Tax Incidence Theory: The Effects of Taxes on the Distribution of Income

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Associated with tax policy are a number of interrelated effects. Taxes have a direct impact on the level of effective demand and employment. Taxes affect work incentives, the amount of saving and the level and pattern of investment. Some taxes distort the allocation of resources and lead to inefficiencies. Finally, the level and structure of taxes determine the level of disposable income, and the distribution of after-tax income among different groups.

The analysis of tax incidence is the investigation of the distributive effects of taxes. In a general way incidence theory is applied distribution theory in which the focus is on how various tax regimes affect factor returns and commodity prices. The distributive impacts of some taxes are fairly straightforward, while the effects of others are quite complex. For example, the burden of a proportional income tax, that is imposed on all income, is proportional to a household’s share in national income. On the other hand, taxes that do not apply to all types of income, or to all commodities, change relative commodity prices, influence factor use in particular industries and change the production structure of the economy. A full analysis of the incidence of taxes that produce such effects requires a general equilibrium approach which accounts, as fully as possible, for tax-induced changes in commodity and factor prices.

Modern general equilibrium incidence theory is based on the marginal productivity theory of distribution that assumes firms choose factor proportion so as to minimize costs, and set commodity prices at profit maximizing levels. A large part of this review is devoted to incidence theory built on these neoclassical assumptions. Initially a set of simplifying assumptions is made: (1) that commodity and factor markets are perfectly competitive; (2) that there is no foreign trade; (3) that factors of production are perfectly mobile (shiftable) between different industries; and (4) that the total supplies of all factors are in perfectly inelastic supply to the economy as a whole. Then, whenever possible, the assumptions will be relaxed. We shall review the literature on dynamic incidence which allows for longer-run effects of tax policy through changes in the level of capital formation, and will also consider the effects of imperfect mobility of factors and the introduction of foreign trade.

The second major section of this review will examine the effects of market imperfections and the implications of non-maximizing behavior. Central to this part of the discussion is the econometric work on the shifting of the corporate profits tax. This quantitative work is an indirect test of the fundamental question of whether concentrated industries, in the aggregate, maximize profits.
Neo-classical Incidence Theory

Marginal productivity distribution theory postulates that in each industry there are a number of possible technologies and that cost-minimizing firms choose production techniques on the basis of relative factor costs (prices). In a constant-returns-to-scale, perfectly competitive economy prices will be equal to average costs and factors of production will receive the value of their marginal products.

In contrast with Austrian capital theory that viewed capital as goods in process, modern distribution theory emphasizes capital as durable producers' goods, such as plant and equipment. There are, of course, many types of capital goods of varying durability and the annual rentals, or quasi-rents, on different types of capital will not be the same. Despite the diversity of capital, well-functioning capital markets will, in the absence of differential risk, establish a single rate of return on real capital (the rate of interest) which would equate the present value of the rentals (gross profits) on a particular asset to its cost of production.

The result, i.e., factor returns are determined by real agents such as technology and material or resource endowments of the economy, has straightforward, simple implications for the burden (incidence) of general taxes, imposed at the same rate on all commodities, or on particular types of factor income. For if the total supply of each factor is fixed, full employment of all factors is automatically achieved through wage and price flexibility, and if government spends the tax proceeds in such a way as to leave relative factor prices unchanged by an increase in the government budget, the real burden of a general tax will fall on its legal tax base.

For a general sales or excise tax which taxes final commodities and which taxes capital goods as well as consumption goods, the tax base is gross national product (G.N.P.). On the assumption that government expenditures are distributionally neutral, the decrease in the real income of each household, resulting from the imposition of such a tax, is proportional to its share in G.N.P. The base of a proportional income tax that allows for the depreciation of capital is net national product (N.N.P.) so the incidence of this tax is a household's share in value-added. The burden of a general profits (wage) tax falls fully on profits (wages). Also, if capital is homogenous, a general property (wealth) tax is equivalent to a tax on profits. Similarly, it does not matter in the case of payroll taxes whether the legal liability of the tax is imposed on employees or on employers. The burden of general payroll taxes falls fully on wage-earners.

All these results follow from the condition that factors receive the value of their marginal products, and general taxes in no way affect the absolute or relative marginal productivities of the factors. For a given set of commodity prices the before-tax incomes of factors will not be affected by general factor taxes. General sales taxes can “get into” the price structure in one of two ways. When there is an accommodating monetary policy, commodity prices will increase by the amount of the tax, or at constant commodity prices factors will have to accept a proportional decrease in their monetary earnings in order to remain fully employed. Regardless of the direction of the adjustment, the incidence of a general sales tax is (depreciation aside) equivalent to that of a proportional income tax.

The view that incidence is a matter of relative price changes and real income changes was established primarily by R. A. Musgrave [50, 1953; 51, 1959, pp. 205–31, 379–82]. This point and other aspects of incidence methodology were developed by Musgrave in response to the stimulating
contributions of E. R. Rolph [66. 1952; 67. 1952; 68. 1953; 69. 1953; 70. 1954]. Rolph, following the lead of H. C. Brown [7, 1939] argued that the traditional view, that excise taxes are shifted to consumers, is fallacious and that the burden of the tax must be borne by factor owners in proportion to their incomes. Rolph placed great stress on the backward shifting of indirect taxes, not only for general excise taxes but also for partial excises.

While it is generally accepted that Musgrave's emphasis on relative rather than absolute prices is correct, the important question is whether an excise tax on capital goods is equivalent to a tax on savings. For if it be so, a general excise tax, including in its base capital goods, is equivalent to a proportional income tax. On the other hand, an excise tax system that taxes only consumption goods increases the prices of consumption goods relative to capital goods and is more burdensome to consumers, relative to an income tax of equal yield.

As a tax on newly produced capital goods will not change the rentals (yield) on capital, and as the price of capital goods is increased by a tax on them, a larger amount of current consumption has to be given up for the same amount of future consumption. This conclusion accords with the results presented by Musgrave [51. 1959, pp. 378-9].

J. F. Due [16. 1963] originally took the quite general position that a general sales or production tax is borne in relation to consumption spending. Due also concluded [17. 1965] that a value-added tax of the income type was equivalent to a general consumption tax.

More recently, however, Due [18. 1968, pp. 207-15] restricted these earlier results to imperfectly competitive economies and agreed that in a competitive situation a tax on capital goods is equivalent to a profits tax on new capital.

In addition to reopening discussion on the incidence of general excises, Rolph questioned the conventional methodology of incidence theory investigation. He went so far as to deny that there is a burden associated with taxes and attributed changes in the real income of the private sector to changes in the level of public expenditures. Rolph's approach to incidence analyzed the distributive effects of a tax increase or decrease, while holding expenditure levels fixed. This approach has not been generally adopted as there is general agreement that the distributive effects of tax policy should be studied with reference to full utilization of resources. J. M. Buchanan [8. 1960, p. 142] makes the fundamental point that Rolph's procedure is illogical as it assumes as constant, things which, by the very nature of the analysis, must vary.

