991). First, the total value of public goods and services to individuals is equal to the total cost of provision. This is of course, an assumption required in all studies of benefit incidence. Second, total benefits are shared or distributed among individuals in certain proportion to their incomes. Even if costs are a reasonable approximation for benefits, the distribution of individual benefits is unlikely to be proportional to income.⁷¹ The evidence available from estimated demand for public goods, voting referenda and surveys have shown that willingness to pay for public goods can differ quite considerably among different income groups.⁷²

In practice, the conduct of incidence analysis generally involves three steps:⁷³

⁶⁹For other studies that have used a benefit incidence approach see Selden and Wasylenko (1992) and Demeri (2000). For an earlier review, see McLure (1974).

⁷⁰These include Household Income and Expenditure Surveys and Living Standards Measurement Surveys.

⁷¹Hemming and Hewitt (1991) argue that the use of the assumption on the proportionality of benefits to income is tantamount to accepting that benefit incidence is un-measurable and therefore equivalent to ignoring the impact of public expenditures on the distribution of income. Other criteria that have been used to allocate “un-allocable” expenditures are equal per capita and in proportion to tax burdens. See Musgrave and Musgrave (1989).

⁷²What can complicate things further is public altruism for some goods (for example, higher income groups may desire to pay for more consumption of education by lower income groups). Then the individual benefits are much harder to determine (Martinez-Vazquez, 1981). Any additional benefits from externalities are ignored in the traditional benefit incidence approach.

⁷³See Demeri (2000). These steps are reviewed in some detail in Appendix II.

- Obtain estimates of the unit cost or subsidy implied by the provision of a particular public service. Data for this step usually comes from public expenditure accounts: for example, budget data on per student costs or subsidy by level of schooling.
- Impute the subsidies to individuals or households identified as users of the service by using information available on use by different income groups: for example, enrollment rates in public schools across population quintiles ordered by income level ranging from poor to rich or clinic visits as reported by different households in consumer expenditure surveys.
- Aggregate individuals or households in groups ordered by income or expenditure or any other grouping of interests such as race or gender, distribute the benefits among the different groups, and arrive at an estimate of the incidence of the per capita subsidies accruing to each group.

Since benefit incidence analysis uses cost estimates as proxies for benefits and makes no attempt to derive direct estimates of benefits that individuals receive, the term “benefit incidence” may appear misleading. The reason for using the term benefit incidence has been to distinguish it from what has been called “expenditure incidence.” This latter measures the income flows government expenditures create in the provision of services, by hiring administrators, renting buildings, and so on. This type of measure has more relevance for interregional analyses but has less relevance in the context of fiscal incidence. As Demeri (2000) puts it, the focus of benefit incidence is on recipients and not providers. For this reason Demeri suggests a less misleading term for “benefit” incidence would be “beneficiary” incidence. Perhaps, an even less misleading term would be “cost incidence.”

The Behavioral Approach: Marginal Willingness to Pay

The essence of the behavioral approach is to use individual preferences to derive marginal willingness to pay as the measure of individual benefits from public expenditures.⁷⁴ The methodology consists of using econometric methods to exploit variation in behaviors in the use of public services, prices, incomes and other household characteristics across individuals and time to estimate demand functions for public services.⁷⁵ These demand functions generate price elasticities and willingness to pay that vary by income groups. With that information one can estimate the incidence of public spending programs. Thus, the behavioral approach allows us to investigate whether a particular expenditure program has pro-poor incidence and whether the poor may have a more elastic response to any changes in costs associated with the use of the service. That is, how individuals react to expenditure programs and how their welfare is affected as a result.

Being able to discern the behavioral impact of public expenditure programs opens up possibilities for the better design of public policies and in particular for better targeting

⁷⁴This approach was pioneered by Gertler and van der Gaag (1990) and Gertler and Glewwe (1990). For a more recent application see Younger (1999).

⁷⁵For example, the demand curves for education in Gertler and Glewwe (1990) are derived from a utility maximization model of school enrollment decisions using a discrete choice framework (a nested multinomial logit model).

expenditures to the poor. For example, a reduction of social welfare programs can be evaluated not only by how it may affect the distribution of income but also labor market participation, family planning, and overall earnings.⁷⁶ If we know that the demands for medical care or basic education are quite responsive to changes in prices and that the price elasticity of demand falls with income, we will be able to anticipate that the use cost recovery fees should reduce the demand for those services and that the poor will be especially affected.⁷⁷

Advantages and Limitations of the Benefit Incidence and the Behavioral Approaches⁷⁸

Both the benefit incidence and the behavior approaches have strengths and weaknesses, in fact some of the same strengths and weaknesses.⁷⁹ In addition, as we see below, these two approaches are not incompatible. In fact, the two approaches have been successfully combined in some recent studies of expenditure incidence. Nevertheless, it is quite useful to review the advantages and disadvantages associated with each of the two approaches if not for anything else then at least to design a better combination of them.

Advantages of the benefit incidence approach:

- It provides simplicity and transparency of estimation procedures.
- It allows us to study which public expenditure programs are most effective in reaching and improving the status of the poor.
- It may be better suited to investigate a “capability” perspective for incidence analysis: how governments contribute to education and health status.

Limitations of the benefit incidence approach:

- The cost measures may not be a good enough approximation of true benefits or marginal valuations of the public service. Unit costs of provision also ignore any long-term benefits (for example, basic education or immunization services).
- Unit costs may reflect inefficiencies in public service provision and may not capture possible differences in the quality of services in rich urban areas and in poor rural areas.
- It has been described as an exercise in accounting - accounting that focuses on current flows only and ignores capital expenditures and the long run effects of expenditure programs on individuals.

⁷⁶See, for example, Schoeni and Blank (2000).

⁷⁷See for example, Gertler and van der Gaag (1990) regarding health care use in the Ivory Coast and Peru and Gertler, Locay, and Sanderson (1987) also for health services in Peru. This does not necessarily mean that cost recovery fees must not be used. If the fee revenues are used to make the services more accessible to the poor, for example, the overall welfare of the poor may be improved.

⁷⁸See Demeri (2000), van de Walle (1998), Selden and Wasylenko (1992)

⁷⁹For example, both the benefit incidence and the behavioral approaches are partial equilibrium analysis. So far, the application of the two approaches has been concerned with annual as opposed to lifetime incidence.

- It cannot incorporate changes in the behavior of individuals in response to changes in public spending nor reveal any information on existing barriers or constraints to participation in government expenditure programs. For example, we may find that poor households may not send their children to school but benefit incidence does not suggest why nor provide a course of policy action.
- It does not typically take into account other government costs such as administrative costs.
- It does not allow for individual (private) cost to the participants.
- Although simple and transparent, the approach often faces serious data problems for participation rates by beneficiaries and on unit costs. The latter is more of a problem in decentralized systems with several tiers of government providing the same service concurrently.
- It focuses on average benefits from public spending but this is not helpful for policy making because public spending decisions tend to be based on impacts on the margin. For example, larger education expenditures can buy better quality for the education of the better off or can increase schooling of the poor.
- The scope is limited to public expenditure programs for which private beneficiaries can be identified. Because a large share of government expenditures is non-rival in nature, benefit incidence necessarily has a limited coverage.⁸⁰
- The self-reported utilization rates of services may be biased. For example, the measure of covered needs in health services may underestimate the needs of the poor because lower income households are less likely to report an illness during the period covered in the survey and because lower access to health facilities by the poor may also lead to less frequent recognition of illnesses.
- It can ignore important interaction effects with the private sector. For example, if the private education sector is able to attract a higher number of richer students, benefit incidence of education becomes more progressive or pro-poor. However, if the quality of education depends, among other things, on peer pressure, the lower number of children of better-educated and wealthier families in public schools may reduce the quality of public education for the poor.
- The counterfactual (the pre-fisc or without government intervention state) is typically assumed to be the distribution of per capita income less the monetary value of the benefits from government programs. However, public policies affect individual behavior, such as in labor supply, consumption, savings and investment decisions. In addition, public expenditure programs displace private alternatives or can increase the private consumption of goods that are complementary with public service.

