NBER WORKING PAPERS SERIES

LIFETIME VS. ANNUAL PERSPECTIVES ON TAX INCIDENCE

Don Fullerton

Diane Lim Rogers

Working Paper No. 3750

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
June 1991

This paper was prepared for the National Tax Association's Spring Symposium entitled "Tax Policy: New Perspectives," held May 9-10, 1991, in Arlington, Virginia. We are grateful for suggestions from Jane Gravelle, Jon Hakken, Paul Menchik, and Jon Skinner. This paper is part of NBER's research program in Taxation. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

NBER Working Paper #3750
June 1991

LIFETIME VS. ANNUAL PERSPECTIVES ON TAX INCIDENCE

ABSTRACT

Recent academic research on tax incidence has shifted from an emphasis on static and annual perspectives to examinations of dynamic and lifetime issues. Meanwhile, policy economists are forced to rely on annual data and hence annual analyses. The purpose of this paper is to discuss the nature and analysis of lifetime tax incidence, and to compare and contrast this lifetime perspective with the more familiar annual perspective. In our comparison, we find that (1) the lifetime perspective requires much more data over longer periods of time, because results depends critically on the whole shape of the lifetime earnings profile, (2) individuals classified by annual income decile are often reclassified into very different lifetime income deciles, (3) the personal income tax and corporate income tax appear less progressive on a lifetime basis, while consumption taxes appear less regressive on a lifetime basis, and (4) despite the different approaches and the different reasons underlying the incidence of each particular tax, the lifetime incidence of the entire U.S. tax system is strikingly similar to the annual incidence.

Don Fullerton
Department of Economics
Rouss Hall
University of Virginia
Charlottesville, VA 22903
and NBER

Diane Lim Rogers
Department of Economics
Kern Graduate Building
Pennsylvania State
University
University Park, PA 16802

I. Introduction

Recent academic research on tax incidence has shifted from an emphasis on static and annual perspectives to examinations of dynamic and lifetime issues. Meanwhile, policy economists are forced to rely on annual data and hence annual analyses. The purpose of this paper is to discuss the nature and analysis of lifetime tax incidence, and to compare and contrast this lifetime perspective with the more familiar annual perspective. In our comparison, we find that (1) the lifetime perspective requires much more data over longer periods of time, because results depends critically on the whole shape of the lifetime earnings profile, (2) individuals classified by annual income decile are often reclassified into very different lifetime income deciles, (3) the personal income tax and corporate income tax appear less progressive on a lifetime basis, while consumption taxes appear less regressive on a lifetime basis, and (4) despite the different approaches and the different reasons underlying the incidence of each particular tax, the lifetime incidence of the entire U.S. tax system is strikingly similar to the annual incidence.

Studies of the distributional effects of tax policy have progressed from the Harberger (1962, 1966) tradition of small theoretically–based analyses of incidence using relatively few sectors and consumers. Another approach, best exemplified by Pechman and Okner (1974), is to use the results of these theoretically–based models to allocate the burden of each tax across a large sample of households classified into annual income categories. The corporate income tax, for example, is distributed according to receipt of corporate– source income or according to

receipt of capital income generally. More sophisticated general equilibrium models such as Ballard et al. (1985) still divide households into groups based on current income.

In contrast, life–cycle simulation models such as Auerbach and Kotlikoff (1987) examine the intergenerational distribution of tax burdens. They compare different age groups, but not different lifetime income groups. Other data–oriented studies examine incidence across lifetime income categories, including Menchik and David (1982), Davies et al. (1984), and Poterba (1989). Most recently, Lyon and Schwab (1990) compare the lifetime and annual incidence of alcohol and cigarette taxes, and Fullerton and Rogers (1991) employ a general equilibrium model to examine the distribution of the U.S. tax burden across lifetime income categories.

The distinction between annual and lifetime perspectives may be important for measuring income, as discussed in section II below. Annual income may be volatile, or it may rise and then fall in a predictable pattern. Lifetime income takes a long run perspective and accounts for both these kinds of changes. We also discuss the use of data, and the choice of model. The distinction also is important for classification, as discussed in section III below. The typical annual incidence study would lump together individuals of different ages who happen to have the same annual income, and the typical life–cycle study would lump together individuals with different income who happen to be the same age. We outline a lifetime incidence study that distinguishes individuals by both age and income. Finally, the distinction between annual and lifetime perspectives may be important for measuring tax burdens, as discussed in section IV

below. Individuals of different ages consume different goods, supply different factors, and bear different annual tax burdens. If everyone bears each of these burdens during the course of life, then overall burdens can look very different in the lifetime perspective.

These three distinctions are related, since tax burdens are usually divided by a measure of income. In either the annual or lifetime perspectives, the measure of income used as denominator in this ratio should be the same as the measure of income used in classification of households.