There are two complementary approaches to incidence, the first, called "balanced-budget" or "expenditure-incidence," varies taxes and expenditures simultaneously on the condition that full employment is maintained. The second approach is differential incidence in which real expenditures are held constant, and the effect of substituting one type of tax finance for another type is analyzed. The expenditure-incidence approach has the advantage that it calculates the absolute decrease in real income resulting from the imposition of a particular tax, rather than being limited to analysis of income changes resulting from changes in tax regimes. Also, in qualitative analysis it is always possible to abstract from the possible effects of the pattern of government expenditures on relative factor prices by assuming the expenditure pattern to be distributionally neutral. In practice, however, the differences between the two approaches is minor as most results on differential incidence can easily be translated into absolute burdens by using the proportional income tax as a "reference point."
Here too, it is almost inevitable that the differential approach will be used in one way or other, for one of the basic aims of incidence analysis is to establish equivalence between different tax systems and to determine the real income of various groups for different tax regimes.

A recent example of differential incidence analysis has been the study of value-added taxes. C. S. Shoup [74. 1955] argued that a value-added tax of the income type (IVA) under which the depreciation of capital is excluded from the tax base, is equivalent to a proportional income tax. Shoup also concludes that a value-added of the consumption tax (CVA), which taxes gross value added minus material purchases and gross investment, is equivalent to a proportional consumption tax, or a sales tax on consumption goods. Ralph [71. 1964] reached the same conclusions. W. H. Oakland [56. 1967] while concurring with Shoup's results for IVA and noting the equality of the tax bases of CVA and a consumption tax, argues that the two taxes are not equivalent in their incidence. Oakland's definition of equivalence requires that a given amount of real revenue be raised and that real, after-tax disposable income be the same. While this definition of equivalence is quite conventional, Shoup [78. 1968] has shown that the fallacy in Oakland's analysis is that his concept of disposable income uses only the price of consumption goods as a deflator. This view makes the size of the consumption tax and the deflator depend on the division of output between consumption and investment.  

Professor Shoup in another recent contribution [75. 1969, pp. 267-9] argues that quite generally a tax on wages is equivalent to a consumption tax. This result is correct when there are only two classes in society, workers and capitalists, and workers consume all of their income and capitalists save all their profit income. Similarly, if an individual inherits no capital, consumes all his accumulated capital during retirement, and makes his savings independent of the return on capital, he will be indifferent between a wage tax and a consumption tax. In fact, in this simplest of life cycle models, wage taxes, apart from considerations of timing, will also be equivalent to wealth or profits taxes.

Apart from these special cases, Shoup's demonstration that the bases of a consumption tax and a wage tax are equal, or nearly so, ignores considerable differences in the wealth and income positions of different groups. Even if, in the aggregate, consumption is equal to wages, this position says very little about the varying consumption behavior of specific groups or individuals. Nevertheless, Shoup's attempt to compare the differential incidence of a wage tax and a consumption tax may well break new ground in incidence analysis. His provocative result raises the possibility that quite different types of taxes may have very similar effects on individual households when viewed from a life-cycle perspective.

The existence of monopoly power makes the incidence of a general profits tax one of the most controversial areas of tax analysis. However, it is generally agreed that in a competitive economy with a fixed capital stock the burden of a general profits tax falls fully on profits. What is not widely un-

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1 The following heuristic argument shows that the flat rate consumption tax is equivalent, in all respects, to a value-added tax of the consumption type. A firm is faced with two sets of separable decisions: (1) profit-maximizing short-run production and pricing decisions made for a fixed capital stock; (2) investments made by the firm for existing owners of capital, and new savers. Gross investment decreases the firm's tax liability under CVA but the firm will not invest unless it is instructed to do so, directly or indirectly, by the stockholders.
derstood is that a general property or wealth tax imposed at the same rate on all income producing wealth has more or less the same economic effects as a general profits tax. To be sure, a comprehensive property tax is not strictly equivalent to a profits tax because required rates of return on different investments vary according to differences in risk. But apart from this complication, and monopoly elements, the equivalence should be obvious; the market value of capital is equal to the capitalized value of future profits.

This is not a novel argument and it dates back at least to the work of H. G. Brown [8. 1924, pp. 178-212]. More recently J. M. Buchanan [9. 1965, pp. 491-7] likened the property tax to a tax on wealth, and L. Rosenberg [72. 1963] and A. C. Harberger [26. 1966] in analyzing the efficiency aspects of profits taxation treat property taxes as taxes on profits. Nevertheless, their view of the property tax remains the minority position. D. Netzer [53. 1966; 54. 1968; 55. 1968], the recognized voice on the property tax, treats this tax on the whole as of the regressive excise variety and pays special attention to the effects of the tax on housing prices. The U.S. Department of Commerce in its G.N.P. accounts lumps property taxes with sales and excise taxes in the category of indirect taxes.

The tradition that the part of the property tax on improvements (reproducible capital) is shifted to consumers and the burden of the tax on land falls on landlords goes back to the work of A. Marshall [42. 1897], W. G. Pierson [90. 1902], F. Y. Edgeworth [19. 1925] and H. A. Simon [77. 1943]. Although these writers were analyzing the effects on residential real estate their results were applied in quantitative work by R. A. Musgrave et. al. [49. 1951], G. A. Bishop [4. 1961] and W. I. Gillespie [20. 1965], to property taxes on industrial and commercial property as well as to residential real estate.

If the property tax were a general, flat-rate tax imposed by the Federal government, the conventional view on the property tax could not be accepted for any economy where firms maximize profits. Yet even though the tax is used primarily by thousands of local governments, and despite the fact that tax rates, coverage, and appraisal practices vary considerably among jurisdictions, this writer finds it difficult to justify the excise tax perception of the property tax. Most localities tax a broad segment of capital holdings and the aggregate data presented by Netzer [53. 1966, Tables 2-4, 2-6, and 2-7] suggest that for the country as a whole, the effective property tax for broad industry groups is remarkably similar. While there are, undoubtedly, numerous complicated excise tax effects resulting from differing tax rates in the many communities, and varying effective property taxes on finer industry classifications, I suggest that drastic reorientation is needed in work on the incidence of the property tax. Surely the starting point must be that property taxes are taxes on income producing wealth that may lead to changes in relative commodity prices and shifts of capital and population between communities. If local governments imposed a morass of wage and salary taxes, varying in their effective rates between communities, industries, and occupations, would these taxes be classified as excises? From my standpoint, it seems rather doubtful.