Advantages of the behavioral approach

- The approach is more theoretically sound with clear foundations in microeconomics.
- It yields estimates of marginal (as opposed) to average incidence.
- It allows the estimation of incidence for public expenditures for which specific users cannot be identified.

⁸⁰For example, a recent study of benefit incidence that sought to be as exhaustive, Devarajan and Hossain (1998), was able to cover only one-third of government expenditures.

- It allows the identification of incidence on several dimensions of welfare, yielding money metrics of welfare such as willingness to pay and compensating and equivalent variations, and non-money measures, such as infant mortality or nutritional status.
- It incorporates individual behavioral responses and therefore it provides concrete guidance for policy reform.

Limitations of the behavioral approach

- The approach is more data intensive and the methodologically more complex.
- Information or data requirements, such as fees and other private expenses incurred by the beneficiaries, are high and may seldom be met in reality.
- It suffers from a series of econometric problems. For example, policy measures may not be exogenous in which case the estimation of the model leads to biased coefficients.⁸¹
- The approach needs to take into account the impact of changes in behavior by non-beneficiaries. For example, households may offer less help to family relatives when the government introduces a welfare scheme to help deserving households.
- Willingness to pay for services as expressed by the head of the household may have little to do with the private benefits children receive from education or health care. Willingness to pay measures are also likely to ignore externalities and social benefits.

Combining the Benefit Incidence and Behavioral Approaches

Clearly, the theory and practice of expenditure incidence analysis is in a state of flux. Neither the benefit incidence approach nor the behavioral approach is a perfect methodology. As we have seen, each has its own strengths and suffers from a variety of weaknesses. The natural evolution or the next step in the field has been to try to combine both approaches to build on their respective strengths. Several recent studies have started this work.⁸²

As van de Walle (1998) points out, one way to proceed is to use the behavioral approach to measure benefits net of behavioral responses. However, because the regression analysis in the behavioral approach only predicts mean outcomes, the benefit approach can be used in a second step to determine incidence on a more disaggregated level and to quantify changes in the distribution of income.

This is the direction followed in Younger (1999). He first employs the behavioral approach to estimate demand curves for education and health services in Ecuador. Next, he uses the compensating variation rather than the unit costs of provision to determine the individuals'

⁸¹ These biases may arise because of simultaneity (for example, the policy of school feeding programs may be started because of the low nutritional status of children) or omitted variables (such as regional variations), which influence both the policy variable (expenditures on school feeding) and the welfare outcome (nutritional status of children). In general, the biases can be controlled with adequate statistical techniques provided the necessary data are available. See, for example, Besley and Case (1994).

⁸² See Hammer, Nabi and Cercone(1995), Ravallion et al. (1995), and Younger (1999)

value of the services.⁸³ Finally, Younger uses these estimates of individual benefits to evaluate the progressivity of government expenditures as is done in conventional benefit incidence analysis.

Another interesting application of benefit and behavioral approaches is provided in Ravallion et al. (1995). This study seeks to distinguish between the extent of “protection” against poverty, as done in conventional benefit incidence, and “promotion” out of poverty, which looks at the behavioral responses of the recipients of social welfare payments.

Country examples of expenditure incidence

The vast majority of benefit and behavioral incidence studies for the reasons we have reviewed above have focused on four categories of government expenditure programs sectors: education, health, water/sanitation, and other infrastructure. In this section, we review first the finding of the two seminal benefit incidence studies by Selowsky (1979) and Meerman (1979). We close by reviewing the incidence findings in several more recent studies that have used both the benefit and the behavioral approaches.

Selowsky (1979) used the benefit incidence approach to study the distributional impact in Colombia of government expenditures on education, health, and investments in electricity, water and sewerage. These represented approximately one-third of total government expenditures in the 1974 budget. The incidence analysis was based on a country-wide survey of 4,019 households. His main findings included the following:

- The total subsidy to education was evenly distributed across income quintiles.
- However, the results were quite diverse among educational levels. While the distribution of the subsidies to primary education was highly progressive, for higher education it was highly regressive. This was mainly due to the higher rates of access to college education by higher income groups.
- The total health subsidy was also relatively similar across households, although it varied significantly by type of program. While the incidence of the National Health System was progressive, the Social Security System, where access depended more on having a job in the formal sector, tended to favor the middle-income groups.
- While the health subsidy per household did not vary with income, in per capita terms the impact was regressive because family size was inversely related to income.
- For electricity, water and sanitation between only 25 and 30 percent of the services went to the bottom 40 percent of the households and almost all beneficiaries were concentrated in urban areas.

Meerman (1979) also used the benefit incidence approach to study the distributional impact in Malaysia of government expenditures on education, health, and investments in

⁸³ The compensating variation is how much income we would need to give a household to be as well off if the public service were not provided.

electricity, water and sewerage. These again represented approximately one-third of total government expenditures in the 1973 budget.. His main findings included the following:

- For education, the distribution of benefits becomes more regressive with the level of education (primary, secondary and post-secondary). This is because enrollment ratios increased with income, the subsidy per student increases with education level (the post-secondary level per student was 13 times that in primary education), and because even though education was free, there were substantial out-of-pocket expenditures (books, fees, meals, uniforms, shoes, transport, supplies etc) which affected the enrollment rates more negatively.
- For health, benefits were quite equally distributed by income group.
- For electricity, water and sewage disposal the distribution of benefits was highly unequal, with access increasing by community size and household income. This reflected the fact that all these services were offered at fees that covered total costs and consequently supply went to where demand was more highly concentrated.
- In terms of overall incidence for all allocable public expenditures in Malaysia, the highest income quintile received a household per capita benefit that was above the mean, the lowest quintile far below the mean, and the three remaining quintiles very close to the mean.

More recently, Selden and Wasylenko (1992) used a benefit incidence approach to estimate the distributional impact of public education expenditures in Peru. They found a mildly progressive or pro-poor incidence. Part of the reason is that a lower proportion of poor children aged 6 through 12 were enrolled in primary schools in comparison to children from middle- and high-income households. Females of school age as a group received fewer benefits than their male counterparts, a result also of different enrollment rates between the two groups. Out-of-pocket expenses for attending public schools represented a substantial barrier to school participation by children of low-income households. However, another incidence study for education in Peru by Gertler and Glewwe (1990), who used a behavioral approach, found that rural households, including the poor, were willing to pay fees high enough to more than cover the operating costs of opening new secondary schools in their villages.

Younger's (1999) recent study, discussed above, uses a combination of benefit and behavioral approaches, to examine the incidence impact of education and health expenditures in Ecuador. He finds that primary education is most progressive, followed by health consultations for children at public facilities, consultations for adults, secondary education, public universities, and finally private universities.⁸⁴

From this brief review of the empirical literature on the incidence of public expenditures several patterns emerge. Incidence studies of public expenditures only cover a share of government total expenditures mostly focusing on education, health, and basic utilities. The incidence of public education expenditures generally varies with the level of education services. Primary and perhaps secondary education tend to be pro-poor and higher education/university typically benefit the rich much more.⁸⁵ The incidence of health expenditures tends to be flatter,

⁸⁴These latter also receive government subsidies.

⁸⁵See van de Walle and Nead (1995) for a review of 13 countries generally supporting this conclusion.

although primary care tends to be more pro-poor and more sophisticated types of health care more pro-rich.⁸⁶ The incidence of expenditures on utility infrastructure tends to be pro-rich.

VI. Net Fiscal Incidence: Combining Tax and Expenditure Incidence

In the two previous sections, we have reviewed the methodologies used in the estimation of tax incidence and expenditure benefit incidence. However, in an ideal world the distributional effects of public expenditures should not be analyzed in isolation of the distributional effects associated with the taxes used to finance those expenditures, or vice versa. Even if the tax system as a whole is regressive, the overall impact of the budget may still be progressive when the distribution of expenditure benefits is sufficiently progressive. Thus, the last step in incidence analysis needs to be the simultaneous consideration of tax and expenditure benefit incidence. This analysis is often known as net fiscal incidence or simply fiscal incidence.

