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ANDREW YOUNG SCHOOL OF POLICY STUDIES

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Budget Policy and Income Distribution

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Introduction

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.[2] 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.

[1] I am grateful to Benjamin Miller for very helpful research assistance. Some of the materials in this paper draw on Martinez-Vazquez (forthcoming).
[2] In some cases the policy can define the target group too narrowly causing some poor individuals to be wrongfully excluded from the benefits. These costs to society are not a priority for policy makers who tend to be more concerned with keeping public expenditures in check (Fozzard, 2001).

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 redistributional 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 chapter more than an overview of the main issues. The main objectives of the chapter 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.

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 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 chapter more than some of the most significant contributions.[3] 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.[4]

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 place through changes in prices that firms pay to suppliers such as labor and landowners, the

[3]For fuller reviews of tax incidence see for example Newbery and Stern (1987), Shah and Whalley (1991) and Musgrave and Musgrave (1989).
[4]See the early work by Bird and de Wulf (1973) for a particularly skeptical perspective.

return they receive on capital, and the prices they charge to consumers. Thus, what is really of importance to policy makers is the economic incidence of a tax which refers to who finally experiences a decrease in real income (e.g., Fullerton and Metcalf, 2002).[5]

Since perceived economic incidence is what guides policy makers in decision making, it is important to understand how to predict the nature of the shift of the tax burden.[6] 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.[7] 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 several forms of 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

[5]Prices 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.

[6] See Gemmell and Morrissey (2005).

[7]For 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.[8]

The counterfactual

In order to establish the incidence of taxes we need to compare the distribution of income that results form the presence of taxes with some initial benchmark distribution of income, or the counterfactual. Identifying how to specify the benchmark so that it most closely resembles what would have happened without the policy intervention "…is at the core of evaluation design (Baker, 2000)." An outline of some of the most popular methods of determining a benchmark is included in Box 1. In specifying the counterfactual, it is important to appropriately accommodate for issues that can arise when estimating the model including, for example, selection bias and endogeneity. Because not all data sets are subject to the same empirical issues, a universal 'best practice' in designing a way to generate a counterfactual doesn't exist.

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Deciding whether or not the new policy dominates the counterfactual can be made by observing the relationship between the distributions of income generated by the two policy options. Both *Lorenz* and *Concentration* curves are appropriate for this type of comparison. If one of the curves lies strictly inside of the other curve the policy which it represents is considered to be dominant (Gemmell and Morrissey (2005); Sahn and Younger (2000)).[9] Without a counterfactual, analysis becomes largely qualitative and the results from the statistical methods use are often biased. That said, it can often be very useful to combine both quantitative and qualitative evaluation methods to get the most comprehensive results (Baker, 2000).

Box 1.
Methods of Determining 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. Ravallion and Lokshin (2000) have attempted to address this issue by taking two basic steps. First, they lump the taxes and transfers into an individuals ex-ante income. Second, they assume that no taxes or transfers are expected.

In addition to the "differential incidence approach", there are several other methods of determining the nature of the counterfactual in a way which adequately isolates the impact of a policy. One way is to use an "experimental design". This process essentially identifies a target group of individuals for a policy and then randomly selects a portion of that group into the program. By dividing the larger group into two sub-groups, those who are and are not participating in the program, 'experimental design' generates effective control and treatment groups. Problems with this method include ethical considerations of denying services to the needs and the political viability of not losing popularity with some voters who are selected into the control group.

[8]Excess 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).

[9] When doing analysis by comparing the pre- and post-fisc curves, it is important to remember to test for statistical significant differences between curves (Sahn and Younger, 2000).

Next, a "quasi-experimental design" is a method which is seen as advantageous because it is possible to draw from existing sources to create the counterfactual. In this design, a control group is generated by looking for data on a group of individuals already surveyed whose characteristics resemble those of the treatment group. How closely a control group matches the treatment group is measure by a propensity score. As a result, if only a control group with a low propensity score can be found, the estimates from this method become less believable.