The Incidence of Partial Commodity and Factor Taxes

The excise tax effects of property taxes result from the tax induced changes in relative commodity prices. If capital is taxed at a differentially higher rate in a particular industry, the relative prices of commodities produced by this industry will increase. Moreover, as the cost of the taxed factor to that industry will increase, other factors of production will be substituted for it. The
taxed factor will, therefore, be released from the taxed industry for two distinct reasons: first, because the output of the taxed industry is decreased by the tax, and second, because of the effect of factor substitution. The final change in relative factor prices will depend, in part, on the characteristics of the untaxed industries absorbing the factors released from the taxed industry.

In situations where both commodity prices and factor prices change, incidence should be studied in terms of the expenditure purpose of income (consumption patterns) and in terms of the sources of income. However, if each group spends the same proportion of its income on the taxed and untaxed commodities, it is possible to disregard the spending side and to concentrate only on factor price changes. This is the approach followed by A. C. Harberger [25. 1962] in his analysis of the incidence of the corporate profits tax. Harberger treats this tax as a partial profits tax on corporate earnings and assumes that in equilibrium the after-tax rates of return will be equal in the corporate and non-corporate sectors. Consequently, any tax on corporate bodies would induce a flow of capital from the corporate into the non-corporate sector. Harberger measures all prices in terms of the price of labor, \( P_L \) (the wage rate). His analysis is carried out for small changes in the tax rate so that the general equilibrium system is differentiated with respect to \( T_{xK} \); the corporate tax is expressed as a per-unit tax in sector \( x \). The tax yield is approximated by the expression \( T_{xK}K_x \), where \( K_x \) is the amount of corporate capital.

To analyze the distribution of the tax yield, it is necessary to solve for the change in the after-tax rate return on capital, \( dp_K \), relative to the price of labor. National income, measured in terms of the price of labor, is equal to \( p_LK + P_LL + \text{taxes} \), where \( K \) and \( L \) are the total amounts of capital and labor, respectively. When the relative prices of labor and capital remain unchanged after the imposition of a tax, i.e., \( dp_K = 0 \), national income, measured in terms of the wage rate, will increase by the amount of the tax proceeds. As the relative prices of labor and capital are unchanged, their relative shares in national income remain the same, so in its distributive effects the tax would be equivalent to a proportional income tax. In general, the relative prices of labor and capital will change after the imposition of a corporate tax. If the fall in the after-tax rate of return on all capital is equal to the tax proceeds, i.e., \( -dp_KK = T_{xK}K_x \), capital bears the full burden of the tax, because the share of labor in total national income is unaffected by the imposition of the tax.

Harberger derives a general expression for the change in the after-tax return on capital in a two-sector, two-factor model commonly used in the theory of international trade. Even for the simplest of general equilibrium systems, the general expression for the changes in factor prices is fairly complex and a wide range of results are possible. To estimate incidence Harberger carried out a numerical analysis of his model where he used factor price information to estimate factor proportions and factor shares. Using a fairly wide range of assumptions for the elasticities of substitution between labor and capital in the two sectors, Harberger concluded empirically that capital probably bears most of the burden of the corporate tax in the United States.

P. M. Mieszowski [48. 1967], using Harberger's model to analyze the incidence of other partial taxes in both sectors, emphasizes the differential incidence of various taxes. In the first part of his analysis, where he follows Harberger by assuming identical spending functions for different groups, Mieszowski distinguishes between two general effects: the output effect and the factor substitution effect. The size of the
output effect depends on the elasticity of substitution in demand and on the relative factor intensities of the two industries.

The output effect relates to the tax induced changes in the output structure of the economy. Judging the situation solely on the basis of the output effect it will always be to capital's advantage to encourage taxes on the labor intensive sector. The factor substitution arises only when a partial factor tax is imposed in one of the two sectors; the untaxed factor will be substituted for the taxed factor and this factor substitution acts to depress the relative price of the taxed factor. Capital will always be better off with a tax on labor in one of the two sectors than with an equal yield commodity tax in the same sector. The worst tax, from capital's point of view is, of course, a tax on profits. When the elasticity of substitution is zero in a particular sector, the three partial taxes on that sector are equivalent to each other. Another equivalence is between a commodity tax and partial factor taxes in the same industry imposed at the same rate on labor and capital. This result serves to demonstrate the rather artificial distinction between direct and indirect taxes and illustrates the excise tax effects of partial factor taxes.

The results of the differential incidence of taxes imposed in different sectors are much less clear cut. The differential incidence of the two commodity taxes depends only on the relative factor intensities of the two industries. Factor taxes, on the other hand, also depend on the different degrees of substitutability between factors in the two sectors. Capital may be better off under a tax on capital in the capital intensive sector (if the elasticity of substitution is relatively small in that sector) than under a capital tax in the labor intensive industry.


On the production side, Meade's model is the standard neoclassical two-sector model. Meade distinguishes between two groups, workers and capitalists, and derives sufficient conditions under which a small increase in an excise tax in one sector accompanied by a small decrease in an excise tax in the other sector will increase social welfare. Government expenditures are held fixed in real terms. In one important respect Meade's analysis is quite general as taxes exist in the system before any tax change is made. His analysis introduces excess burden considerations; one of Meade's conditions for an improvement in social welfare is that the tax substitution shifts demand to the commodity for which there existed the larger excess of marginal social value over marginal social cost. Meade's use of a social welfare function also introduces normative distributional weights for the two groups.

Mieszkowski [48. 1967] disregards excess burdens and analyzes the differential incidence of a wide range of taxes from the position of capitalists. He takes the first-order change in real income, $dR$, resulting from the imposition of a tax as equal to

$$dR = pxdX_k + pydY_k$$

where $px$ and $py$ are the original prices of the two commodities X and Y respectively; and $dX_k$ and $dY_k$ are the change in the consumption of X and Y by capitalists, respectively.

As is well known from index number theory, this kind of measure, by using original prices, overstates the loss in real income.

The introduction of separate demand functions for different groups broaches a
demand condition that depends on the spending propensities of different groups on particular commodities. If relative factor prices are fixed, i.e., \( dp_X = 0 \), a tax of any type on commodity \( X \) will decrease the real income of capitalists more than would an equal-yield tax on \( Y \), if capitalists spend a larger proportion of their income on \( X \) than do workers, the converse also holds. When relative factor prices change, the results on differential incidence are unambiguous only if the factor-intensity (output) effect, the demand effect, and the factor substitution effect operate in the “same direction.” For example, the substitution of a tax on labor in \( X \) for a tax on capital in \( Y \) will be certain to increase the real income of capital if \( X \) is labor intensive relative to \( Y \) and if capitalists spend a higher proportion of their income on \( Y \) than workers do.