Clearly, from a policy viewpoint, net fiscal incidence, not tax incidence or benefit incidence, is the relevant equity measure that government authorities need to use in judging particular policies. For example, a program that charges cost recovery fees in the health sector may be regressive from the revenue side but it may have progressive fiscal incidence if the revenues are used to finance better health services or easier access to services by the poor. Or an increase in excise taxes may be rejected on equity grounds as being regressive, but this policy may be desirable from an equity stand if the resulting revenues are used to finance school construction in poor neighborhoods. More in general, governments need to be able to gauge how well they are able to achieve their distributional objectives.⁸⁷ This can only be accomplished if we adopt a net fiscal incidence perspective.

Two sets of issues stand in the way of using net fiscal incidence as the equity standard for government policies. The first is that budgetary policy is ordinarily quite fragmented. Either comprehensive tax reforms or the fine tuning of individual taxes are most of the time undertaken in isolation of government expenditure policies. Similarly most expenditure programs are assessed on their own merits without a clear linkage to any particular type of revenue sources. Correspondence between tax and expenditure policies most often takes place only at the macroeconomic level to ensure a budget balance or a particular deficit level. There are many good reasons in budgetary policy and practice for de-linking tax and expenditure decisions and this is not the place to discuss them. However, the reality is that fragmentation in budget policy decisions makes the task of assessing net fiscal incidence much harder and less relevant also. With the few exceptions of government programs that have both a revenue and expenditure side, the analysis of net fiscal incidence is only relevant for the entire government budget. Of course, this latter is not at all trivial and ultimately is the only issue that should matter.⁸⁸

⁸⁶ See Sahn and Younger (2000).

⁸⁷ However, governments may not always have an interest in finding out the net fiscal incidence of the budget. Political considerations may get in the way. For example Meerman (1979) reports that the Malaysian authorities in 1974 de-emphasized any discussion of incidence issues in the government policy plans in order to avoid disclosing that the Chinese ethnic minority (35 percent of the population) was paying for more than half of the government budget.

⁸⁸ In the same way that tax and benefit incidence alone may give a misleading picture of the net impact on the distribution of income, focusing on the net fiscal incidence of isolated government programs may also be

The second set of impediments to using net fiscal incidence is of a technical nature. Net fiscal incidence has quite demanding data and information requirements since at the very least it compiles the conceptual and data difficulties of tax and benefit incidence. It is therefore not surprising that the empirical literature on net fiscal incidence is much smaller than that on tax incidence or expenditure benefit incidence.⁸⁹

How do we estimate net fiscal incidence? Net fiscal incidence measures the changes in income distribution associated with a particular tax-expenditure government package. Ignoring data limitations for the time being, and following Hemming and Hewitt (1991), the computation of net fiscal incidence would involve these steps:

- (i) Determine the distribution of “original” income, meant to be private income from all sources before transfers, taxes and government expenditures.⁹⁰
- (ii) Allocate taxable cash transfers by income to the distribution of “original income” to get the distribution of total income.
- (iii) Allocate direct taxes by income to obtain the distribution of post-tax income.
- (iv) Allocate indirect taxes, nontaxable cash transfers and in-kind transfers by income to obtain the distribution of net income.
- (v) Allocate benefits (income equivalent) from public goods and services to obtain the distribution of final income.

Although the labels used for the different concepts of income may be changed, these steps generally capture the methodology behind the computation of net fiscal incidence.

Let us now bring back the issue of data availability. While there is generally information on direct and indirect taxes and most transfers, there is generally no information available on the distribution of “original” income. In addition, as we saw in Section V, it is possible to estimate the monetary equivalent of benefits from some public goods and services. But, even in the best of cases more than half of government expenditures are not directly allocable to individuals. For completeness, these other expenditures may be allocated at cost across individuals in proportion to income or in equal per capita terms. Neither of these two approaches is ideal.⁹¹ Adopting an equal per capita assumption clearly will make net fiscal incidence results be more progressive.

misleading. These programs may be justified on efficiency or other grounds, while the existence of other progressive programs can still deliver an overall progressive net fiscal incidence for the entire budget.

⁸⁹See, for example, Devarajan and Hossain (1998) for a recent developing country study. For a simpler application to the case of the United States see Musgrave and Musgrave (1989, chapter 12).

⁹⁰As we saw in the previous two sections, a general problem with all incidence analysis is to determine the counterfactual, that is, the original distribution of income without the presence of government. As we noted above, this is never quite possible in a strict sense, because both taxes and transfers affect the behavior of economic agents. Arriving at the original income would require netting out these behavioral responses from economic agents to fiscal policies. In addition, wages and most prices, which determine income, are also affected by government policies. Thus, in reality we do not truly know what the counterfactual income distribution would be without fiscal policy or government. In practice, several compromises are needed. For example, we can define the counterfactual as the distribution of income net of direct taxes and cash transfers.

⁹¹As we discussed previously, another possibility, much less frequently used, is to allocate the expenditures in proportion to taxes paid. See Musgrave and Musgrave (1989).

The fundamental question is why use an equal per capita criterion. In reality there are as many goods reasons to use any of the other criteria, but none of these reasons is convincing.

A good way to understand the complexities and issues surrounding the estimation of net fiscal incidence is to review an empirical study. With this objective, we review here the recent study by Devarajan and Hossain (1998) for the Philippines.

As a first step, they used the *1988 Family Income and Expenditure Survey* to map families of different income classes into deciles. To estimate the incidence of taxes, Devarajan and Hossain use a multi-sector, computable general equilibrium model of the Philippine economy. Besides the inclusion of indirect relative price effects on tax incidence, the use of the CGE allows them to better capture the impact of the peculiarities of Philippine institutions on tax incidence. For example, the model allows for an open economy by assuming that domestic production and imports are imperfect substitutes in all markets. The model also allows for the impact of inter-industry transactions (cascading) via an input-output table. To take into account the level of evasion in the Philippines, effective tax rates (tax revenues divided by the tax base) rather than statutory tax rates are used in the computations. Overall they find that the distribution of tax burden in the Philippines is largely neutral with all income deciles roughly paying 20 percent of their income in taxes. The slightly regressive nature of indirect taxes is offset by the progressive nature of income taxes.

On the expenditure side, Devarajan and Hossain focus on the expenditure categories with significant distributional implications: education, health and infrastructure. Because of the lack of data they use an indirect approach to benefit incidence. They look at the regional pattern of expenditures, in combination with information on income distribution and utilization rates for services (primary and secondary enrollment rates and hospital and clinic utilization rates). This allows them to arrive at inferences about a nationwide incidence pattern by income group. Overall, they find a progressive or pro-poor incidence of expenditures. Thus, the combination of neutral tax incidence and the progressive expenditure benefit incidence implies a progressive net fiscal incidence for the Philippines.

VII. Conclusion

Poverty has very complex and difficult roots, so its eradication cannot rely on simple measures. Government policy can help, however, by making sure that the tax burdens of the poor are nil or very low and that the composition and direction of public expenditures favor the poor. Implementing these types of policies requires understanding well the tax and benefit incidence or net fiscal incidence of government budgets. The goal of this paper has been to review the main issues in the definition and practice of tax and benefit incidence.

An important conclusion we have reached is that there is no unique or best way to measure individual welfare and changes in the distribution of welfare. We need to be aware that using different measures can generally yield different conclusions on the impact of government policies. Thus, it is extremely important in incidence analysis to be explicit about the definitions being used and the assumptions made.