Given the desirability of lifetime tax incidence analysis, and given its obvious practical limitations, a natural question is how the annual perspective compares to the lifetime one: if policy economists are forced to rely only on annual measures of tax incidence, how different are their conclusions from those that would come out of a lifetime analysis? According to the preliminary results of our book (Fullerton and Rogers, 1991), the patterns of lifetime tax burdens are often quite similar to the familiar annual incidence results. Often a tax that is progressive in an annual sense is also progressive (although less so) in the lifetime perspective. Similarly, annually regressive taxes are merely less regressive on a lifetime basis. While the "bottom lines" are often similar, however, the stories underlying these incidence patterns are typically quite different.

II. Lifetime vs. Annual Income

The distinction between lifetime and annual perspectives would be unimportant if each person's income did not change over the course of his or her lifetime. In that case annual

income would accurately reflect permanent income, and individuals would not change annual income categories. Income paths would be flat, and the poorest annual income category would include the same individuals as the poorest lifetime category.

The first difference between the two perspectives therefore arises from hump–shaped income profiles. Many studies confirm that incomes rise during early years, level off during later working years, and fall during retirement. This pattern puts young and old lifetime–rich individuals into low annual–income groups. It thereby affects incidence results.

A second difference can arise simply with income volatility. Self–employed individuals with an average permanent income might be placed into a high–annual–income category, or a low–annual–income category, depending on the year taken for study. Employed workers subject to temporary lay–offs may experience similar fluctuations in annual incomes.

A third distinction involves "ability to pay." A misconception is that the lifetime perspective takes lifetime income as a superior measure of current ability to pay. Not so. Instead, the lifetime perspective takes two individuals with similar lifetime incomes as similar on a lifetime basis. For the tax system to be horizontally equitable, these two individuals should pay similar taxes over their lifetimes. In addition, for vertical equity, higher lifetime incomes could be associated with higher lifetime tax burdens. It does not matter when those taxes get paid. There is no presumption that lifetime income measures current ability to pay, only that lifetime income measures lifetime ability to pay. Whether or not actual taxes are based

on an annual accounting system, policymakers should be concerned with both "short run equity" and "long run equity." With borrowing constraints, for example, the timing of tax payments can be important. Still, the fairness of a tax should be evaluated both on how current taxes reflect current ability to pay and on how lifetime taxes reflect lifetime ability to pay.

Other differences are more subtle. A fourth distinction concerns what to include in the measure of income. In the annual perspective, income includes wages and salaries, entrepreneurial income, and all forms of capital income such as interest, dividends, and capital gains. One might impute all corporate–source income through to shareholders. Annual income may be realized or accrued, and it may be before or after taxes and transfers. Similarly, annual taxes may be realized or accrued. In contrast, a lifetime measure of income requires no capital income at all. Lifetime income would include only gifts and inheritances received plus labor income, although these would be discounted by the net rate of return to capital. Any capital income received at any point during the lifetime would then reflect not different levels of well–being, but simply different choices about when to consume: two individuals with identical paths for labor incomes and inheritances will have the same lifetime income, even if one prefers later consumption and thus has higher initial savings and capital income.

We note, however, that while lifetime income is independent of capital income, lifetime tax burdens are not. The lifetime burden of our tax system will be affected by consumption and savings behavior, since capital income is included in the income tax base. For two individuals with the

same lifetime income, the current system places a larger burden on the one with more savings and delayed consumption.

Therefore the lifetime perspective still requires information on savings behavior and capital income. This brings us to a fifth important difference between the annual and lifetime perspectives. Data on capital income by annual income category are readily available, given that households must report interest and dividend income on their annual tax returns. With the lifetime perspective we are not so fortunate. Data covering the entire lifetime profiles for labor income do not exist, let alone data on the composition of income (capital relative to labor) by lifetime income category. The panel data that are available, such as the Panel Study of Income Dynamics (PSID), can be used to predict lifetime labor income profiles with some degree of confidence, but the survey lacks adequate information on asset incomes.

Thus, under the lifetime perspective, we are forced into a choice between the lesser of two evils. One alternative would try to find and use real data on savings and capital incomes for each lifetime income category. Even if adequate data could be found, however, it would be difficult to use with a model of economic behavior. It would undoubtedly show uneven consumption patterns, saving during retirement, and other behaviors that might be difficult to explain in a model of rational lifetime decisionmaking.

The other alternative is to choose the model of lifetime decisionmaking, perhaps on the basis of empirical acceptability, and then let the model determine each group's consumption, savings behavior, and capital income through time. The obvious

starting point for a model of lifetime tax incidence would be a version of the life–cycle model (Modigliani and Brumberg, 1954, Ando and Modigliani, 1963), but it could be modified by the consideration of bequests, liquidity constraints, the degree of foresight, and even differences between interest rates for lending and borrowing. This alternative has the advantage of a rigorous framework for subsequent economic analyses using the model, but the disadvantage of rejecting any available saving and capital income data in favor of constructed paths.