It is fairly clear that qualitative analysis of general equilibrium models can only modestly narrow the range of outcomes on incidence. Yet the complexities involved in doing empirical research with such models should not serve as a basis for the readoption of more primitive methods of analysis. The work of H. G. Brown [6, 1924, pp. 178-212] suggests a numerical example which serves to illustrate the pitfalls of over-emphasizing a single dimension of incidence problems.

Brown took exception to the view that a property (profits) tax on residential real estate is shifted to the consumer and argued that a tax on housing would shift capital out of housing and would be a tax on capital in the economy as a whole. Brown also pointed out that the small size of a taxed sector is not a sufficient reason for ignoring general equilibrium adjustments.

In our example, we assume an economy consisting of three groups, A, B, C. A property tax is imposed on apartment dwellings, a service consumed only by group A. Group C owns all of the capital, and originally 1 percent of the total capital stock is used as apartment buildings. No labor is used in the production of the residential services in apartment buildings. By choosing the value of other parameters appropriately, we can obtain the result that the total level of after-tax profits in the economy will fall by the amount of the tax proceeds. As only 1 percent of the capital is originally employed in the taxed sector, this proposal means that the after tax rate of return on all capital will fall by 1 percent of its original value. It would appear that Brown might very well be correct. The owners of capital (group C) appear to bear the full burden of the property tax as wages have not changed and total profits have fallen by the amount of the tax.

On the other hand, the consumers of apartment building services (group A) have also suffered a loss in real income. The change in the price of the taxed commodity is equal to \( f_X(dp_X + T_X) \) as \( f_X \) (the share of capital in the taxed industry) is equal to 1, and since \( dp_X \) is very small relative to \( T_X \), the price of \( X \) will rise by approximately the amount of the tax. Paradoxically, it appears that the real incomes of both the consumers of the taxed product and the owners of capital fall by the amount of the tax proceeds. What has happened is that in addition to providing government revenue, the tax, by decreasing the price of capital, does not appear to have had the intended effect.

\[ \text{We have assumed that the elasticity of substitution between labor and capital in the taxed industry is zero, that the ratio of capital in the taxed industry to capital in the untaxed industry is } 0.01, \text{ and that no labor is employed in the taxed industry. Under these assumptions the general expression for the changes in the price of capital, relative to the price of labor, which is the numer}

\[ \frac{0.01E}{T_X} \]

\[ \text{where } E \text{ is the elasticity of demand for } X, T_X \text{ is the tax on capital in } X \text{ expressed as a per-unit tax, } g_k \text{ is the share of capital in the untaxed sector, and } S_X \text{ is the elasticity of substitution in the taxed industry. We assume } E = S_Y = -0.5 \text{ and } g_k = 0.25 \text{ to obtain the result that } dp_X = -0.01 T_X. \text{ As only 1 percent of total capital is subject to tax, total after-tax profits fall by the amount of the tax proceeds.} \]
transfers purchasing power to group B, the group that does not consume any of the taxed product and does not own any capital. If the tax proceeds are 200 and Group A earns 1 percent of total income and spends one quarter of their income on housing, and the shares in total income by groups B and C are .69 and .30 respectively, then the change in real income is −198 for A, +138 for B, and −140 for C. Group C loses 200 units of income in its capitalist role and gains 60 units in its consumers’ role.

Interregional Incidence

Two interrelated extensions of the general equilibrium approach to incidence are: (1) to drop the assumption of perfect factor mobility between industries and, (2) to introduce trade between countries. The two extensions are closely connected because the standard model of international trade is a two-country, two-commodity model where both countries produce the two commodities and labor and capital are perfectly immobile. The Harberger model may also be interpreted as a two country trade model where both countries are completely specialized in the production of one commodity and factors may, or may not, be mobile between countries.

The importance of inter-regional or international incidence results from the growing interest in fiscal federalism in the United States and in the European Common Market. It may be in the self interest of a community (a city, state, or nation) to export as much of the tax burden as possible. Also, the “urban crisis” in America and elsewhere has stimulated interest in the effects of local taxes, especially their effects on residential choice and industrial location.

Despite the importance of these issues there are few published papers dealing specifically with inter-regional incidence. Beyond the contributions of H. E. Brazer [5, 1961] R. H. Parks [59, 1961] and C. E. McLure [43, 1964] there is only the related literature on international trade. Although the trade literature has developed models which could be used to analyze incidence, it has, in fact, ignored incidence, with the important exception of the famous contribution of W. Stolper and P. A. Samuelson [62, 1941] on the distributive effects of tariffs; instead it has concentrated on questions of efficiency and on the real income of a country as a whole. In what follows I shall rely primarily on unpublished material and attempt to sketch the models that have been used, and could be used, to study interregional incidence.

Again, it is convenient to begin with the standard trade model where both capital and labor are perfectly immobile. As in a closed economy, general taxes such as a proportional income tax, a production tax, or a general sales tax are equivalent in effect and the burden of each is proportional to the citizens’ contribution of national income in any country imposing the taxes. The burden of partial commodity taxes, partial factor taxes, and taxes on trade, for a small country that has no effect on the world terms of trade, falls fully on the country imposing the tax. The analysis of these taxes is made easier under the condition that world prices are fixed. The introduction of variable terms of trade introduces a complicated dimension that might be used by a country to “export” some of its tax burden. Also, in this case, a partial production tax is not equivalent to a partial consumption tax. One of the interesting possibilities of this analysis is the comparison of the effects on income distribution of taxes on trade, with the distributive effects of other partial taxes.8

In two unpublished articles C. L. McLure [44, 1968; 45, 1969] has analyzed models of incidence in which one of the

8 Work along these lines is being carried out by Maria Schmuidt of the University of Western Ontario. What is especially interesting about her research is that she also studies models that allow for the mobility of capital in situations in which both countries are not completely specialized.
two factors is perfectly mobile between two countries and the other factor is perfectly immobile. Both countries are perfectly specialized in the production of one commodity. When labor is immobile a wage tax in one of the two countries will be borne fully by the workers subject to tax. McLure shows that a commodity tax is really a combination of a tax on labor and a tax on capital. As capital is perfectly mobile, it will flow out of the taxing country and this capital outflow will decrease the wage rate there, while increasing (decreasing) the wage (profit) rate in the non-taxing country. A high elasticity of demand for the taxed commodity and a high elasticity of substitution in the taxing country works against labor in the taxing country, and in its favor in the non-taxing country, while a low elasticity of substitution in the non-taxing country reduces the burden on labor in the taxing country. These results, derived by McLure, form only a small part of his analysis and are clearly interpretable. The main weakness of his analysis is the assumption of perfect specialization.