What is that we can conclude from the review of incidence studies? Although it is difficult to generalize, and it may even be dangerous because incidence results are very sensitive to country-specific conditions, there are some general patterns that emerge from our review. First, the higher use of direct taxes tends to make the final distribution of income more equal, i.e. in general direct taxes tend to be progressive. The reverse is true for indirect taxes. The higher relative importance of indirect taxes tends to make tax systems more regressive. As a net result, we are likely to find in the typical country that overall tax incidence may be proportional or mildly regressive for very low income groups, proportional over a large range of middle-income groups, and progressive for higher income groups. Many tax systems therefore tend to show a proportional to a mildly progressive incidence impact. In general, taxes have not been a very effective means of re-distributing income. One reason for the limited redistributive scope of tax policy is the potentially large excess burdens or efficiency losses associated with highly progressive taxation. Second, and although not discussed in any depth here, direct cash transfers and in-kind transfers tend to be quite progressive unless there are serious targeting problems. Third, the expenditure side of the budget (including transfers) can have a more significant impact on income distribution. Expenditure programs in the social sectors (education and health) are more progressive the more is spent in relative and absolute terms on those services more frequently used by the poor (basic education and primary health care). As remarked by Selowsky (1979), government expenditures even in the poorest countries tend to be quite large by comparison to the income received by the poorest groups of the population. Therefore, changing the benefit incidence of public expenditures does have a significant potential for changing the welfare of the poor: i.e., increasing the supply of certain services (education, health and clean water) which have been proved to be critical to lifting people from endemic poverty. Although less evidence is available, in terms of net fiscal incidence budgets appear to have an overall neutral or mildly progressive impact on the distribution of income.

Other government policies, such as monetary and exchange rate policies, may have, as we saw in Section IV, as significant distributional effects as tax and expenditure policies, which in many cases are designed with particular distributional objectives in mind. Currently economists have not devised adequate methodologies that can take into account not only the net fiscal incidence of taxes and expenditures but also the distributional impact of other government policies. Thus, in a way, we are condemned to remaining in partial light, if not in total darkness, in regard to the basic question of how government budgets affect the distribution of income. We need to accept that we only have partial answers. But hopefully, the more complete these partial answers are the more likely we will be able to piece them together to get closer to the basic question that motivated this study: how government budgets affect the distribution of income and in particular the status of the poor.

Appendix I

The Conventional Estimation of Tax Incidence: Methodology and Case Study

Methodology

This appendix reviews the basic methodology used in conventional studies of tax incidence. Broadly speaking, what this methodology does is to allocate tax revenues from each tax among households based on their consumption profiles and income sources.

The first basic step in the methodology is the development and access to data sources. Typically, this process requires data from two or three sources. First, household expenditure surveys provide data on spending profiles and income sources. Second, tax collection data are based on actual collections as reported by the tax authorities or the Ministry of Finance. Third, it is desirable to use also individual tax return data provided by the tax authorities. Often, the data available have serious shortcomings and it may be necessary to supplement with additional information. It is also always necessary to make sure that the data are consistent.

The second basic step in the methodology is to establish the expected final incidence of each tax. Many of the options available are discussed in Section IV of the paper. Of course, the importance of the final incidence assumptions is that these are the criteria used to allocate or distribute tax revenues among different income groups. When we assume that sales taxes are shifted forward to consumers then household expenditure patterns are used to allocate the tax amount among households. When we assume that an income tax falling on wages is paid by workers, then tax revenues from this tax are allocated to households on the basis of the wages they receive.

The third step is to make a choice on the unit of analysis. One needs to decide whether to use the household or the individual. In the case of the household, it is assumed that the household, as opposed to the individuals in a household, makes spending and income generating decisions and pays taxes for all the individuals in the household. The most common choice in conventional tax incidence studies is to use the household as the unit of analysis. When taxes are paid by the individual, such as the case of the personal income tax, using the household as the unit of analysis requires aggregating the incomes of all individuals in the household. Some countries also allow the household to pay income taxes as a joint return. A disadvantage of using a household approach is that it ignores the size of the household which, of course, matters in equity issues. The choice of the individual as the unit of analysis is more relevant in the study of benefit incidence as discussed in Appendix II.

The fourth step is the construction of the distribution of income before taxes. This is the most burdensome step. But, it is of course critical. It will make no sense to judge the incidence of taxes vis-à-vis income if we do not have an accurate measure of household (or individual) income. However, “accurate” is a relative term given the limitations on available data. With full information, a comprehensive measure of current income would include: gross (before taxes)

wages and salaries; fringe benefits; income-in-kind from self-production; imputed income from owner-occupied housing; income from capital; the household's share of retained earnings and of the portion of the corporate income tax that is shifted to the household in the form of lower capital earnings (income); and transfer payments. It is rarely the case that the necessary information is available to construct a comprehensive measure of income. At a practical level, one often has to compromise and construct the best possible measure of household current income. For example, information on fringe benefits is generally not available. However, personal income taxes can be added to net wages to obtain gross wage income. Similarly, retained earnings and the estimate of the corporate income tax paid by capital owners can be added to income from capital to arrive at gross income from this source. Often it is also possible to add the imputed value of owner-occupied housing services. The key to useful information is the quality and scope of the household income and expenditure survey. For example the survey may ask for weekly or monthly income and that has to be transformed into annual incomes. Often, researchers end up using reported expenditures, which tend to be more reliable as an approximation to cash income. This does not present major problems if the survey also provides information on changes in savings levels. Once income has been defined, the entire population in the survey is assigned to different income groups. Later on the observations in the sample are blown-up to the entire population using the weights provided in the household expenditure survey. Often the population is divided into deciles, but other breakdowns are also used.

The fifth step consists of allocating taxes to different income groups according to the incidence assumptions. For example, individual income and payroll taxes are assumed to be borne by workers in some proportion to the wage income in each of the groups. One way to proceed in the allocation of individual income taxes and payroll or social security taxes if information is not directly available for the income side is to estimate effective average tax rates by level of income for taxpayer return data. As another example, if we assume that the corporate income tax is paid by capital, before the tax is allocated among different groups according to income from capital, the measure for capital income must be grossed up for corporate taxes paid and retained earnings. But if we assume that the corporate income tax is shifted forward to consumers, in this case income would not be grossed-up by the corporate income tax. If information on the distribution of capital income does not exist, the burden of the corporate income tax may be allocated in its entirety to the top income decile (under the assumption that the tax is not shifted.) Household expenditure patterns from the household expenditure survey are used to allocate indirect tax burdens. Note that specific commodity expenditures, when available, should be used to allocate taxes on commodities among households. That is, the tax revenue collected for each commodity is allocated among households based on their proportion of total expenditures on that commodity. However, often there are data limitations and a compromise must be reached in allocating the taxes among household expenditures. For example, some taxes on imports can be allocated in a disaggregated fashion: taxes on imports of motorcars can be allocated to motorcar expenditures reported in the survey. Similarly, import taxes on beverages or footwear can be allocated to households according to their expenditure patterns in the survey. The same can be done in general for excise taxes on tobacco, alcoholic beverages and gasoline, typically the most significant revenue items among excise taxes. These items typically can be allocated to households on the basis of their expenditures on these commodities. For property taxes, burdens on residential property may be allocated between owners and renters according to the information on ownership or actual property tax payments in

the survey. The portion of the property tax borne by landholders may be allocated to the highest income decile.

The sixth step is the computation of average tax rate or burdens by income decile. Because the sample of households in the survey does not represent the entire population, total revenues collected from each tax cannot be allocated to those deciles. Otherwise we would have a gross overestimation of effective burdens. The options are to blow-up the sample using the weights reported in the survey thus adding enough households to account for all GDP, or to scale down tax revenues according to the income reported in the sample survey.

Case Study: The Distribution of Tax Burdens in Mexico⁹²

Vertical Distribution of Tax Burdens

With the exception of a very recent study,⁹³ no estimates appear to exist on the vertical and horizontal incidence of the tax system in Mexico. The lack of information on the actual distribution of tax burdens in Mexico has contributed to the lack of voluntary compliance because of the generalized perception that many are not contributing their fair share of taxes. However, the issue of vertical equity goes beyond the lack of information. Even if information existed, it is often hard to find any consensus on what is the desirable degree of progressivity for the tax system. This reflects the fact that vertical equity, in essence, is not an economic or technical question, but rather a political or value-loaded one.