Another option which is available to researchers is to make the control group be the same group of people as those that are treated by using what is termed "reflexive comparisons". This type of design would monitor a group of individuals for a set time period before implementing a policy and then continue to monitor them after the policy intervention. One problem with this type of method is that it can be problematic to make sure that the results are attributable to the policy and not some other factor which changed over time.

Finally, it is possible to use 'instrumental variables' to solve the problem of identifying the counterfactual. Under this procedure, it is necessary to identify an instrumental variable and include it on the right hand side of the estimated function in place of the independent variable which relates to program participation. To be acceptable, the chosen instrument to be correlated with whether or not an individual is selected into a program, but should not be related to the measured program outcomes. The impact of the program is derived by interpreting the estimates of the coefficient on the instrumental variable. In general, this method is difficult to apply in practice because it is hard to find an instrumental variable that adheres to the requirements stated above.

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.

Source: Baker (2000)

Conventional models of tax incidence[10]

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.

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 of the basis of computing taxes for relatively small number of artificial

[10]Devarajan 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.

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 geographical locations.[11] The representative household approach can use the same assumptions for tax shifting as the conventional approach based on a distribution of income. But, it is 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 include[12]: (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.[13]

Assumptions used in conventional models of tax incidence[14]

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, household 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 sifting assumptions, typically there has been wide agreement on the assumptions used:[15]

- The individual income tax is typically assumed not to be shifted and thus it is assumed to be paid by the recipients of income.[16] So in the presence of progressive tax rates this tax usually has a progressive incidence.

[11]Wasylenko (1986) uses the representative household approach together 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.
[12]See Bird and De Wulf (1973) for a description.
[13]See OECD (2000).
[14]See Shah and Whalley (1991) and Browning (1978).
[15]See 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).

- 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.[17] 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 assumption 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.[18] 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.[19] 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.[20] 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.[21] 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

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

[17] In his empirical study of Chile, Grubber (1997) confirms that the the payroll tax is shifted to the employees.

[18] In Thailand the lion share of the tax burden is borne by workers Son (2006). In contrast to the expected outcome with a small open economy, Gravelle and Smetters (2001) find that capital income bears the majority of the tax burden in the U.S.A., a large open economy. Furthermore, when the tax burden is not placed on capital, it tends to be exported rather than shifted to laborers (Gravelle and Smetters, 2001).

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

[20]Some 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). In order to prevent cascading in Japan, all businesses must pay a tax on all goods they purchase and then those they resell the (modified) product receive a tax credit for the previously paid tax (Beyer, 1992).

[21] It is also possible that consumption taxes will generate more revenue for the government than personal or corporate income taxes in developing economies since the latter two types of taxes are more difficult to effectively collect Son (2006).

regressive impact (tobacco products and cheap liquor).[22] 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.

- 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. In addition, according to the new view, the property tax is somewhat progressive because capital income is a higher proportion of income for wealthy families relative to poor families.[23] 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.[24]

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 assumptions 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 demands 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.

General Equilibrium Approaches to Tax Incidence

[22] Son (2006) claims that excise taxes on luxury goods may be also regressive.
[23] See Fullerton and Metcalf (2002).
[24] See for example Martinez-Vazquez and Sjoquist (1988).

The general equilibrium approach to tax incidence was pioneered by Harberger (1962).[25] 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 is a lump-sum fashion.[26] 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.[27]

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.[28] 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 wealth and with utility functions defined over 16 consumer goods. The government collects taxes on many 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

[25]See Mieszkowski (1969), McLure (1975), and Bovenberg (1987) for applications and expansions on Harberger's model.

[26]See 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.

[27]See Boadway and Wildasin (1984), Fullerton and Metcalf (2002)

[28]See Fullerton et al. (1978, 1979) and Ballard et al. (1985).

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.

At present, many authors are choosing to employ the original Harberger (1962) method of analysis as well as the newer computable general equilibrium model in their research as each method has its strengths. The original general equilibrium approach is beneficial in that it proves to be useful in understanding the intuition behind many tax incidence studies, whereas the computable general equilibrium model is more helpful in estimating the changes in real outcomes experienced by agents subject to the tax (Fullerton and Metcalf, 2002).