In particular, note that the choice of model will surely affect the savings path and therefore the lifetime incidence of capital income taxation. For this reason we need to clarify that our model employs the basic life–cycle framework, with perfect capital markets, one interest rate, and no liquidity constraints. We incorporate bequests, however, as is necessary to explain the observed U.S. capital stock (Kotlikoff and Summers, 1981). Nevertheless, the lack of savings data and the complexity involved in simulating such data may make lifetime incidence more of an academic exercise than an operational policy tool.

III. Lifetime vs. Annual Classification

To illustrate the classification problem, suppose that the economy included only the two types of individuals depicted in Figure 1. One has relatively poor lifetime prospects, advancing with age through points A, B, C, and D. The other has relatively rich prospects, and advances with age through points E, F, G, and H. The typical annual incidence study would take individuals at point G as the highest–income group, lump together individuals at points F and C for the second group,

those at points E, B, and H for a third group, and those at points A and D for the poorest group. The typical life–cycle study would lump together individuals at points A and E as one youngest group, those at B and F as another group, C and G as the next group, and D with H as the oldest group. The model could then calculate redistributions between the old, the young, and later generations. Neither of these analyses captures the fundamental distinction between the two types of individuals in this economy. We report below on a preliminary attempt to distinguish groups by lifetime income.

In order to classify consumers into groups, however, we must first specify who is being classified. That is, we must choose the unit of analysis. In annual studies such as Pechman (1985), consumers are categorized according to household income. This makes good sense, since the well–being of an individual depends not simply on his or her own income or wealth, but rather on the income or wealth of the entire household. Our income tax system uses the household as the unit of analysis for similar reasons. In the lifetime perspective, however, it becomes extremely difficult to think about the "lifetime" of a household. Household composition varies tremendously over an individual's lifetime due to marriage, births, divorce, deaths, and the moving out of adult children. The concept of "lifetime household income" is very complicated even in theory, but especially in practice. For this reason, the lifetime perspective may typically examine burdens across individuals rather than households. Still, however, one can assign shares of total household labor income or inheritances to the different individuals in the household.[1]

Whether the unit of analysis is the individual or the household, classification may also depend upon the nature of the model, the budget constraint, and the utility function. In either the annual or the lifetime perspective, for example, labor supply may be taken as fixed or variable. Even with fixed labor and no excess burden from labor supply distortions, the model can still measure annual or lifetime burdens from labor taxes, capital taxes, or any consumption taxes. With variable labor, however, the definition of income is not so obvious. Consider the following two interpretations of the budget constraint, both based on the life–cycle hypothesis of savings behavior:[2]

$$\sum_{t=0}^{T}\sum_{i=1}^{N}\frac{p_{it}c_{it}}{(1+r)^t} = \sum_{t=0}^{T}\left[\frac{w_t L_t}{(1+r)^t} + \frac{G_t}{(1+r)^t}\right] \qquad (1)$$

$$\sum_{t=0}^{T}\sum_{i=1}^{N}\frac{p_{it}c_{it}}{(1+r)^t} + \sum_{t=0}^{T}\frac{w_t \ell_t}{(1+r)^t} = \sum_{t=0}^{T}\left[\frac{w_t E_t}{(1+r)^t} + \frac{G_t}{(1+r)^t}\right] \qquad (2)$$

where i indexes the N goods, and t indexes the T time periods of economic age. The interest rate, r, is assumed constant across all periods. In these constraints, the c are consumption goods, p are the corresponding prices of the goods, w is the wage rate, L is the amount of labor supplied, and the G are net gifts received (including intergenerational transfers) in each period.[3] The right–hand sides of these equations show the two ways we could measure lifetime resources. The measure in equation (1) includes lifetime earned labor income, L_t, while the measure in equation (2) includes the full value of time, that is,

labor endowments E_t. The amount of labor supplied equals the total time endowment minus the amount of leisure consumed, ℓ_t.[4]

A budget constraint such as (1) may be used in a model with a lifetime utility function of the form $U(x_0,x_1,...,x_T)$, where the x are each a composite of the N consumption goods. In this specification, utility depends only on consumption of goods and is not a function of leisure. With exogenous labor incomes and no labor–leisure decision, earned labor income is the appropriate measure of ability to pay.

