Title

Tax Expenditures Related to the Production and Consumption of Motor Fuels and Motor Vehicles: Report #18 in the Series: The Annualized Social Cost of Motor-Vehicle Use in the United States, Based on 1990-1991 Data. Rev. 1

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Report #18 in the series: *The Annualized Social Cost of Motor-Vehicle Use in the United States, Based on 1990-1991 Data*

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LIST OF ACRONYMS AND ABBREVIATIONS AND OTHER NAMES

The following are used throughout all the reports of the series, although not necessarily in this particular report

AER = *Annual Energy Review* (Energy Information Administration)
AHS = *American Housing Survey* (Bureau of the Census and others)
ARB = Air Resources Board
BLS = Bureau of Labor Statistics (U. S. Department of Labor)
BEA = Bureau of Economic Analysis (U. S. Department of Commerce)
BTS = Bureau of Transportation Statistics (U. S. Department of Transportation)
CARB = California Air Resources Board
CMB = chemical mass-balance [model]
CO = carbon monoxide
dB = decibel
DOE = Department of Energy
DOT = Department of Transportation
EIA = Energy Information Administration (U. S. Department of Energy)
EPA = United States Environmental Protection Agency
EMFAC = California's emission-factor model
FHWA = Federal Highway Administration (U. S. Department of Transportation)
FTA = Federal Transit Administration (U. S. Department of Transportation)
GNP = Gross National Product
GSA = General Services Administration
HC = hydrocarbon
HDDT = heavy-duty diesel truck
HDDV = heavy-duty diesel vehicle
HDGT = heavy-duty gasoline truck
HDGV = heavy-duty gasoline vehicle
HDT = heavy-duty truck
HDV = heavy-duty vehicle
HU = housing unit
IEA = International Energy Agency
IMPC = Institutional and Municipal Parking Congress
LDDT = light-duty diesel truck
LDDV = light-duty diesel vehicle
LDGT = light-duty gasoline truck
LDGV = light-duty gasoline vehicle
LDT = light-duty truck
LDV = light-duty vehicle
MC = marginal cost
MOBILE5 = EPA's mobile-source emission-factor model.
MSC = marginal social cost
MV = motor vehicle
NIPA = National Income Product Accounts
NO_X = nitrogen oxides
NPTS = Nationwide Personal Transportation Survey
OECD = Organization for Economic Cooperation and Development

O_3 = ozone
OTA = Office of Technology Assessment (U. S. Congress; now defunct)
PART5 = EPA's mobile-source particulate emission-factor model
PCE = Personal Consumption Expenditures (in the National Income Product Accounts)
PM = particulate matter
PM_{10} = particulate matter of 10 micrometers or less aerodynamic diameter
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less aerodynamic diameter
PMT = person-miles of travel
RECS = Residential Energy Consumption Survey
SIC = standard industrial classification
SO_X = sulfur oxides
TIA = *Transportation in America*
TSP = total suspended particulate matter
TIUS = *Truck Inventory and Use Survey* (U. S. Bureau of the Census)
USDOE = U. S. Department of Energy
USDOL = U. S. Department of Labor
USDOT = U. S. Department of Transportation
VMT = vehicle-miles of travel
VOC = volatile organic compound
WTP = willingness-to-pay

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18. TAX EXPENDITURES RELATED TO THE PRODUCTION AND CONSUMPTION OF TRANSPORTATION FUELS

18.1 INTRODUCTION

18.1.1 Background

It is an elementary principle of economics that if a good or service is underpriced — that is, if the all-inclusive economic cost to society of consuming the good or service exceeds the private-cost price that consumers actually pay for it— then consumers will consume "too much" of it from the standpoint of society. More precisely, unless the underpriced good is offered by a monopoly, or provides unaccounted for (external) benefits, the amount consumed will exceed the amount that provides the greatest net benefits to society. Generally, the correct solution to this problem is to set all prices in the economy equal to marginal social cost rather than marginal private cost.

For most if not all goods and services, the marginal social cost exceeds the marginal private cost, if only because nearly all production and consumption creates pollution. Recently, however, many researchers have argued that this divergence between social cost and private cost is especially serious in the case of motor vehicles and transportation fuels. These researchers often label this divergence the "unpaid" cost of motor-vehicle use, and usually estimate three different kinds of unpaid costs: environmental externalities (e.g., the harmful effects of air pollution or oil spills), public-sector expenditures in excess of user fees received (e.g., expenditures on highways less road-user tax revenues), and so-called "tax subsidies" (preferential treatment in the tax code), which we will refer to as "tax expenditures[1]." (See Report #3 in this series for a review of estimates of the social-cost of motor-vehicle use.)