Conventional versus General Equilibrium Approaches: Advantages and Disadvantages[29]

There is no ideal or unique approach to the study of tax incidence. All approaches used present advantages and disadvantages.[30] 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. 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 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

[29]See Fullerton and Rogers (1991) and Devarajan et al. (1980).
[30]See Devarajan et al. (1980).

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 Incidence[31]

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.[32] 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.[33] This different perspective on tax incidence has yielded a number of studies on lifetime incidence.[34]

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

[31]See Fullerton and Rogers (1991) and Menchik and David (1982).

[32]A 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.

[33] Slavov (2006) makes a related claim. In examining the approval by the youthful population of policies that provide benefits for the elderly, she finds evidence that individuals consider their whole lifetime when voting. While the young do not directly benefit from the tax they pay towards social security in the calendar year, they continue to pay because they want to be able to collect the entitlement in their old age. Therefore, even though the social security tax system may not seem equitable on an annual basis, the conclusion can be quite different on a lifetime basis.

[34] Within this literature is has been found that individuals whose income varies wildly from year to year pay more than the person whose income remains consistent over time (Japan Shoup Mission, 2002).

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 income 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[35]

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.

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.[36] 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, inadequate

[35]See Owens (1983).
[36] See, for example, Milanovic (1995).

administration and regional differences[37], there is low and uneven take-up of benefits, which may affect the progressivity assumed for this type of transfer.[38]

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.[39] 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.[40]

The impact of the institutional setting on tax incidence

Particular institutional issues, such as the level of development of private markets[41], 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[42], 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 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.

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[37] See, for example, Komives et al. (2006).

[38] See Fozzard (2001).

[39] 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.

[40] For some types of in-kind subsidies, the form of the subsidy can determine whether or not a transfer is progressive or regressive in nature. For example, water and electricity subsidies allocated using a quantity-targeting system are regressive, whereas geographical targeting mechanisms and connection subsidies tend to be pro-poor (Komives, 2006).

[41] Fullerton and Metcalf (2002) provide a good explanation of the impact of taxation in imperfectly competitive markets.

[42] See, for example, Gemmell and Morrissey (2005).

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.[43] 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. Although traditionally distributional policies are left to central governments, it is possible to make the case for sub-national tax policy to pursue redistributing goals (Pauly, 1973). But, regardless the potential effectiveness of redistributional policies at the sub-national level, regional and local taxes have their own specific incidence with respect to income. 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.[44] 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 taxes at the subnational level tends to contribute to the regressive distribution of tax burdens, while the incidence of also widely used property taxes depends on how these taxes are structured. 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.

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

[43]Of 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

[44]See Phares (1980), Pechman (1985), and Citizens for Tax Justice (1996).

taxes falling on them are paid for by residents outside the jurisdiction levying the tax.[45] 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 (Phares, 1999). 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.[46] 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.[47] McLure finds that tax exporting among states in the United State ranged between 17 and 38 percent of public expenditures.[48] 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. However, tax exporting has been found to have an impact on the welfare effects that accompany a change in the policy (Damus et al., 1991).

Tax evasion and the incidence of tax evasion[49]

Most conventional and general equilibrium studies of tax incidence ignore tax evasion. When tax evasion is allowed for,[50] 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 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.

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[45] In general, policy makers attempt to place "*exporting*" levies on transactions for which it could be hard to export the good/service itself (i.e. mining, tourism, etc.) See Hogan and Shelton (2001).

[46] Wildasin (1987) challenges this theoretical claim. He finds that the marginal cost of providing a public good does not change according to whether or not a local government's tax burden falls on its residents or on non-residents.

[47] His 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.

[48] A more recent estimate on the average level of taxes exported in U.S. states is in the neighborhood of 18% (Phares, 1999).

[49] See Martinez-Vazquez (1996).

[50] Some 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.

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 may 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.[51] 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.[52]

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 re-distributional objectives such as price subsidies or increased hiring in the public sector (Demery and Addison, 1987).[53]

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 good and services, including house rents
- minimum wages

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

[52]For 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.

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

- 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.[54]

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.[55] Instead, we review the incidence results obtained in some recent studies and summarize general trends in the findings of past studies.