A number of models developed in the international trade literature by M. C. Kemp [30. 1966] and R. W. Jones [28. 1967] can be used to extend incidence analysis to situations in which capital is perfectly mobile and at least one of the two countries is incompletely specialized. Also, J. S. Chipman [10. 1968] has shown that when technologies differ between countries, perfect capital mobility will not necessarily lead to specialization as there will be positive production of each commodity in both countries.

A variation that should be useful in the study of the incidence of local taxes is a three factor model where one of the two (or three) commodities is not traded between communities. Such goods might be housing or other local services. The importance of the third factor, land, is suggested in an article by R. L. Richman [65. 1987] in which he argues that a property tax on improvements is shifted fully onto the owners of land. If a property tax is imposed at a higher rate in a particular city and is not translated into a higher level of public services, and if labor (the population) is also perfectly mobile, then, indeed, land which is perfectly immobile must bear the full burden of such a differential tax. What is crucial to this result is the assumption that labor is perfectly mobile. If labor is perfectly immobile, or imperfectly mobile, part of the property tax on improvements will fall on the residents.

Let us clarify this point by considering the situation where the residents of a city are perfectly immobile and all the capital used in the city is imported. There is one native good in the community, housing services, which is heavily capital intensive. Originally the share of capital in this industry is .80 and the share of land rents is .20. All of the residents in the community work in an export industry (guns) and use their wages and land rents to purchase housing services and imports (golf clubs). Capital is perfectly mobile, and will receive the rate of return that is determined by national conditions. The prices of exports and imports are also given to the community. If the community taxes capital in both sectors wages and land rents have to fall in the export industry in order for that industry to remain competitive. The exact change in the relative prices of the two immobile factors, labor and land, is a complicated general equilibrium problem that depends, as in previous problems, on relative factor intensities of the two industries, the partial elasticities of substitution between pairs of the three factors, and between pairs of products—all of which bear on the final division of resources between home goods and exports, which pay for imports. For purposes of illustration, we shall assume that wages and land rents fall in proportion to their original shares in the export industry, which we specify as .70 and .10 respectively. If the tax is $5.00 per unit of capital, the price of labor falls by $.87 and the price
of land by $.13. The price of housing goes up by (approximately) the tax multiplied by the share of capital in that industry.

For this very special case the results accord, at least in part, with conventional wisdom—the price of housing services goes up substantially as the result of the tax on improvements. Also, the part of the tax on industrial activity is shifted backward onto immobile factors of production, a possibility that has been emphasized by Rolph. Perhaps a complete analysis will someday show that everyone has been partially right and everyone has been partially wrong.

Dynamic Incidence

To this point we have discussed work which assumes that total supplies of labor and capital are fixed. The analysis of the growth effects of tax policy, or "dynamic incidence," is primarily an investigation of the effects of tax policy on the level of savings and growth. There is no single well-defined approach to dynamic incidence. Some investigators have studied long run factor shares, others the per-capita wage rate, and still others the effect of taxes on the rate of return on capital in the long-run. The variations in approach stem from the fact that in the long run taxes not only have an effect on the distribution of income, but may also have a pronounced effect on the size of the total income.

D. Dossier [14. 1961], who made one of the first contributions on dynamic incidence, suggested that a tax system could be progressive with respect to absolute income at a given point in time yet will be regressive at some later point in time if the rate of change of income differs significantly between groups. Dossier's concept of dynamic regression or progression refers to whether groups or types of income that are growing relatively quickly were taxed at relatively higher rates.

Dossier's article and the discussion that followed in A. D. Bain [2. 1963], A. R. Prest [63. 1963] and Dossier [15. 1963]—raised the question whether tax liabilities should be based at least in part on rate of growth of income, rather than just on absolute levels, and whether certain types of tax systems had good automatic redistributive features. I find it difficult to justify a differential rate of tax on the "old" rich relative to the "new" rich (incentives aside), and the whole notion of dynamic incidence, as used by Dossier, seems rather empty unless it refers to the quite general question of the role of tax policy in modifying long-run factors that influence income inequality.

A different, more specific, approach to dynamic incidence, or long shifting, is contained in a series of articles by Marian Krzyzaniak [34. 1966; 36. 1967; 39. 1968]. Using a one sector and a two sector neoclassical growth model, Krzyzaniak numerically analyzed the long run effects of a corporate profits tax on factor shares, rates of return on capital, total profit income and total wage income. A key assumption is that savings out of profits are substantially higher than out of wages, so that the profits tax would have a significant effect on capital formation in absolute and in differential (when substituted for a wage tax) terms. Krzyzaniak reaches two principal conclusions: first, that the decrease in capital formation will lead to a significant increase in the before-tax rate of return on capital, and second, that the long run indirect effects of a profits tax may be very substantial. He finds [36. 1967, p. 487] for a particular set of production and growth parameters, the long run global tax burden to be 2.7 times the tax revenues and that workers bear 44 percent of the total burden. In other words if the government imposes a small tax and collects $1.00 in revenue, at some point in the future total output, because of the decrease in capital formation, will be $1.70 less at that point in time than it would have been in the absence of the tax and total wages will fall by $1.20. Krzyzaniak although expressing surprise at the size of the growth effects, does not draw any concrete
policy implications from his findings. There is the danger that the inference might be asserted that the profits tax should be lowered because of growth effects and even that it is to the long run advantage of labor to accept lower taxes on profits and higher taxes on wages. There are good reasons for being wary of such inferences. First, we can question the assumed substantial difference in the rate of savings out of profits and wages. But even if this difference is granted the growth effects of a tax should be considered in differential terms rather than in terms of what happens when a profits tax is imposed. The differential effect on savings may be the same as the absolute effect if savings out of wages are negligible, but the effect on after-tax wages will be quite different. P. M. Mieszkowski [47, 1963], using a model and numerical estimates very similar to those of Krzyzaniak, found that if a small decrease in the profits tax is accompanied by an equal yield increase in a wage tax, it takes a very long time (between 50 to 60 years) for the after-tax real wage rate to rise above the level it would have been under higher profits taxation. Thus, disregarding the lower level of after-tax wages in the intervening period, it will take an indefinite period for labor to reap the benefits of higher capital formation. These results are consistent with the Krzyzaniak findings where he observes that the effects of a tax change on any individual worker's welfare take an extremely long period to work themselves out. It seems safe to say that a decrease in the profits taxes or in taxes on high income groups in general, if accompanied by an increase in taxes on low income groups, will decrease the absolute level of income of the poor for a very long period of time, if not permanently. If we are to have faster growth with equity, the additional saving should come through budget surpluses and not through changes in tax structure.