A budget constraint such as (2), on the other hand, may be used in a model with a lifetime utility function of the form $U(x_0,x_1,...,x_T, \ell_0,\ell_1,...,\ell_T)$. Here, utility depends on both consumption goods and leisure. With an endogenous labor supply decision, where the individual is free to choose the number of hours to work, ability to pay is best reflected by the total value of the individual's labor endowment.[5]

In our model, we adopt the latter leisure–inclusive definition of lifetime resources both for the classifier of individuals and for the denominator of the burden measure. This choice will affect classification if, for example, two individuals with the same earned income differ with respect to the value of leisure taken. It will affect relative tax burdens if, for example, income groups vary systematically with respect to the leisure/ endowment ratio. In the next section we discuss incidence results from a model where high income groups take relatively more leisure, a good that is excluded from any tax on

labor, on capital, or on consumption. As a consequence, all U.S. taxes look more regressive. An immediate implication is the importance of measuring differences in leisure/endowment ratios by group, despite the obvious difficulties.

Thus lifetime income and classification may differ from the annual perspective because of hump–shaped earnings profiles, volatility in annual income, the exclusion of capital income, the use of a life–cycle model, the individual as the unit of account, and the decision to include leisure in the total value of endowment. The next logical question, therefore, is whether these issues really matter. How different is a lifetime classification from the standard sort of annual classification?

To address this question, we estimate lifetime wage profiles for individuals in the Panel Study of Income Dynamics (PSID). Using simple econometric techniques with all individuals and years together, we first estimate the wage rate as a function of time, age, age–squared, age–cubed, and various demographic characteristics. Then we return to each individual in the sample, take actual wage rates for available years, and use the estimated regression coefficients to predict wage rates in other years. The estimated wage profile for each individual allows us to calculate potential lifetime earnings, that is, the total value of the endowment used for classification into deciles. (A later step involves re–estimating the wage profile for each group separately, but that step is not relevant for the classification issue discussed here.)

Then, for the same individuals in the PSID, we take annual income for 1984, including labor and capital income (but

excluding transfers). Thus the same individuals can be classified into annual income deciles.

Table 1 shows the percentages of each annual income decile that fall into each of the lifetime income deciles. For the poorest annual income group, for example, the first row shows that 47.5 percent are also in the poorest lifetime decile and 20.1 percent are in the second decile. The weighted number of observations is in parentheses.

Few observations are grossly reclassified. The upper right corner of the table indicates that nobody from the poorest annual group is placed into the richest lifetime group. The lower left corner indicates that one observation from the richest annual group is placed into the poorest lifetime group. Yet the diagonal from upper left to lower right indicates that few observations are similarly reclassified, either. The top and bottom annual deciles have about half their members in the same lifetime category, but annual groups 2 through 9 have only 15 to 20 percent of members placed in the same lifetime group.

Percentages away from the diagonal may be small, but the reclassification may be important. For example, column 10 of row 2 indicates that 2.3 percent of individuals from the second–poorest annual income decile are actually in the richest (10th) lifetime income decile. These are largely very young and very old lifetime–rich individuals at the low points in their age–income profiles. Column 2 of row 7 indicates that 4.2 percent of individuals from annual income decile 7 (fairly high annual income) are only in the second–poorest lifetime income decile. These are mainly middle–aged lifetime–poor individuals, at the peaks of their age–income profiles.

Overall, 24.8 percent of individuals are in the same annual and lifetime income decile. Only 56.1 percent are in a lifetime decile within plus–or–minus one of their annual decile. If the same calculations are performed including transfers in annual income, then 23.3 percent of individuals are in the same annual and lifetime deciles, while 55.5 percent are within plus–or–minus one of the same decile. We conclude that the annual and lifetime classifications are too different to assume that lifetime incidence will be similar to annual incidence.

IV. Lifetime vs. Annual Taxes

Theoretical models and common sense agree that tax burdens can be shifted by changes in behavior. Corporate taxes, for example, can be borne on the "sources side" through changes in the wage rate or through changes in the net rate of return to all capital owners, and they can be borne on the "uses side" through changes in product prices. These considerations have led to two approaches. First, the researcher may choose among alternative assumptions about the shifting of each tax instrument, and then add up the burdens for each group. The approach is not necessarily "partial equilibrium," because it may assume particular general equilibrium effects on factor returns or product prices. This first approach has been used in annual incidence calculations by Pechman and Okner (1974), and in lifetime calculations by Davies, St–Hilaire, and Whalley (1984). Second, the researcher may specify all demand and supply behaviors in an explicit general equilibrium model and then "compute" the ultimate burdens on each group. This approach has been used in annual incidence calculations by Ballard, Fullerton, Shoven,

and Whalley (1985), and in lifetime calculations by Fullerton and Rogers (1991).

The main advantage of the first approach is that it can employ detailed micro–data on thousands of households. The computer program makes one pass through each household, calculates income, allocates it to an income group, and adds its taxes to that group's burden. In contrast, a general equilibrium model might take many iterations to find an equilibrium price vector, so the sample must be reduced or aggregated for repeated calculations.