Five recent studies of tax incidence in African countries: Ghana (Younger, 1996), Eight Sub-Saharan countries (Sahn and Younger, 1999), Madagascar (Younger et al., 1999), Madagascar (Rajemison and Younger, 2001) and Uganda (Chen et al., 2001) reach quite similar conclusions. The tax systems of those 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[56], 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); Mann (2002)), Venezuela (Seijas et al. (2003) and Mexico (Martinez-Vazquez, 2001).[57] The majority of other recent studies for developing countries, reviewed in Shah and Whalley

[54] See, for example, Bahl et al. (1996) which stresses the importance of tax policies being consistent with economic policy.

[55] See, 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.

[56] In contrast to the previous evidence which characterized excise taxes as being largely regressive in developing economies, the African experience shows that taxes on goods such as petroleum, alcohol and even tobacco are progressive. From a poverty reduction perspective, this evidence implies that taxes should be relatively lower on the most essential goods for the poor like food and cooking fuel (Gemmell and Morrissey, 2005). International experience in Jamaica also confirms the idea that a consumption tax need not hurt the poor so long as a few, well identified goods important to the poor are exempted from the duty (Bahl, 1991).

[57] A summary of the findings for Mexico is presented in the Annex to this paper.

(1991), also find a broadly progressive overall incidence pattern.[58] 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[59] 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 found to have some degree of progressivity in the tax systems.

While the progressivity result is attractive, it should be noted that shifting the tax burden from the poor towards the rich did not come without consequence in some situations. In the Latin American experience, there has been a notable decrease in tax collections in many countries during the shift to the more progressive system as these tax rules include exempting the poor from income taxes and not levying duties on staple food items that compose a large amount of consumption spending of the poverty stricken population relative to other social classes. As tax receipts shrink, the government has fewer resources to redistribute towards the needed community. Thus, while a more progressive tax system reduces the tax burden on the poor, it also may reduce the benefits which they receive from government expenditure policies. This issue is particularly important for policy makers as the reduction of services such as healthcare and education can often be more costly to the poor than cost savings associated with reduced taxes. In sum, the response of tax collections must be considered when designing a policy because the impact of a change in tax collections can be significant in shaping its redistributive effects (IDB, 1999). In addition, it is necessary to consider what governments services will be reduced as a consequence of reduced collections.

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.

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[58]One 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.

[59] Willner and Granqvist (2002) suggests that financing a flatter tax schedule by broadening the tax base can be welfare enhancing for an economy in some situations. These authors find that the impact on inequality can be positive or negative depending on the characteristics of the reform and the ex-ante income distribution in the country.

Two lessons can be extracted from the quite 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. In addition, some taxes (e.g. payroll tax, corporate income tax) can be shifted backward to factors of production while other taxes (e.g. consumption taxes) are shifted forward onto consumers (Fullerton and Metcalf, 2002). 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 (Mann, 2002). 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 as a percent of GDP tends to be significantly smaller.[60]

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 (van de Walle and Nead, 1995).

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

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

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, government expenditure policies are implemented 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 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

[61]The 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.

[62]Using 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 Bergstrom 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.

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 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 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

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

[64]An advantage of the incidence approach using demand curves for public goods is that it can be applied to all types of public services provided sub-nationally, 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.

[65]Brennan (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.

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

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

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

why the contingent valuation technique has not been applied outside the case of environmental public services.

The Traditional Approach: Benefit Incidence

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 existence of several constraints, the nature of public services, available information, and so on, has 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]

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

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

[71]Hemming 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).

[72]What 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.

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

- 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." Expenditure incidence 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 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,

[73]See Demeri (2000).
[74]This approach was pioneered by Gertler and van der Gaag (1990) and Gertler and Glewwe (1990). For a more recent application see Younger (1999).
[75]For 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).

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 Approaches[78]

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.
- 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**.**

[76]See, for example, Schoeni and Blank (2000).
[77]See 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.
[78]See Demeri (2000), van de Walle (1998), Selden and Wasylenko (1992).
[79]For 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.