A significant impact of profit tax on growth and rates of return does not depend on the assumption that savings must stem from profits. P. A. Diamond [13, 1967] found that for an economy of identical individuals who save in their working life and dissave during retirement, the substitution of a profits tax for a lump sum tax will increase the gross rate of return on capital and may even increase the net rate of return, depending on the nature of the technology.

One of the basic shortcomings of the distributive aspects of neoclassical growth models is that they are highly aggregative and limited to two highly artificial groups, workers and capitalists. In a paper on the theory of distribution of wealth, J. E. Stiglitz [81, 1968] takes the first steps towards breaking out of this narrow classification. Stiglitz' basic objective is to determine, on the basis of specific assumptions about reproduction, inheritance, and savings behavior, whether in a neoclassical growth model the distribution of wealth will become more or less equal among groups. He concludes that in the long run, the distribution may well tend towards equality; he is also concerned with the effects of various taxes on the speed of equalization. He assumes that taxes collected are distributed equally among citizens. For any given government revenue, he finds that wealth taxes are equivalent to profit taxes and dominate proportional income taxes in their effect on the speed of equalization. Progressive income taxes have a greater equalization effect than proportional income taxes. Stiglitz elsewhere [80, 1966] studies the long run effects of various taxes on the dispersion of income as measured by the Gini coefficient. Clear-cut results of this type of work will ultimately depend on empirical research, but the research should relate the results on profit rates and wage rates derived through an aggregative growth model to a much more satisfactory measure of income inequality.
Monopoly Elements and Incidence

The introduction of monopoly elements does not necessarily lead to a drastic revision of the results on incidence derived from competitive models. If monopolies maximize profit and/or if the markups used by concentrated industries are independent of the corporate profits tax, the competitive results remain more or less unchanged.

A profit-maximizing monopoly (or oligopoly where industry profits are maximized) is a firm that recognizes it has monopoly power, and attempts to maximize the value of the firm. There will be two types of profits in monopoly situations, the competitive, or required, rate of return that stockholders could earn in the competitive sectors of the economy, and monopoly profits. By not undertaking investments yielding less than the required rate of return the firm will maximize monopoly profits. Monopoly profits will be capitalized in the market value of the company's stock. As is well known, the imposition of a profit tax will not affect any of the conditions that determine profit maximizing prices and output so the burden of a general profits tax falls fully on profits. All of the results on general taxes discussed for our competitive model remain unchanged except that a property tax is not equivalent to a profits tax as, monopoly profits do not get into the tax base. Since relative commodity prices will not change with a general tax, a proportional income tax, imposed on income gross of depreciation, will be equivalent to a general sales tax, on final goods and services under monopoly. Also, if the degree of monopoly is relatively not greater in the capital goods sector, an excise tax on capital goods will increase the relative price of the goods and will decrease the real return on savings. The presence of monopoly elements does, however, complicate the analysis of partial excise and partial factor taxes. In the competitive model when the taxed industries have the same factor intensities the incidence of an excise tax will depend on the levels of spending by different groups on the taxed good. In the presence of monopoly rents, monopoly profits will fall (rise) when the partial excises are imposed on the monopoly (competitive) sectors as the output of the taxed industries will fall.

Harberger [25, 1962] was the first formally to introduce monopoly into a general equilibrium incidence model by assuming that in the monopoloid industry a constant markup over normal costs exists.

\[ p = (f_k p_k + f_l p_l)(1 + M) \]

where \( f_k \), \( f_l \) are the shares of capital and labor respectively, \( p_k \) is the competitive (required) rate of return on capital, \( p_l \) is the wage rate and \( M \) is the markup. The basic difference between the markup model where \( M \) is constant and profit maximizing monopoly is that the implicit markup for the latter will vary with shifts in demand and cost. The constant markup model is an intermediate case between profit maximizing monopoly and non-profit maximizing situation in which the markup varies freely. The constant markup if it is applied to taxes will increase the relative price of these commodities relative to what they would be under competition or profit maximizing monopoly for the imposition of partial taxes. General taxes will not change the price of factors, so even for the constant markup model the results on general taxes are the same as under competition. In short, the basic complication introduced by monopoly elements when markups are constant or monopoly profits are maximized is that partial taxes by affecting the output mix of the economy will change the level of monopoly rents. Otherwise, the competitive results persist.

A variety of reasons have been put forth

* A fixed markup is fully consistent with profit maximization, if costs are constant and if the elasticity of demand, as seen by the monopolist, is constant.
as to why firms will not maximize short run profits and will increase markup and before-tax profits in response to taxes, especially profits taxes. The explanations range from fear of anti-trust action, the belief that unions will increase their wage demands if profits are raised to profit maximizing levels, to the idea put forth by R. G. Penner [61, 1967] that managers are uncertain about final sales prices and, being risk-aversers, will set output below the level equating marginal expected (mean) revenue to marginal cost.

The most formal model, where firms do not maximize profits, is the theory of managerial capitalism of W. J. Baumol [3, 1967] and R. Marris [41, 1964]. According to these writers the salary of a manager is more closely related to sales (size) than profitability and they will pursue expansion at the expense of profits subject to a minimum profit constraint. To be more specific, we can assume that firms strive to achieve a 10 percent after-tax rate of return to keep stockholders happy. All firms in the economy have considerable monopoly power and profits could be much higher than 10 percent, but in their emphasis on sales, firms in the aggregate price their products below profit-maximizing levels. If a profit tax of 50 percent is imposed, managers, in order to maintain dividends and/or to preserve the level of retained earnings for expansion, increase prices relative to costs and partially or fully shift the corporate tax. This result is at sharp variance with the results derived for profit-maximizing behavior and the conflict between the two theories should ideally be resolved by empirical work.

Econometric Studies of Incidence

A number of studies, including those by E. H. Lerner and E. S. Hendriksen [40, 1956], J. C. Clendenin [11, 1956], B. K. Ratchford and P. B. Han [64, 1957] and M. A. Adelman [1, 1957] attempted to draw empirical conclusions about the incidence of the corporate profits tax by analyzing the relationship between tax rates and factor shares or rates of return. While these studies are suggestive, they were all defective in that they did not control for factors, other than taxes, that affect rates of return or factor shares.

The first systematic attempt to isolate the effects of the corporate profits tax on rates of return was the study for American manufacturing by Marian Krzyzaniak and R. A. Musgrave [32, 1963] (K-M henceforth). Their results were quite startling as they found that an increase in tax liabilities of $1.00 per unit of capital, will increase before-tax profits to $1.35. The corporate profits tax in manufacturing is shifted by more than 100 percent. These results, a measure of short run shifting for a fixed capital stock, have far reaching implications for tax policy, and for price and distribution theory. The price theorist who has based his work on the equality between marginal cost and marginal revenue is asked to believe that corporations can increase profits at will or, at the very least, that in the absence of the 50 percent tax on corporate profits, corporate profits in manufacturing would be lower than they are at present even after the 50 percent tax has been paid.