The main advantage of the second approach is that it employs a structural model with demand and supply behaviors derived from explicit production functions and utility functions. The advantage is not that tax incidence is "calculated rather than assumed," because the structural model itself requires many assumptions about functional forms and elasticity values. Varying the elasticity of substitution in production will generate different amounts of burden shifting, the same way that the first approach may assume different amounts of burden shifting. Rather, the advantages are more subtle. First, the analyst can see explicitly how results are tied to a particular elasticity parameter that might be estimated. Second, incidence results are consistent in that all tax burdens interact simultaneously rather than being assumed independently. Results can include small effects on unrelated markets, and they can include implicit taxes such as the difference between the market rate of return on tax–free bonds and taxable bonds.[6] Third, results can be stated in terms of an "exact" utility–based welfare measure such as an equivalent variation (in either the annual or lifetime

perspective).[7] Fourth, this utility–based welfare measure can include excess burdens or deadweight loss. Whereas the first approach allocates burdens across households that sum to total taxes paid, the second approach calculates changes in consumer surplus that may sum to a figure larger than total taxes paid.

This last effect may be small, especially in one–period models like that of Harberger (1966) where excess burden remains only .5 percent of income. Incidence analysis by definition is concerned with distributional effects rather than the overall efficiency of the tax system. Excess burdens may differ across income categories, however, if higher–income individuals have different factor supply elasticities or face different marginal tax rates. Moreover, efficiency effects may be much larger in dynamic models with intertemporal effects on savings, capital formation, and growth (Judd, 1987). Thus, utility–based measures may be more important in the lifetime perspective. For these reasons, we use an applied general equilibrium framework, specify a lifetime utility function, and compute tax burdens according to a lifetime equivalent variation.

Now we turn to specific tax instruments and discuss likely differences between tax incidence in the annual and lifetime perspectives. First, for the personal income tax, economic incidence is often assumed equal to statutory incidence. Even general equilibrium models do not find much shifting of this tax (Devarajan, Fullerton, and Musgrave, 1980). The progressivity of the personal income tax affects annual incidence more than lifetime incidence, however, as confirmed in Davies, St–Hilaire, and Whalley (1984), and Fullerton and Rogers (1991). Both of these studies find that personal income taxes remain

progressive in the lifetime perspective, but that they are less progressive than in annual studies. As we saw in the previous section, many annually–poor individuals are actually young or old lifetime–rich individuals, so their temporarily low taxes do not represent low taxes on low lifetime income. Similarly, some middle–aged lifetime–poor individuals may have a current annual income that is fairly high, so their temporarily high taxes do not represent high taxes on high lifetime income. The lifetime income distribution exhibits much less inequality than the annual income distribution, and the lifetime incidence of the income tax appears less progressive than the annual incidence.

Second, consider taxes on income from capital such as the property tax, corporate income tax, and the personal income tax on interest and dividends. These taxes may have "uses side" effects on the prices of consumption goods, but we discuss such effects later. For now, just consider a tax that reduces the net rate of return on the "sources side."

In the annual perspective, capital income taxes burden those who own capital. They clearly redistribute from "rich" to "poor," if households are categorized by wealth. If households are categorized by annual income, however, Devarajan et al. (1980) find that the ratio of capital income to labor income is U–shaped. The low–income group includes many retirees with accumulated savings and no labor income. Middle–income households are in their high–earnings years, and the highest income households again hold more wealth. Thus the distributional burden of capital taxes also is U–shaped across annual income groups. In other words, capital taxes appear to

burden some low–annual–income individuals who may not have low–lifetime–income.

In the lifetime perspective, very different considerations come into play. The burden of capital taxation depends very much on the whole shape of the estimated profile for the lifetime endowment. First, the burden of capital taxes depends on the height of the peak. In the life–cycle model, individuals wish to achieve smoothly increasing consumption over the lifetime (if the interest rate is higher than the rate of time preference). A steeper earnings profile would therefore induce them to save and then dis–save, earning more capital income and paying more capital taxes.

Who has steeper profiles? After all of the PSID individuals were classified into lifetime income deciles as described in the previous section, we re–estimated the profile separately for each decile as a function of age, age–squared, and age–cubed. As it turns out, our estimated profiles are flatter for low–lifetime–income groups and more steeply peaked for high–lifetime–income groups. Thus life–cycle savings behavior generates higher capital–labor ratios for the lifetime–rich than for the lifetime–poor, and the lifetime–rich bear more sources–side burden of capital taxes. The lifetime– rich tend to be "capitalists" just as in the annual perspective, but for a different reason. While property and other capital taxes tend to be lifetime progressive for this reason, payroll taxes tend to be lifetime regressive. These results are similar to those of annual studies.