- 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.
- While benefit incidence does describe the social distribution of benefits, it does not explain it.[81]
- Conventional benefit incidence analyzes the impact of marginal changes in public expenditures using average participation rates. This methodology can create deceptive results that are not reliable for estimating the distributional impact of a public spending program. The results will underestimate the benefits of pro-poor spending, and underestimate the costs to the poor of eliminating pro-poor programs. This problem can be remedied by estimating the marginal odds of program participation rather than using average participation rates (Lanjouw and Ravallion, 1999).

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.

[80]For 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.
[81] See Fozzard (2001).

- 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.[82]
- 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.[83]
- 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.[84]

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'

[82] Fozzard (2001) claims that less technically sound service delivery surveys are adequate for gathering information. Though the results will not be as precise using less than desirable data, they can be informative to policy makers when making decisions about "spending priorities and delivery mechanisms (pg. 20)".

[83] 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).

[84] See Hammer, Nabi and Cercone(1995), Ravallion et al. (1995), and Younger (1999)

value of the services.[85] 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 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

[85] 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.

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.[86]

- 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.[87] 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.[88] Khandker et al. (2006) is a second recent article that uses the benefit and behavioral methods to determine the impact of expenditures. In their study they examine the effect of road infrastructure on poverty in Bangladesh. They argue that past estimates of the return to transport investments have yielded poor results because the traditional model does not include information on the ex-post behavioral changes of the communities and households impacted by the road construction. By controlling for behavioral responses to the changes in road infrastructure in the short and long term, these authors are able to show that road improvements imply several substantial benefits for the Bangladeshi people.

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

[86] Seijas et al. (2003) found a similar result when analyzing the incidence of education spending in Venezuelan.

[87] A more recent review of Latin American countries published by the IDB in 1999 confirms this result. This report also generalizes health spending as pro-poor and expenditures on utilities, defense and industrial/farm subsidies are regressive.

[88] These latter also receive government subsidies.

typically benefit the rich much more.[89] The incidence of health expenditures tends to be flatter, although primary care tends to be more pro-poor and more sophisticated types of health care more pro-rich.[90] The incidence of expenditures on utility infrastructure tends to be pro-rich.

Perhaps the most serious issue surrounding the effectiveness of public expenditure programs in achieving their goals is appropriately targeting the expenditures so that the population in need of the service actually receives it. A principal cause of this issue is that many of the services which are included in public expenditure programs have a positive income elasticity of demand. As a result, a simultaneous goal of policy makers should be to increase the demand the poor have for the services which the government offers relative to other social classes. There are two main ways of accomplishing this objective. First, the programs can be designed so that only the poorest individuals will demand the services. A second method is to take into consideration factors that enter into the households' decision making process in relation to the use of publicly provided services. For example, to increase the use of services by the poor, policy makers can improve accessibility to the facilities where the services are provided while raising the quality of the services that are received. This would have the impact of lowering the costs of using a service while increasing its benefits. One would only expect that such a change will translate into an increase in the demand for the service by the poor (Castro-Leal et al., 1999).

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.[91] 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 standpoint if the resulting revenues are used to finance school construction in poor neighborhoods. More in general, governments need to be able to gauge how

[89] See van de Walle and Nead (1995) for a review of 13 countries generally supporting this conclusion, Sahn and Younger (2000) for a review of 8 countries that support this conclusion and Castro-Leal et al. (1999) for an analysis of seven countries that support this conclusion.

[90] See Sahn and Younger (2000), Fozzard (2001). Castro-Leal et al. (1999) finds a similar result in their analysis of benefit incidence in seven African countries. They find that the public health expenditures in Africa are not absolutely progressive meaning that the richest quintile of the population receives more benefits than the poorest quintile. However, the health spending is progressive in the sense that the poorest quintile is shown to have a disproportionately large share of household income come from the health subsidies relative to the richest quintile.

[91] See, for example, Bahl et al. (1996).

well they are able to achieve their distributional objectives.[92] 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 revenue and expenditure sides, 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.[93]

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.[94]

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.[95]
(ii) Allocate taxable cash transfers by income to the distribution of "original income" to get the distribution of total income.