Furthermore, the high levels of shifting are not restricted to the United States. Using the K-M model, R. W. Roskamp [73, 1965] and B. G. Spencer [79, 1969] found the corporate tax to be shifted by 100 percent for West Germany and Canada, respectively.


The basic criticism made by all these writers is that the K-M model significantly understates the degree of shifting because it is incorrectly specified. The variables included by K-M to reflect non-tax variables do not adequately capture the cyclical
swings that were so pronounced during their sample period. The sample period begins in 1935 when the unemployment rate was 20 percent and the corporate profits tax was 14 percent and ends in 1959 when the unemployment rate was 5.5 percent and the corporate profits tax was 52 percent. In the intervening years there are the war years 1941–42 and 1950–52 (1943 through 1947 is excluded) characterized by very high degrees of capacity utilization and by very high corporate taxes.

In short, levels of effective demand and taxes were highly correlated during K-M's sample period and if, as C-H-M have shown, a variable that is omitted from the regression is positively related with the before tax rate of return and the tax variable the causal influence of the tax variable will be overestimated. All of the critics believe that the non-tax variables used by K-M have little a priori justification, and do not resemble the variables, such as sales or output, which are used to explain profits in numerous econometric models. In addition to taxes K-M explain before tax profits in year $t$, by the increase in consumption as a percentage of G.N.P. in year $t-1$, the ratio of inventories to sales in year $t-1$, and the ratio of net tax accruals (other than corporate taxes) to G.N.P. in year $t$. The consumption variable is peculiar and its influence seems to depend on the nature of past business cycles as its sign cannot be determined, a priori, if the fraction of consumption decreases in booms and increases in recessions. The ratio of inventories to sales, which K-M lag one period, makes sense only if it is on a current period basis. The finding that the influence of other taxes is negative and is statistically significant adds little to the credibility of the model, nor does the finding that the influence of government expenditure on the before-tax rate of return is negative. Furthermore, when K-M use the budget surplus to capture the influence of government, the only variable that is statistically significant is the corporate tax variable. Similarly, when K-M take first differences of their standard model, their estimate of shifting remains unchanged, but all the other variables become statistically insignificant.

Gordon [23, 1968, pp. 1366–67] has extended the period of fit of the K-M model back from their initial year, 1935, to 1924. This causes the consumption variable to change sign and the inventory variable to border on insignificance. Gordon also demonstrates that the K-M model fails to predict the fall in profits between 1929 and 1932 and the boom in profits in the middle 1960s. Both periods were characterized by constant tax rates.

A more direct attempt at demonstrating the inadequacy of the K-M model was made by Goode, Slitor and C-H-M who added cyclical variables to the K-M regressions. Goode and Slitor added the ratio of actual to potential G.N.P., while C-H-M used the employment rate as an additional pressure variable. As predicted, the addition of a pressure variable decreased the estimate of shifting, but it remained very high at about 100 percent. When C-H-M also added a dummy variable for the mobilization and war years 1941, 1942, 1950, 1951, and 1952, the estimate of shifting drops to 60 percent and the tax variable is not statistically different from zero. Even more striking is the regression presented by C-H-M when profits are explained by the employment rate and the war dummy; both are positive and significant, and the tax rate is statistically insignificant and has a negative sign.

K-M in their reply [37, 1968] to C-H-M object to the use of the war dummy and attempt to re-establish their position by excluding the mobilization and war years. Using only peace years they estimate the degree of shifting to be over 100 percent.

Although the introduction of a war variable is somewhat arbitrary, especially as many of the really significant tax changes occurred during the war years, these "neg-
"tive" exercises tend to confirm the sensitivity of the K-M model to changes in specification and/or sample period.

The only clue provided by K-M for their original specification of the profits equation is contained in their reply [35. 1966] to Goode and Slitor where they object to the use of unlagged pressure variables that are endogenous on the grounds that the inclusion of such variables leads to biased and inconsistent results. While C-H-M have shown that the resulting bias in the estimate of shifting is upward, not downward, it appears that statistical considerations dictated K-M’s use of lagged variables, and lead to a model that is not very plausible.

Gordon’s comments [22. 1957] on the K-M model are only a minor part of his contribution to the incidence literature. He used a model based on a mark-up theory of pricing, namely that firms apply a mark-up over variable costs such as wages and materials cost. The test of shifting in this model is, essentially, a test of whether the mark-up is set, in the absence of corporate taxes, at its profit maximizing level. Reduced to its bare essentials Gordon’s estimating equation is

\[ Z_t = \alpha_t \frac{C_t}{1 - vt} \]

where \( Z_t \) and \( C_t \) are before-tax profits and costs respectively, normalized by the amount of capital or total revenue; \( \alpha_t \) is the mark-up parameter, \( t \) is the tax rate, and \( v \) is the shifting parameter. The interpretation of this parameter is as follows. In the absence of taxes there will be a relation between costs and profits as determined by the mark-up parameter. For example, if profits are one-third of variable cost, \( \alpha_t \) is equal to .33. If a 50 percent corporate tax is imposed, profits will remain unchanged if there is no shifting of the tax so that \( v \) will be equal to zero. If the tax is fully shifted, before-tax profits will double and the mark-up parameter is “blown up” by the denominator, i.e., \( v \) will be equal to 1 and \( \alpha_t/5 \) will be equal to .66.

Gordon’s complete equation contains a full capacity variable that accounts for fixed costs which are independent of the level of output in the short run and variables reflecting rates of change of prices and output, which are designed to pick up swings in inventory profits and the reaction of profits to cyclical movements.

The last two variables were introduced in an ad hoc fashion. Yet Gordon has shown [23. 1968, p. 1362] their inclusion merely decreases the goodness of fit and does not affect the estimate of shifting. Gordon’s estimates of the shifting parameter for total United States manufacturing are all small (around .2) and not statistically different from zero. His estimates of shifting for various two digit manufacturing industries are quite varied, being negative for some industries and close to 100 percent for industries such as rubber products and chemicals.

One problem with Gordon’s results is that they are biased toward zero, for due to data limitations, he used revenue (price) information rather than data on variable costs. Although the effects of taxes may be reflected in the price, the resulting bias is tolerable. The size of the bias depends on the relation between normal profits and variable cost; when the normal markup is one-third, shifting of 100 percent will be estimated to be 75 percent. When the normal markup is one-eighth, full shifting would be estimated as 90 percent because of the use of price data.