Even if there is some consensus on what the proper vertical distribution of tax burdens should be, several common mistakes are often made in designing tax policy in the pursuit of vertical equity. First, vertical equity should be viewed from the perspective of the entire tax system rather than by examining particular taxes in isolation. The effective administration of some taxes or the achievement of other desirable objectives such as minimizing economic distortions may require sacrificing the objective of a progressive distribution of tax burdens. Second, tax measures taken to protect the poor by making taxes more progressive may often backfire by actually making taxes less progressive or even regressive. A case at hand is the use of zero rating for some domestic goods such as food and medicines in Mexico.⁹⁴ The equivalent amount of tax expenditures (forgone revenues) could be used much more efficiently to redistribute income or increase the welfare of the poor through the expenditure side of the budget that specifically targets the funds to the true poor. Third, the largest potential for redistributive policies in favor of the poor are those from the expenditure side of the budget, when governments spend more funds on education, health and social assistance programs, and not from the revenue side of the budget.⁹⁵ This is particularly true in countries like Mexico where the

⁹²See Martinez-Vazquez (2001).

⁹³.See GEA Económico (1999). These results are discussed further below.

⁹⁴As noted by Casanegra et al. (1997), the distribution of the tax expenditures implied by the zero rating of food items is quite unequal and significantly regressive. For 1994, using the National Consumer Expenditure Service for that year, Casanegra et al. (1997) find that over 33 percent of the total subsidy accrues to the two highest income deciles of taxpayers while less than 9 percent of the total subsidy accrues to the two lowest income deciles of the population.

⁹⁵Of course, more government spending does not necessarily translate into effective redistribution of income. Expenditure programs need to be effective and well targeted.

overall tax level, is relatively low and social spending programs are below international norms. From this perspective, it greater distributions may be achieved with tax systems that are less progressive in themselves but raise more revenues for spending on social programs.⁹⁶

So the agenda for vertical equity in Mexico is first to determine what the actual distribution of tax burdens implied by the current system is. Second, some national consensus must be found on what is the desirable level of progressivity before embarking on the next round of tax reform.

To answer the first question, an estimated is provided of the incidence of the main taxes in Mexico. The taxes actually analyzed include: Personal Income Tax (wages and salaries only), Payroll Taxes earmarked for Social Security Accounts, Corporate Income Tax, Value Added Tax, Excises and Import Duties. These taxes account for approximately 95 percent of the taxes collected by the Federal Government.

The methodology used to assign tax burdens assumes households ultimately pay all taxes, so that these payments must equal receipts. Therefore, no attention is paid to the existence of “excess burdens” or the welfare losses suffered by taxpayers as a consequence of the distortions in economic behavior induced by taxes. In order to proceed with the incidence estimations a database containing information on household expenditures and sources of income is required. The database used here is the *Encuesta Nacional de Ingreso-Gasto de los Hogares* (ENIGH) from INEGI for 1996 (latest available). This longitudinal survey of 14,000 households provides detailed information on their sources of income, expenditures, housing conditions, and personal characteristics of the members. The survey also contains a weighting variable that allows the replication of the statistics at a national scale.

The sources of income reported in the ENIGH include income from wages, business activities, fringe benefits, interest, rental income, transfer payments, capital income, income in kind, and imputed income from owner occupied housing. On the expenditure side this survey contains information on monetary and non-monetary expenditures on food, transport, house maintenance, personal items, education, rent, clothing, health, transfers, and capital expenditures, among others.

It should be noted that the methodology followed here to analyze tax burdens has several limitations. First, there is no measure of the permanent income of each household. This problem is directly linked to the fact using a single observation in time is used. In the case of using the 1996 survey, a bias on results may arise with respect to a “normal” situation, due to the fact that in that year the country was still recovering from the 1994 peso crisis. Second, income categories are reported on an after-tax basis, so that in order to estimate the burden it is necessary to estimate income on a pre-tax basis. Finally, as mentioned, this methodology does not allow for the existence of excess burdens or deadweight losses, and leaves out the imputation of tax arrears.

The analysis of direct taxes includes the Personal Income Tax (on wages & salaries only), the Corporate Income Tax (tax on assets, on income from business activities and on rents and interest primarily)⁹⁷ and Payroll taxes earmarked for Social Security Funds. In order to arrive at

⁹⁶See “The Distributional Aims of Fiscal Policy” (Chapter 8) IDB (1999).

⁹⁷This composition of categories included in PIT and CIT is guided by Ministry of Finance estimates of the split of the revenue collected under the Impuesto Sobre la Renta (ISR).

the incidence of these taxes, several calculations are made to provide a pre-tax measure of income.

For the Personal Income Tax it is assumed that the burden is fully borne by the supplier of inputs, in this case labor. This is a reasonable assumption based on the evidence of inelastic labor supply in Mexico. The taxation of wages and salaries includes progressive tax rates, “subsidies” (truly credits which work as a percent reduction of the tax liabilities) and a “credit” (truly a negative tax or transfer) to salary that decreases as taxable income increases. Given that the lack of income reported on a pre-tax basis, the reported net income on wages and salaries is grossed up by developing a tax calculator based on 1996 tax income parameters. Following Casanegra et. al. (1995) the tax liability is estimated by the following formula:

$$T = t_1 + (t_s / 100) * (Yg - x_1)$$

Where t_1 and t_2 are tax parameters for a given bracket, x_1 is the lower limit to the bracket and Yg is the gross taxable income. For the subsidy we have:

$$S = s_1 + (s_2 / 100) * (t_2 / 100) * (Yg - x_1)$$

Where s_1 and s_2 are the subsidies parameters. This subsidy *should* be adjusted downward by the average level of fringe benefits received as a proportion of Yg . However, since this adjustment is made at the average company level rather than on an individual basis (and there is a lack of that kind of information in the survey), this adjustment is not taken into account in the estimates. If net income is define as:

$$Yn = Yg - T + S + C$$

where Yn is net income and C is the salary credit, we can then use these three equations to estimate gross income as:

$$Yg = \frac{[Yn + t_1 - s_1 - x_1 * (t_2 / 100) * (1 - s_2 / 100) - C] * 10,000}{10,000 - (100 * t_2) + (s_2 * t_2)}$$

However, to estimate gross income it is first necessary to determine the corresponding net income brackets, yet the presence of a credit impedes this estimation (overlapping and blanks between brackets are some of the problems that arise). Therefore, only the tax and subsidy rates are applied to obtain a “first-step” estimation of Yg , that in turn will be used to estimate the corresponding credit, C , that will be subtracted to obtain the final gross income.

To estimate the incidence of the PIT we calculate a collection factor (a) that matches total tax liabilities estimated from the survey (expanded at a national scale) (Ts) to the collected revenue (C):

$$Ts * a = C$$

This factor is applied to each individual imputed tax liability to obtain the effective individual liabilities:

$$T'_i = a * T_i$$

The presence of a refundable tax credit in the system generates the possibility of negative taxes or refunds to the individuals with low wages. Therefore, the burden of collected revenues must be assigned only to those taxpayers with *positive* payments. For the other households the refunds are calculated from the imputation process.⁹⁸ If final gross income obtained is negative due to the credit imputation, then it is assumed that these individuals are not actually paying personal income tax, and no gross-up process is undertaken on their income.

For the payroll tax earmarked for social security funds the estimates takes into account the rules of the social security system as it was in 1996. The structure used to gross up income is based on the Instituto Mexicano del Seguro Social (IMSS) rules.⁹⁹ The total contributions amounted to 31.5 percent of the salary,¹⁰⁰ with 5 percent paid by the government, 90 percent paid by the employer, and 5 percent paid by the employee. The assumption used to estimate the incidence of this tax is, again, that labor bears the entire burden (in this case 95 percent). This burden is assigned in proportion to the share of total income from the base salary. One problem underlying this estimate is the impossibility of identifying with precision the individuals who actually contribute to the social security system, so there may be a bias for wage earners in the lowest deciles many of whom are in the informal sector. For the sake of consistency, those individuals whose incomes were not taxed in the estimate of the PIT, are assumed not to pay taxes at this stage either.