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[92]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.

[93]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 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.

[94]See, 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).

[95]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.

(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 3, 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.[96] Adopting an equal per capita assumption clearly will make net fiscal incidence results be more progressive. 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.

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

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 chapter 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 redistributional 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 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.

ANNEX:

An Example of a Fiscal Incidence Study for Mexico

This annex summarizes the approach and findings followed in an incidence for Mexico (Martinez-Vazquez, 2001). This study analyzes the redistributive characteristics of various taxes (i.e. PIT, CIT, VAT, excise taxes, etc…) by applying the conventional tax burden analysis method. The results were generated in the context of a comprehensive tax reform effort that the Government of Mexico considered during the first year of President Fox's mandate, an effort that for the large part faltered due to lack of support in the parliament.

The annex discusses first some data sources, followed by a discussion of several methodological issues and ends with a presentation of the incidence results..

The analysis takes advantage of the wealth of information found in the *Encuesta Nacional de Ingreso-Gasto de los Hogares* (ENIGH)[97] to conduct the conventional tax burden analysis for direct and indirect taxes in Mexico. ENIGH provides the necessary information for doing conventional incidence analysis, the sources of income and household expenditures within the economy, as well as other useful information such as housing conditions and preferences.

In order to estimate the tax liabilities, the study follows the methodology in Casanegra et al. (1995). We predict the burden placed on a household from a tax by estimating the associated change in the household's net income (Yn) which comes as a direct result of being subject to the tax. The net income of a household is defined by the equation Yn = Yg – T + S + C. In order to estimate the change in net income, we must first determine the values for the gross income of the household, the tax liability or subsidy and a salary credit. Specified equations which describe these variables of interest are found below as are definitions of the variables used (Table 2).[98]

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

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

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

[97] a household survey collected by the Mexican government's statistics office (INEGI)

[98] "This subsidy *should* be adjusted downward by the average level of fringe benefits received as a proportion of Yg…[T]o estimate gross income we must first 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, we proceed by only applying the tax and subsidy rates to obtain a "first-step" estimator of Yg, that in turn will be used to estimate the corresponding credit, C, that will be subtracted to obtain the final gross income."

Table 1 Descriptions of the Variables Used in Conventional Tax Burden Incidence Analysis				
Variable	Definition		Variable	Definition
Yg	gross taxable income		T	tax liability
Yn	net income		t_1 *and* t_2	tax parameters for a given income bracket
C	salary credit		x_1	is the lower limit to the income bracket
S	Subsidy		t_s	estimate of total national tax liabilities
s_1 *and* s_2	subsidy parameters		a	collection factor
K	Capital		r_n	net interest rate (that equals $r_g - t$)
I	Interest		r_g	an average of interest rates for each kind of investment considered

In general, to execute an incidence analysis we often find ourselves in a position where it is necessary to make assumptions regarding each of the different types of taxes so that policy implications can be extracted from the results. The assumptions made in the study are identified in Table 2 below.

Table 2 Assumptions Made in Conventional Tax Burden Analysis	
Type of Tax	Assumption(s) Made
Personal Income Tax	• Labor bears the tax burden. • Actual tax collections aren't equal to the aggregated tax liabilities. To take this into account, we must integrate a collection factor (a) into the model. This weighting factor is used to obtain the individual liabilities which are denoted by T'_i where $T'_i = a*T_i$. • Since some agents receive salary credits we assign the burden to the taxpayers with positive payments (i.e. the agents receiving salary credits are assumed to pay no taxes).
Corporate Income Tax	• Here we evaluate two situations o Capital owners bear the full burden of the tax o Capital owners bear 50% of the tax burden. The other 50% is distributed among consumers according to their consumption. • The CIT evaluation depends on identifying the taxable capital of a firm. To accomplish this, we should a firm's interest income and approximate the level of capital using the formula: $I = K * r_n$. With this measure of capital, the corporate income tax liability is then estimated using the formula $t * K = K * r_g - I$.
Value Added Tax	• In general, we distribute the tax burden according to an individual's share of consumption of taxable goods and services o Purchases of goods and services that carry zero-rates or exemptions are both excluded
Payroll Tax	• Labor bears the tax burden. • Individuals with low incomes often operate in the informal sector and do not contribute to the social security system. Thus, it is hard to know precisely who pays into the social security system. Staying consistent

	with the assumption made above for the PIT, in the evaluation of payroll tax we assume that people who didn't pay income taxes also don't pay social security tax.
Excise Taxes	• We assume that the tax burden is distributed according to an individual's share of consumption of taxable commodities.
Import Duties	• Due to a lack of specific data in ENIGH, the burden is distributed "…according to the household share of cash expenditures of all goods and services without any further distinction."