A completely different approach to the estimation of shifting, based on cross-section data, is found in the work of R. W. Kilpatrick [31. 1965] for the United States and R. J. Lévesque [39. 1967] for Canada. They assume that the degree of shifting in an industry is positively related to the degree of concentration in that industry. Zero
shifting is assumed for industries with a zero concentration index. On this basis, shifting is measured by regressing the change in industry profits on the concentration index, and other variables between two time periods, between which there was a significant change in tax rates. Both studies conclude that the degree of shifting in manufacturing is somewhere in the order of 100 percent. The accuracy of these estimates depends, of course, on the isolation of non-tax influence. Lévesque's results for Canada are suspect on this score, since in his regressions, changes in industry profits seem to depend primarily upon the degree of industry concentration. While Kilpatrick's work is more successful, he himself shows that in the pre-Korea years (his base period) profits and concentration were positively related for pairs of years for which there was no change in corporate tax.

Gordon [22. 1967, p. 752] has questioned Kilpatrick's assumption that before-tax profits will remain unchanged for industries with zero concentration. Gordon's own work suggests that the degree of shifting is negative for these industries and he concludes that even if some industries shift the tax, the shift of resources to the more competitive manufacturing sector will decrease prices and rate of return in these industries so that the degree of shifting in manufacturing as a whole will be very small.

One of Gordon's explanations for the difference between his results and those of Krzyzaniak and Musgrave is that he used costs per unit of capital as an explanation variable and K-M failed to account for changes in the productivity of capital over time.

A much more explicit account of long run factors is the production function approach developed by C. A. Hall, Jr. [24. 1964]. Although Hall's untimely death prevented him from completing his work on the effects of the corporation income tax, he deserves much credit for pioneering an estimating procedure that has firm theoretical foundations and directly accounts for changes in the productivity of capital on the rate of return.

Hall's estimates of the incidence of the corporate profits tax in American manufacturing are based on two steps. He first estimates the rate of neutral, (assuming disembodied) technological progress at each point in time by relating changes in output to changes in factor inputs weighed by their marginal productivities (factor shares). Hall notes that the observed factor shares may be distorted by a shifting of the profits tax, and calculates three sets of estimates of technical change. One set is based on the assumption of zero shifting, a second on the assumption that the tax is shifted fully to consumers, and the third that the tax is shifted back onto labor in the form of lower wages. Hall then uses the three sets of estimates for technological change to adjust the output series and fits two production functions, one a Cobb-Douglas and the other a linear production function. For both functional forms the goodness of fit turns out to be best for the zero shifting assumption and Hall concluded that the tax was not shifted in manufacturing.

Musgrave [52. 1964] criticized this conclusion on the grounds that the coefficients of determination, the $R^2$, were not sufficiently different to allow any firm conclusion about shifting. For example, in the Cobb-Douglas case, the $R^2$ for the zero shifting assumption was .9722 and for full sales shifting it was .9455. The small difference in the $R^2$'s according to Musgrave was too thin a margin of victory to base a firm conclusion about shifting.$^5$

$^5$As the value of the dependent variable is changed by a change in the shifting assumption, the $R^2$ criterion is incorrect and Hall should have based his conclusions on the sum-of-squared residuals. Also, as Musgrave suggests [52. 1964, p. 301] Hall should have attempted to maximize the goodness of fit by investigating values of shifting between zero and one. However, Musgrave's
Hall's approach has been extended by Joan L. Turek [83, 1969] in a still unpublished dissertation. Turek assumes a constant elasticity production function of American manufacturing, and that the degree of monopoly, apart from the possible effects of taxes, was constant during her sample period. On these assumptions she derives an estimating equation for the ratio of factor shares using a tax rate variable, time to represent a constant rate of technological progress, a capital to labor ratio, and two cyclical variables as explanatory variables. The point estimate of shifting when the basic statutory tax rate is used as the tax variable was about 12 percent. However, the standard error of the estimated tax coefficient is about three times the size of the coefficient. This means that the point estimate may be highly unreliable because of sampling error. Turek concluded, nevertheless, on the basis of likelihood ratio tests, that it is 2 times more likely that the true value is zero, given the actual estimate of .12 and the high standard error of the estimate, than that the true value of the shifting parameter is 50 percent. On the same basis, Turek concluded that the “odds” are 100 to 1 in favor of zero shifting relative to 100 percent shifting. In other words, the policy maker can be moderately confident (the odds are 2 to 1) that the degree shifting is low rather than 50 percent, and he can be highly confident that the tax is not fully shifted.

Though his is not an econometric study, Harberger's [25, 1962] general equilibrium analysis has important bearing on the interpretation on results discussed above. We have noted Gordon's conclusion that for some industries, because of general equilibrium adjustment within manufacturing, the degree of shifting is negative, and for those industries negative and positive shifting will cancel out. Actually, as noted by Cragg, Harberger, and Mieszkowski [12, 1967, p. 819], one should expect to find an increase in the before tax rate of return of the corporate sector because of the reallocation of capital from the corporate to the noncorporate sector. In fact, once this adjustment is complete, the K-M measure would show 50 percent shifting even though capital actually bears the full burden of the tax. What needs to be emphasized is that even if it can be established, without a shadow of doubt, that large segments of the corporate sector fully shift the corporate tax in the sense of K-M, the burden of the corporate tax may well fall on capital taken as a whole. It is easy to show, by extending the Harberger approach, that if concentrated industries make investments on the basis of a target rate of return criterion, the sharp increase in the use of capital in these industries can drive down the rate of return in the competitive sectors of the economy to an extent that the return on all capital falls by considerably more than the yield of the corporate profits tax.

Concluding Remarks

Even in a long review some topics are inadequately treated. For example, I have not discussed the empirical studies on the allocation of tax burden by income class. I do not doubt the value of such studies, but these studies merely utilize existing theory of incidence, and in large measure, the well-known criticisms of such work by A. R. Prest [62, 1955] question the underlying theory on which the quantitative allocations are based.

Certain complications that bear on the incidence of the corporate income tax such as the fact that the tax applies only to equity capital and the preferential treatment
of capital gains have also been omitted in the discussion. While the aggregative results are probably little affected by these factors, differences in debt-equity ratio in so varied a sector undoubtedly means that a tax on equity will have complicated differential price effects within the corporate sector.

One important recent development in incidence analysis has been the increased use of general equilibrium techniques. However, there is the danger that unless the difficult task of estimating these models is undertaken, we will merely end up with a set of very general qualitative statements. The use of econometric analysis, while it has not definitely settled anything, is a big advance. In addition to the estimates of corporate shifting, the econometric studies by L. L. Orr [58, 1965], J. D. Heinberg and W. E. Oates [27, forthcoming], and Oates [57] on the incidence and capitalization of property taxes and J. Weitenberg's [84, forthcoming] estimates of the incidence of social security taxes represent long overdue developments of this type of approach to the analysis of tax incidence.

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