In tax burden estimates perhaps the most controversial is that of the Corporate Income Tax (CIT). In studies of tax incidence there is no consensus on who bears the final burden (capital owners?, labor?, consumers?) In Mexico the law on income tax for business activities gives the taxpayer the possibility of choosing between paying a flat 34 percent rate (in 1996) or accumulating this incomes to pay an individual tax with progressive rates. This system avoids double taxation on dividends. For the present study, it has been assumed that taxpayers choose to pay the individual income tax on income from businesses,¹⁰¹ rents and interests from the non-financial sector. For interest from savings accounts, fix-term investments, and equity instruments, a schedular treatment is made. To estimate the tax liability in this case we make an approximate estimate of the level of capital generating such interests and tax such capital. In other words, interest (I) would equal on average:

$$I = K * r_n$$

where K is capital and r_n is net interest rate (that equals $r_g - t$), and the tax liability would be:

$$t * K = K * r_g - I$$

where the gross interest rate r_g is an average of interest rates for each kind of investment considered.¹⁰²

⁹⁸The estimated refunds for individuals in the first 8 deciles due to the salary credit amounts to 10 percent of total tax revenues (without social security funds) and 25 percent of ISR collected revenues.

⁹⁹IMSS is the social security institute that covers workers in private sector enterprises. By 1996 IMSS provided coverage to about 80 percent of the insured population, so the bias of assuming their rules for the entire population is negligible.

¹⁰⁰These rates include contributions to pensions, health services, housing, workplace injury insurance. The upper bound to contributors is 25 minimum wages.

¹⁰¹Agriculture, livestock production, forestry, and fishery businesses with revenues below 20 minimum wages are exempt from this tax.

¹⁰²The categories considered are interests paid on equity instruments, saving accounts, and fixed term investments.

The estimates of the incidence of the CIT are made under two hypothesis. The first assumes that capital owners bear the entire burden; the second assumes that capital owners assume half of the burden and the other half is shifted to consumers in the form of a final sales tax. In order to estimate the results on the second hypothesis, the CIT rates are reduced by 50 percent and half of the burden is assigned to capital owners, the other half of the burden being distributed among consumers proportionally to their share of consumption of goods and services.

For indirect taxes the general assumption underlying the estimates is that consumers bear the entire burden according to their share of consumption of the taxed goods and services. In the case of Value Added Tax (VAT), the estimates take into account the assorted exemptions and zero-rates in the system. For simplicity, exempt and zero-rated goods are treated alike, i.e., excluded from the bundle of taxed goods.¹⁰³ The presence of exempt and zero-rated goods leads to a more or less flat incidence on the VAT, given that for households in the lower deciles, expenditures on food and medicine represent a large proportion of their total expenditure. The estimates do not take into account the 5 percent difference in VAT rates between border regions and the rest of the country, which may introduce some bias in the results.

For excise taxes the burden was distributed according to the share of consumption of gasoline, tobacco, alcohol, bottled water, and telephone. In the particular case of gasoline the estimate took into account direct expenditures on gasoline, but also expenditures on transport services that use gasoline, which means the estimates allow shifting part of the burden to users of transport by means of higher prices. This explains why the incidence of the excise tax on gasoline is more or less flat, instead of being progressive.¹⁰⁴

Finally, for import products it is very difficult to make a precise estimation with the information contained in the ENIGH because it does not provide sufficient information to identify the origin of each product (imported or produced domestically), and it is also impossible to know the component of imported inputs in domestically produced goods and services. In light of this we have simply distributed the burden from import duties according to the household share of cash expenditures on all goods and services without any further distinction. Further exploration on the incidence of this tax should take into account information on the origin of final and intermediate consumed goods in the economy and their distribution by sectors of production.

The final incidence results are presented in Table I-1 for the base case scenario, where it is assumed that the burden from the CIT is fully borne by capital owners, and in Table I-2 for the alternative scenario, where it is assumed that the burden from the CIT is equally divided between capital owners and final consumers.

The distribution of tax burdens for indirect taxes (VAT, excise on gasoline, other excise and import duties) is the same in both scenarios and mildly regressive. In particular, the highest income decile of the population (those with incomes over Pesos 96,689) tends to pay a smaller share of their gross income in indirect taxes than any other population decile. The reason, of course, is that the highest income group saves a higher share of its gross incomes. Also

¹⁰³These mainly included food, water, medicines, public transport, some expenditures on education and health, house rents, books and magazines, tickets for lotteries and games, inheritances, jewelry, etc.

¹⁰⁴One problem with this method is that it assigns the indirect taxes burdens to consumers according to their final consumption bundles, and this may generate a small bias for those revenues collected in the intermediate phases of production.

noteworthy is the fact that despite the zero rating and exemption of many basic commodities, the lowest income deciles pay a similar share of their incomes in VAT to that paid by higher income deciles.

In the base case scenario, the incidence of income taxes (PIT and CIT) is progressive. The incidence of the PIT is particularly progressive because of the negative tax received by eight of the population deciles due to “credits” and “subsidies” in the current law, and the much higher share of gross income paid by the highest population decile. The progressivity in the distribution of tax burdens for the CIT also lies in the higher share of gross income paid by the two highest income population deciles, especially the latter. For social security taxes, the incidence follows an inverted U-shape. Taxpayers in middle income deciles, who are more likely to earn their income in wages from the formal sector, pay a higher share of their gross incomes than those at the top and bottom of the income distribution. This effect is also helped by the fact that social security contributions are capped at some income levels.

The distribution of the total tax burdens in the base case scenario is overall progressive. The lowest income decile ends up paying about 4 percent of their gross income in taxes while the highest income decile ends up paying 27 percent. The share of gross income paid by the in-between deciles rises smoothly from the bottom to the top.

In the alternative case scenario, the main difference is in the distribution of tax burdens for the CIT. The incidence of other taxes as a share of gross income differs in some cases from the base case scenario because of slight differences in the computed gross incomes. (See Tables I-4 and I-5 for the two distributions of gross incomes). Now the distribution of tax burdens for the CIT is basically proportional. This, of course, reflects the fact that in the alternative scenario 50 percent of that tax is assumed to be paid by consumers. The impact of this alternative assumption on the overall distribution of tax burdens in Table I-2 is to reduce the degree of progressivity. Part of the tax burden of middle to high-income groups is shifted to lower income groups. Nevertheless, the overall incidence of taxes in Mexico remains progressive.

An important part of estimating the incidence of taxes is the derivation of income distribution among taxpayers. Here three distributions of income are presented: the distribution of income net of taxes (Table I-3), the distribution of gross (pre-tax) income in the base case scenario (Table I-4), and the distribution of gross (pre-tax) income in the alternative case scenario (Table I-5). As already mentioned, the distributions of gross income in the two scenarios differ because of the different assumptions made in the grossing up procedures, discussed above.

Several things are notable in these distributions of income. First, Mexico’s tax system starts with a very unequal distribution of income across population deciles. While the top decile receives almost 40 percent of total gross income, the bottom decile receives less than 2 percent. Another way of illustrating the current inequality in the distribution of income is to remark that the two top deciles (one-fifth) of the population receive two-thirds of total gross income and all the rest (four-fifths) of the population receives the remaining one-third of total gross income. Second, the impact of the tax system on income distribution, despite the fact of being quite progressive, is very limited. The distribution of net (after-tax) income becomes more equal than the two distributions of gross (pretax) incomes, but the changes are quite small. This illustrates well the principle discussed above that the most effective way of redistributing income is not through the tax system but through the expenditure side of the budget.