Second, the burden of capital taxes depends on the timing of the peak. If individuals achieve high earnings early in

the life–cycle, and desire smoothly rising consumption, then they will have more savings and bear more burden from capital income taxes. Unfortunately, however, the estimated profiles demonstrate no clear tendency to peak early or late in the lifetimes of those with high or low lifetime income. This effect is difficult to measure, however, and deserves much more study.

Third, the burden of capital taxes depends on the extent and timing of gifts and inheritances. If such gifts are larger or received earlier in life for those with high lifetime income, then their capital income and the burden of capital taxes will be greater. Again this issue deserves greater study.

Finally, consider taxes on consumption. In this category we include the effects of any tax on the "uses side," that is, effects on the prices of consumption goods. In the annual perspective, consumption taxes are regressive because the annually–poor have a high ratio of consumption to income. Consumption may even be higher than income for the very young, for retired generations, and for anyone with volatile income in a bad year. In contrast, the lifetime perspective eliminates these age–specific effects, so that the overall lifetime ratio of consumption to income is more similar across lifetime income categories. Poterba (1989) points out that if individuals consume according to the life–cycle hypothesis with no intergenerational transfers, then the present value of consumption must equal the present value of labor income. Thus a proportional tax on all consumption would be strictly proportional to lifetime income.

Consumption taxes may still be regressive in the lifetime perspective, however, for three kinds of reasons. First, actual

consumption taxes are not strictly proportional. In preliminary work, we find that lifetime income categories differ in the types of goods consumed. The lifetime–poor spend larger fractions of their income on highly taxed goods, such as cigarettes, alcohol, and gasoline. As a result, U.S. sales and excise taxes are still lifetime regressive.

Second, even if consumption tax rates were strictly proportional, the tax base excludes bequests given. Menchik and David (1982) find that low– lifetime–income groups may bequeath a low fraction of a lifetime income measure that includes both earnings and public transfers. They would thus bear a relatively high burden from consumption taxes.

Third, consumption taxes do not apply to consumption of leisure. If high–lifetime–income groups consume proportionately more untaxed leisure than low–lifetime–income groups, then even a proportional consumption tax is regressive.

This simple point does not appear in existing incidence literature, possibly because no study has estimated the ratio of leisure to income on a lifetime basis. Also, discussion of leisure has been oriented toward efficiency issues, focusing on the second–best problem of minimizing excess burden given that leisure must be left untaxed. We note that leisure is important for distributional issues, however, whether lifetime or annual in nature. If any individuals enjoy relatively high amounts of leisure as a fraction of the full value of their endowments, then those individuals bear proportionately less of the consumption tax burden.

As illustration of this effect, the lifetime–rich in our model choose higher leisure–to–endowment ratios than do the

lifetime–poor. Thus all consumption–based or labor–based taxes look more regressive.[8] Whether doing annual or lifetime incidence analysis, economists might therefore want to consider more carefully the intensity of labor across income categories.

Finally, we use the lifetime incidence model to evaluate the entire tax system, i.e., the combination of personal income taxes, corporate taxes, property taxes, payroll taxes, and sales and excise taxes. Overall, U.S. taxes are close to proportional in lifetime incidence, with slightly heavier burdens in the upper and lower tails of the lifetime income distribution. Interestingly, this overall incidence pattern is similar to that found by Pechman and Okner (1974) in their well known annual incidence study.[9]

This overall similarity derives from offsetting effects. The lifetime incidence of personal income taxes is less progressive, and that of consumption taxes is less regressive, but the combined pattern is similar to annual incidence. We emphasize, however, that while the lifetime and annual perspectives come to similar overall conclusions, they provide very different explanations and somewhat different conclusions for the incidence of each particular tax.

IV. Conclusion

Annual incidence analysis will remain a basic tool for detailed tax studies and specific policy analyses. Yet lifetime incidence provides us with a longer–run view of the distributional effects of taxes. The lifetime perspective does not substitute for, but rather supplements, the annual perspective. Especially with liquidity constraints, annual tax burdens should increase with

annual abilities to pay, while lifetime tax burdens still reflect lifetime abilities to pay.

The earliest of lifetime studies indicate that the lifetime incidence of the overall tax system is close to proportional, similar to conclusions from annual studies. The underlying factors under the two perspectives differ, however. For example, the progressivity or regressivity of each type of tax tends to be reduced in adopting the lifetime perspective, due to the humped nature of age–income or age–endowment profiles. Whereas age itself affects capital–labor income ratios in the annual perspective, it is the whole shape of the lifetime profile that determines savings and thus capital–labor income ratios in the lifetime perspective.

While practical considerations presently limit the widespread use of lifetime analysis as a routine procedure, academic studies of lifetime tax incidence can still provide policy economists with insights into the differences and similarities between the annual and lifetime perspectives. Any discussion about equity that is based on annual calculations could be supplemented, wherever possible, with potential lifetime effects. Until better data are available, however, the lifetime perspective will most likely be used as a qualitative rather than quantitative input into tax analysis.