The results from the incidence analysis are found in Tables 3 and 4. The tax burdens are reported according to income deciles for each individual tax. The aggregate tax burdens for each income group are also reported in the far right column. The main distinction between the two tables is that the each evaluates one of the two different assumptions that we make regarding corporate income tax (shown above).

As can been seen by looking at the tables, the end product of an analysis such as this one is quite valuable for policy makers. First, we can observe the distributional consequences of individual taxes. For example, in Mexico, we notice that the middle class suffers the most from the gasoline and social security taxes, the PIT is largely progressive and the VAT is more or less flat. Next, we can also easy see which income groups bear the greatest burdens from the overall the tax regime. In the Mexican experience we see that the tax system is progressive since the percent of gross income paid to taxes increases with income in both the base and alternative scenarios. In addition, it is possible to identify the base scenario as being the slightly more progressive option since it has greater disparity in percent of gross income paid to taxes (4.20-27.20 compared to 8.19-27.15).

When the data are available to do this kind of study, there is little to suggest that it is unwise. The information derived from this kind of study is clearly advantageous to policy makers that seek to improve their fiscal systems.

Table 3: 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
0-11206	7.14	1.82	1.03	2.25	-14.54	0.46	6.03	*4.20*
11207-15621	6.81	2.29	0.90	2.00	-8.71	1.01	7.25	*11.55*
15622-19906	6.85	2.31	0.92	1.94	-7.63	1.01	9.16	*14.54*
19907-24584	6.89	2.38	0.87	1.86	-6.54	1.10	9.11	*15.67*
24585-30339	7.05	2.46	1.08	1.83	-5.50	1.22	9.86	*17.99*
30340-37571	6.94	2.74	1.07	1.76	-4.37	1.30	10.61	*20.05*
37572-47299	7.26	2.57	1.04	1.69	-2.95	1.46	10.67	*21.74*
47300-63823	7.13	2.36	1.13	1.58	-0.64	1.94	9.59	*23.11*
63824-96688	7.17	2.22	1.10	1.47	1.93	2.40	7.63	*23.92*
Over 96689	6.93	1.75	0.84	1.28	7.54	5.70	3.04	*27.08*
Total[1\]	*7.07*	*2.00*	*0.91*	*1.46*	*4.23*	*5.29*	*6.24*	*27.20*

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 4: 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
0-11186	7.16	1.82	1.05	2.26	-14.46	4.41	5.95	*8.19*
11187-15591	6.83	2.30	0.89	2.01	-8.78	4.24	7.30	*14.78*
15592-19876	6.84	2.29	0.91	1.94	-7.64	4.13	9.06	*17.53*
19877-24529	6.96	2.42	0.89	1.88	-6.53	4.09	9.13	*18.83*
24530-30252	7.07	2.48	1.09	1.83	-5.47	4.05	9.82	*20.86*
30253-37402	6.98	2.72	1.07	1.76	-4.48	3.96	10.68	*22.70*
37403-47072	7.32	2.60	1.03	1.70	-2.96	3.98	10.62	*24.30*
47073-63469	7.12	2.38	1.15	1.59	-0.67	3.99	9.71	*25.27*
63470-96191	7.23	2.23	1.10	1.48	1.94	4.05	7.64	*25.67*
Over 96192	7.07	1.78	0.86	1.30	7.58	5.46	3.12	*27.17*
Total[1\]	*7.21*	*2.04*	*0.93*	*1.49*	*4.32*	*5.39*	*6.36*	*27.75*

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

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