Horizontal Distribution of Tax Burdens

There is some evidence that Mexico's tax system does not perform well at taxing equally individuals with the same income level. The most important source of horizontal inequities, but also the hardest to measure, is tax evasion. The large, and growing, size of the informal sector means that businesses with equal incomes pay very different taxes and some none at all. Similarly, under the individual income tax, employees subject to withholding tend to bear a disproportionate share of the tax because professionals and other self-employed are more able to underreport income or escape tax altogether. A second important source of horizontal inequities is the tax law itself. Unequal treatment of individuals with the same income arises because of the exemption of some forms of income, examples being (previously untaxed) capital gains from the sale of securities; different treatment of some forms of consumption, as is the case for the zero rating of some goods under the VAT, different effective tax rates paid by different sectors, as under the current special tax regimes of the corporate income tax for transportation, agriculture and publishing vis-à-vis other economic sectors.

Horizontal inequities also can arise when the tax laws are explicitly used to protect the poor or bring more equity among taxpayers with particular aspects of the law. This is the case with Mexico's current negative income tax for low-income taxpayers with low or zero fringe benefits in their compensation package. The credit received by a household does not depend on the number of its members that work in the formal sectors, and there is no adjustment for the number of dependents in the household. As a result, the fiscal credit can go to households that are above the poverty line, with each of the employed members receiving a subsidy, while poorer households can be entirely excluded from this benefit even when its single employed member is in the formal sector. The discussion assumes that the final incidence of the credit is to benefit employees. However, this credit is not generally perceived by employees as a special benefit to them since typically it is subsumed in the overall salary of the employee. Given the labor market conditions in Mexico, it is possible that the credit is captured by employees via lower effective wages.

Table I-1
Tax Burden by Income Decile: Base Scenario
(as percent of income)

Income Decile (1996 mx pesos)	VAT	Gasoline	Other Excises	Import Duties	PIT (only wages)	CIT	Social Security	Total Burden
0-12097	6.68	1.67	0.99	2.06	-11.37	0.62	2.88	3.52
12098-17179	6.10	1.86	0.80	1.79	-7.43	1.16	4.02	8.30
17180-22272	6.07	2.06	0.81	1.71	-6.37	1.14	5.25	10.67
22273-27656	6.26	2.13	0.82	1.69	-6.13	1.02	6.10	11.89
27657-34428	6.39	2.34	0.99	1.65	-4.91	1.36	6.28	14.09
34429-42814	6.40	2.26	0.92	1.57	-3.91	1.38	6.60	15.21
42815-54232	6.21	2.26	0.92	1.47	-2.93	1.39	7.17	16.49
54233-74005	6.14	2.07	0.96	1.38	-1.23	1.92	7.28	18.51
74006-113458	6.16	1.94	0.96	1.26	1.47	2.06	7.29	21.16
Over 113458	6.19	1.55	0.75	1.14	7.28	5.10	5.33	27.35
<i>Total</i> ^{1\}	<i>6.33</i>	<i>1.79</i>	<i>0.81</i>	<i>1.30</i>	<i>3.79</i>	<i>4.74</i>	<i>5.59</i>	<i>24.35</i>

Source: Staff calculations

1\ Total expresses the total collected revenues by each tax as a percentage of total before-tax income of all the households in the economy. Given that each scenario leads to a different estimated before-tax revenue there may be a divergence on totals between scenarios.

Table I-2
Tax Burden by Income Decile: Alternative Scenario
(as percent of income)

Income Decile (1996 mx pesos)	VAT	Gasoline	Other Excises	Import Duties	PIT (only wages)	CIT	Social Security	Total Burden
0-12077	6.70	1.69	0.99	2.07	-11.35	4.14	2.87	7.10
12078-17165	6.12	1.87	0.81	1.80	-7.43	3.96	4.03	11.16
17166-22207	6.12	2.05	0.81	1.71	-6.39	3.81	5.18	13.30
22208-27536	6.29	2.15	0.82	1.70	-6.08	3.69	6.11	14.68
27537-34279	6.42	2.36	0.99	1.65	-4.96	3.80	6.28	16.55
34279-42744	6.41	2.23	0.91	1.57	-3.97	3.66	6.57	17.39
42745-54049	6.25	2.28	0.94	1.48	-2.92	3.51	7.21	18.74
54050-73352	6.18	2.09	0.95	1.39	-1.26	3.64	7.25	20.23
73353-112753	6.19	1.96	0.98	1.27	1.42	3.49	7.31	22.62
Over 112754	6.30	1.57	0.76	1.16	7.36	4.81	5.47	27.44
<i>Total</i> ^{1\}	<i>6.44</i>	<i>1.82</i>	<i>0.83</i>	<i>1.33</i>	<i>3.86</i>	<i>4.82</i>	<i>5.68</i>	<i>24.78</i>

Source: Staff calculations

1\ Total expresses the total collected revenues by each tax as a percentage of total before-tax income of all the households in the economy. Given that each scenario leads to a different estimated before-tax revenue there may be a divergence on totals between scenarios.

Table I-3 Income Distribution of Net (After-Tax Income).
(In Percentages)

Income Deciles	Total Net Income	Salaries & Wages	Fringe Benefits	Business Income	Income from Interest	Other Monetary Income	Income in-kind
I	1.88	1.19	0.11	2.06	0.02	2.08	3.01
II	3.05	2.12	0.23	3.65	0.53	3.39	4.28
III	3.92	3.30	0.68	4.33	0.14	3.96	4.94
IV	4.84	4.67	1.15	4.35	1.41	5.09	5.71
V	5.90	5.73	1.97	5.96	3.60	5.30	6.77
VI	7.20	7.21	3.83	6.74	1.62	6.81	8.07
VII	8.80	9.51	5.65	7.09	4.40	7.78	9.70
VIII	11.22	12.10	9.61	9.53	4.78	9.50	12.10
IX	15.82	17.35	20.73	12.54	9.32	14.77	15.97
X	37.37	36.82	56.05	43.74	74.18	41.33	29.46
<i>Total</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>

Source: Staff estimates.

Note: The income categories are based on the divisions made during the incidence study (see methodological annex). The business income category also includes income from leasing activities and interests from the non-financial sector. Income from Interest takes into account only interest from saving accounts, equity instruments, and fixed-term investments; other categories are included in other monetary income. The deciles are not exactly the same between the base and the alternative scenario because of the different underlying gross-up process. For the net income the estimations are made using the base scenario deciles in order to control for the same population.

Table I-4. Income Distribution of Gross (Pre-Tax Income). Base Scenario.
(In Percentages)

Income Deciles	Total Gross Income	Salaries & Wages	Fringe Benefits	Business Income	Income from Interest	Other Monetary Income	Income in-kind
I	1.54	0.77	0.11	1.79	0.02	2.08	3.01
II	2.64	1.65	0.23	3.21	0.55	3.39	4.28
III	3.52	2.83	0.68	3.82	0.14	3.96	4.94
IV	4.45	4.13	1.15	3.85	1.48	5.09	5.71
V	5.53	5.26	1.97	5.31	3.63	5.30	6.77
VI	6.88	6.84	3.83	6.04	1.79	6.81	8.07
VII	8.62	9.30	5.65	6.42	4.35	7.78	9.70
VIII	11.25	12.30	9.61	8.81	4.75	9.50	12.10
IX	16.31	18.47	20.73	11.74	9.33	14.77	15.97
X	39.25	38.45	56.05	48.99	73.95	41.33	29.46
<i>Total</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>

Source: Staff estimates.

Note: The income categories are based on the divisions made during the incidence study (see methodological annex). The business income category also includes income from leasing activities and interests from the non-financial sector. Income from Interest takes into account only interest from saving accounts, equity instruments, and fixed-term investments; other categories are included in other monetary income. The deciles are not exactly the same between the base and the alternative scenario because of the different underlying gross-up process. For the net income the estimations are made using the base scenario deciles in order to control for the same population.