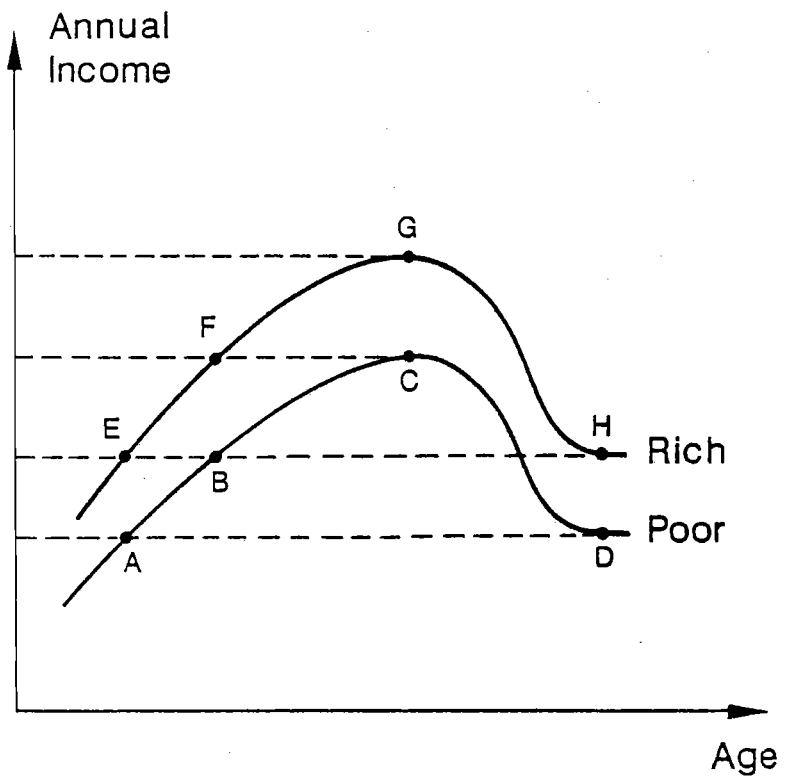
Annual
Income
G
F
C
E
H
Rich
B
Poor
A
D
Age

TABLE 1 - Annual Income Decile by Lifetime Income Decile
(% of each annual income decile falling in the various lifetime income deciles; weighted number of observations in parentheses; diagonal underlined)

Annual Decile	Lifetime Decile 1	2	3	4	5	6	7	8	9	10
1	47.5 (3,993)	20.1 (1,690)	14.7 (1,236)	9.0 (754)	2.5 (214)	2.9 (245)	1.3 (108)	0.5 (40)	1.4 (121)	0.0 (0)
2	23.3 (1,967)	16.7 (1,417)	12.2 (1,032)	13.4 (1,131)	8.5 (723)	10.0 (847)	6.1 (515)	5.5 (462)	2.0 (172)	2.3 (194)
3	14.2 (1,192)	18.2 (1,527)	15.7 (1,313)	14.1 (1,182)	9.5 (798)	8.2 (688)	7.6 (638)	5.2 (438)	3.6 (303)	3.6 (300)
4	11.7 (994)	17.7 (1,507)	17.1 (1,457)	14.6 (1,246)	15.3 (1,307)	8.3 (705)	5.1 (431)	3.9 (334)	5.5 (466)	1.0 (85)
5	2.6 (215)	16.0 (1,337)	17.3 (1,444)	12.8 (1,067)	16.3 (1,364)	14.8 (1,234)	6.5 (541)	8.6 (714)	4.7 (395)	0.4 (34)
6	0.5 (39)	6.2 (527)	13.7 (1,161)	11.2 (952)	16.2 (1,379)	18.6 (1,584)	11.9 (1,008)	9.1 (773)	8.0 (680)	4.6 (394)
7	0.0 (2)	4.2 (341)	6.6 (540)	12.5 (1,018)	10.1 (820)	18.2 (1,483)	19.4 (1,582)	10.8 (879)	15.9 (1,292)	2.4 (193)
8	0.0 (2)	0.0 (0)	1.5 (125)	7.5 (642)	8.5 (734)	13.6 (1,169)	22.3 (1,921)	21.9 (1,890)	17.6 (1,514)	7.2 (618)
9	0.5 (39)	0.9 (80)	1.1 (91)	4.3 (374)	8.3 (715)	3.8 (328)	13.2 (1,133)	25.0 (2,155)	20.5 (1,768)	22.4 (1,929)
10	0.0 (1)	0.0 (0)	0.6 (48)	1.6 (137)	4.3 (367)	1.8 (153)	6.7 (574)	8.9 (756)	20.5 (1,747)	55.6 (4,743)

ENDNOTES

1. For example, husband and wife could each be assigned one–half of their combined incomes or inheritances in each year.

2. These budget constraints assume perfect capital markets. With borrowing constraints, a negative net asset position may be infeasible. With transactions costs, a higher interest rate may be paid by borrowers than is received by savers. Whether or not we assume perfect capital markets, however, lifetime resources can still be defined as the present discounted value of the labor income or labor endowment stream, plus the present value of net gifts and intergenerational transfers.