Table I-5. Income Distribution of Gross (Pre-Tax Income). Alternative Scenario.
(In Percentages)

Income Deciles	Total Gross Income	Salaries & Wages	Fringe Benefits	Business Income	Income from Interest	Other Monetary Income	Income in-kind
I	1.57	0.77	0.11	1.97	0.02	2.07	3.01
II	2.67	1.65	0.23	3.48	0.54	3.38	4.26
III	3.57	2.79	0.61	4.20	0.65	3.95	4.98
IV	4.51	4.11	1.20	4.23	0.93	5.02	5.68
V	5.60	5.25	1.98	5.73	3.82	5.31	6.78
VI	6.97	6.79	3.89	6.52	1.51	6.91	8.08
VII	8.71	9.30	5.43	6.91	4.36	7.70	9.62
VIII	11.35	12.17	9.26	9.45	9.62	9.46	12.13
IX	16.49	18.36	20.94	12.54	5.63	14.85	16.03
X	38.57	38.81	56.36	44.97	72.93	41.36	29.43
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Staff estimates.

Note: The income categories are based on the divisions made during the incidence study (see methodological annex). The business income category also includes income from leasing activities and interests from the non-financial sector. Income from Interest takes into account only interest from saving accounts, equity instruments, and fixed-term investments; other categories are included in other monetary income. The deciles are not exactly the same between the base and the alternative scenario because of the different underlying gross-up process. For the net income the estimations are made using the base scenario deciles in order to control for the same population.

Appendix II

Conducting Benefit Incidence Analysis¹⁰⁵

Benefit incidence estimates depend on two sets of issues. First, how much government spends on particular services. Second, how much different groups of individuals use those services. The incidence of public expenditures will tend to be more progressive or pro-poor the higher the share of government expenditures that are spent on those public services more frequently used by the poor. For example, if the poor have higher enrollment rates in primary education than in secondary and post-secondary education, a higher share of education expenditures spent on primary education will tend to make the incidence of education expenditures more progressive.

The methodology behind benefit incidence consists of three basic steps: (i) calculate the unit cost or subsidy implicit in the provision of a particular public service; (ii) impute the subsidies to individuals or households identified as users of the service; (iii) aggregate individuals or households in groups, where individuals are ordered by income or expenditure or other means, such as race or gender, and compute the distribution of benefits among the different groups. Although these steps appear to be quite simple, the simplicity is deceptive. There is a good list of conceptual and data issues that need to be carefully addressed in each of these steps. There is also a question on whether there is a need to consider individual private spending associated with the consumption of the public services as a fourth step in the computation of benefit incidence.

(i) The Estimation of Unit Subsidies

The source of the costs of provision for the service are the executed government budgets. It is critical to use actual, as opposed to budgeted, expenditure data. Sometimes it is hard to get data at the right level of disaggregation. In these cases it may be necessary to conduct surveys of spending agencies to find out how much was actually spent.

Several conceptual issues need to be tackled in this step. The first is whether not only current expenditures but also capital expenditures should be included in the computation of unit costs. Because of the bulky and discontinuous nature of capital expenditures, a common practice is to leave out capital expenditures in the computation of unit costs. But this can be misleading since access to public services depends to a great extent on the existence of capital infrastructure. A more adequate approach is to estimate a value for the “flow of capital services” and incorporate that amount in the estimates of unit costs.¹⁰⁶ However, this can be quite complex since it is necessary to arrive at some estimate of the value of the stock of infrastructure.

A second issue is whether or not to exclude charges and cost recovery fees from the estimation of unit costs. The general practice is to net out cost recovery revenues from government expenditures to arrive at the unit subsidies. However, the netting out should be performed only when the revenues from cost recovery revert to the general government budget.

¹⁰⁵This appendix is based on Demeri (2000).

¹⁰⁶This is a concept similar to the “user cost of capital” in the microeconomic theory of the firm.

If the cost recovery revenues remain with the spending agency (school, clinic, and so on) the proper thing to do is not to net them out in the computation of the unit subsidy because these funds are added to the other available funds to provide the public service. In effect, users pay the cost recovery fee but also receive back the same amount in increased services, so in net the value of the unit subsidy is not affected.

(ii) The Identification of Users of Public Services

In order to assign the unit subsidies to households or individuals it is necessary to obtain information on the utilization of the public services by different individuals. The benefits from education or health services only accrue to individuals if the decision is made to send children to school or to visit a health clinic. Changes in utilization rates can make the same expenditure programs more or less progressive without a change in total funding. Data on user patterns are normally obtained from household surveys. The information on users obtained from the government agencies providing the services is typically not very useful because that information does not contain data on income and other household characteristics.

The two most important issues that need to be addressed in this step are how to address biases that may exist in the information from household surveys, and how to best match the household survey data with the official data. Biases in the survey data can arise from different sources. First, they may arise from the individuals themselves. Different groups may have different self-reporting rates (e.g., higher income groups seem to report illnesses with higher frequency) or groups of survey subjects may have different information available to them (e.g., not everyone knows what services are available and where they are available). Biases may also arise by incorrectly asking questions in the surveys. Second, matching survey and official data is often required because the categories of expenditures are different in both data sets. Dealing with data biases and differences in data categories requires care and ingenuity.

The imputation of benefits to households or individuals is not always possible. Even in general categories of expenditures, such as health and education, where benefits are private, there may be some components of expenditure that are of a public good nature (neither rival nor excludable); for example, spraying for insect control. However, other expenditure programs that may show significant externalities, such as vaccination, are still allocated among individuals because they are rival in consumption.

(iii). Aggregating individuals (households) into groups

Typically, individuals are classified by income. Household expenditure is also frequently used because these data are more readily available and can also be more reliable.¹⁰⁷ The next step is to arrange all individuals or households into groups with equal numbers, thus dividing the entire population into, for example, ten groups (deciles) or five groups (quintiles).

As discussed in Section V, benefit incidence studies take the distribution of income without the imputation of benefits as the counterfactual (the distribution of welfare that would

¹⁰⁷The use of expenditure data may also be justified as a proxy for permanent or lifetime income. See Section IV for a discussion of this issue.

have taken place without the government expenditure programs.) Establishing the distribution of income is also a crucial step because here we identify who are the poor and who are the better off. We need to be reminded that computing total income or total household expenditures is not an easy task.¹⁰⁸

Incidence analysis can be performed by grouping individuals not only by income or expenditures but also by regions, gender, race, urban and rural, and so on. These alternative classifications can produce valuable insights. For example, we can find that the average benefit for females is quite a bit smaller than for males. Classification by ethnic groups may show the disadvantaged status of ethnic minorities.

(iv). Accounting for household spending?

One last possible step in the estimation of benefit incidence is to account for the private spending incurred by the individuals or households in order to utilize the public service. These out-of-pocket costs are present even when there is no fee and the service is provided entirely free. Two arguments are raised in favor of including these additional private expenditures in the benefit incidence estimation.¹⁰⁹ The first is that it provides a more “complete accounting” of benefit incidence. These private expenditures tend to vary by income group.. The second argument is that these private out-of-pocket costs can discourage the use of the services, especially by the poor and lead to poor targeting of the government spending programs. This is a more powerful argument. Information on the additional costs helps explain different participation rates in the programs within the methodology of benefit incidence. Generally, these issues can only be explored by using a behavioral approach to expenditure incidence.

(v). The choice of unit of analysis

One last measurement issue needs to be addressed in the estimation of benefit incidence: whether to use the household or the individual as the basic unit of measurement. The choice is not harmless. For example, poor households tend to have a higher number of children. Therefore, if benefit incidence is established on a per child or adult-equivalent basis the results may look less progressive.¹¹⁰ Generally, the choice of unit should be responsive to what we are trying to measure. When we investigate services that are provided to individuals, such as education or health, it is more proper to use individuals as the basic unit of analysis. Using the household as the unit of measurement could give a misleading reading of incidence as being pro-poor because, again, lower income households tend to have more individuals than higher income households. The reverse applies for services that are provided to households, such as electricity, drinking water, or sanitation.

¹⁰⁸See also the discussions in Section IV and Appendix I.

¹⁰⁹Notice that only non-discretionary expenditures, which must be incurred regardless of the quality of the service provided, should be accounted for in these calculations. For example, these would include consultation fees and transport cost in the case of health services.

¹¹⁰The adult-equivalent calculation typically assumes that a child represents a half-adult.

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