3. In this general form, gifts can be received or given at any point in the individual's lifetime. A bequest given at the time of death, for example, would be represented by $G_T < 0$.

4. Labor supplied, L_t, may be zero so that $\ell_t = E_t$ in some periods such as retirement.

5. To the extent that hours of labor supply are not subject to individual choice, the full endowment might not be an appropriate measure of ability to pay. One may say that when unemployment is involuntary, for example, leisure hours contribute positively to lifetime utility but not to ability to pay.

6. An individual holding municipal bonds would not explicitly pay taxes on the return to these bonds and yet would implicitly be bearing a burden of taxation in the form of a reduced return.

7. "Equivalent variation" is the money–metric equivalent of a utility change, based on ex ante prices. Based on the Hicksian (compensated) demand system, this is an exact measure of welfare change, whereas Marshallian consumer surplus is not. Another exact measure is the "compensating variation," which measures the utility change in terms of ex post prices. See Tresch (1981, pp. 64–69).

8. Incidence results are affected only quantitatively and not qualitatively. Our differences in leisure–to–endowment ratios affect only the degree to which consumption taxes and payroll taxes are regressive, and the degree to which income taxes are progressive.

9. An updated version of annual incidence analysis is Pechman (1985). The later version does not find the same curling up at the high end of the income distribution as was found in the earlier study.

REFERENCES

Ando, Albert and Franco Modigliani (1963). "The 'Life Cycle' Hypothesis of Saving: Aggregate Implications and Tests," American Economic Review 53 (March), 55–84.

Auerbach, Alan J. and Laurence J. Kotlikoff (1987). Dynamic Fiscal Policy, New York: Cambridge University Press.

Ballard, Charles, Don Fullerton, John Shoven, and John Whalley (1985). A General Equilibrium Model for Tax Policy Evaluation, Chicago: University of Chicago Press.

Davies, James, France St–Hilaire, and John Whalley (1984). "Some Calculations of Lifetime Tax Incidence," American Economic Review 74 (September), 633–49.

Devarajan, Shantayanan, Don Fullerton, and Richard Musgrave (1980). "Estimating the Distribution of Tax Burdens: A Comparison of Alternative Approaches," Journal of Public Economics 13 (April), 155–82.

Fullerton, Don and Diane Lim Rogers (1991). Who Bears the Lifetime Tax Burden?, manuscript prepared for the Brookings Institution, Washington, D.C.

Harberger, Arnold C. (1962). "The Incidence of the Corporation Income Tax," Journal of Political Economy 70, 215–40.

Harberger, Arnold C. (1966). "Efficiency Effects of Taxes on Income from Capital," in M. Krzyzaniak, ed., Effects of Corporation Income Tax, Detroit: Wayne State University Press.

Judd, Kenneth (1987). "The Welfare Cost of Factor Taxation in a Perfect–Foresight Model," Journal of Political Economy 95 (August), 675–709.

Kotlikoff, Laurence J. and Lawrence H. Summers (1981). "The Role of Intergenerational Transfers in Aggregate Capital Accumulation," Journal of Political Economy 89 (August), 706–32.

Lyon, Andrew B. and Robert Schwab (1990). "Consumption Taxes in a Life–Cycle Framework: Are Sin Taxes Regressive?," paper presented at the American Economic Association meetings, Washington, D.C., December.

Menchik, Paul L. and Martin David (1982). "The Incidence of a Lifetime Consumption Tax," National Tax Journal 35 (June), 189–203.

Modigliani, Franco, and Richard Brumberg (1954). "Utility Analysis and the Consumption Function: An Interpretation of Cross–Section Data," in K. Kurihara, ed., Post–Keynesian Economics, New Brunswick, N.J.: Rutgers University Press.

Pechman, Joseph A. (1985). Who Paid the Taxes, 1966–85?, Washington, D.C.: Brookings Institution.

Pechman, Joseph A. and Benjamin A. Okner (1974). Who Bears the Tax Burden?, Washington, D.C." Brookings Institution.

Poterba, James M. (1989). "Lifetime Incidence and the Distributional Burden of Excise Taxes," American Economic Review 79 (May), 325–30.

Tresch, Richard W. (1981). Public Finance: A Normative Theory, Plano, TX: Business Publications, Inc.