In this report, we too provide estimates of tax expenditures related to the production and consumption of transportation fuels. But—and this is an important qualification—we do not add the estimates of environmental externalities, public-sector expenditures, and tax expenditures together because, as we will explain in more detail later, *tax expenditures are not necessarily social costs in the same way that environmental externalities and public-sector expenditures for roads are.* In other words, tax expenditures or subsidies do not belong in an analysis of the social-cost of motor vehicle use, because they are not *necessarily* an economic cost, or welfare loss, to society. Of course, tax expenditures are relevant in analyses of the "fairness" or "neutrality" of transportation, energy, and tax policy, and for this reason we have estimated them here[2]. But the main point must be kept in mind throughout this analysis: in the absence of social-welfare analytical demonstration to the contrary, one should not count tax expenditures as an item in the social cost.

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[1] Note the subtle distinction between a tax expenditure and a tax subsidy: the expenditure is what the government foregoes, and the subsidy is what a producer gains, as a result of special tax provisions.

[2] We do apply our estimates of tax expenditures from this report in our equity-based analysis of user payments for government-provided motor-vehicle infrastructure and services in report #17 in the UCD social-cost series.

18.1.2 Outline of this paper

First we will present the theory, and explain why tax expenditures are not necessarily a social economic cost—that is, why they do not necessarily constitute a reduction in social welfare. Next we will review the literature, which builds up estimates of tax expenditures piecemeal, tax provision by tax provision. Then, we will offer an alternative way to estimate tax expenditures, based on aggregate corporate income-tax rates. We do this for 1991 and for the year 2000, the most recent year for which data are available. We also provide an estimate of tax expenditures related to transportation based on differences in sales tax rates.

18.2 THEORETICAL ISSUES

18.2.1 Definition of a tax expenditure

The tax code does not treat every individual and every business the same way. For example, certain products are exempt from sales tax, and some mineral production activities are allowed special deductions that reduce income tax liabilities. As a result of this differential tax treatment, some people and businesses pay less (or more) tax, both in total and per unit of income, than do others. If one defines a "baseline" or "standard" tax rate on particular entities, one can then calculate the difference between the taxes actually paid by the entity and the taxes that would have been paid had the entity been taxed at the "standard" or baseline rate. This difference has been called a tax expenditure:

> Tax expenditures exist when actual tax treatment for particular kinds of taxpayers deviates from standard tax treatment" (EIA, 1992, p. 21).

The Joint Committee on Taxation (JCT) of the U.S. Congress elaborates:

> "Tax expenditures" are defined under the Budget Act...as reductions in individual and corporate income tax liabilities that result from special tax provisions or regulations that provide tax benefits to particular taxpayers. These special tax provisions can take the form of exclusions, credits, deductions, preferential tax rates, or deferrals of tax liability...In general, a special provision is classified as a tax expenditure because the provision represents a departure from the taxation of economic income that is made for reasons other than administrative feasibility (JCT, 1993, page 2)[3].

According to the JCT, the tax expenditure is calculated by estimating the "difference between tax liability under current law and the tax liability that would result from a recomputation of tax without benefit of the tax expenditure provision. Taxpayer behavior is assumed to remain unchanged for tax expenditure purposes" (JCT, 1993, page 8).

Tax expenditures, then, depend entirely on what one deems to be the "standard" treatment, with respect to which deviations constitute "preferential" treatment. What is "standard" ultimately is a matter of taste, and as a result, "there is disagreement as to what constitutes standard tax treatment..." (EIA, 1992, p. 21).

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[3] Note that the tax expenditures identified by JCT and the Treasury (OMB) refer only to preferential treatment in federal income tax provisions. They do not consider other forms of taxation such as federal excise taxes, or state and local income taxes.

18.2.2 Tax expenditures and social welfare.

Over the past 15 years there have been several estimates of tax expenditures related to oil use (see the literature review below, and also Koplow and Dernback [2001] and Koplow [2004]). In most of these studies the expenditures are referred to as a "subsidy," which in some studies seems to imply that the expenditure is, or constitutes, a social cost, in the same way that the cost of the highways or the cost of air pollution is a social cost (i.e., a reduction in social welfare, the benefits of use aside). In any event, still *other* researchers have interpreted tax expenditures to be social costs (in economic terms), and have incorporated the original estimates of expenditures (from the studies reviewed below) into analyses of the total social cost of oil use or motor-vehicle use. As we stated in the introduction, we believe that this is an error. In the following section we will explain why.

The tax expenditure estimates in the major original analyses that we will review, such as the studies by the EIA (1992) and Koplow (1993), are derived from data published by the Joint Committee on Taxation and the Office of Management and Budget. The Congressional Budget Act of 1974 (Public Law 93-344) requires that the U.S. Federal budget, published by the Office of Management and Budget (OMB), include estimates of tax expenditures. In compliance with the law, every Federal budget contains estimates of tax expenditures for three years: the last fiscal year, the current fiscal year, and the coming fiscal year for which the budget was submitted.

The OMB develops its estimates of tax expenditures in cooperation with the Congressional Joint Committee on Taxation (JCT), which publishes its own estimates of tax expenditures. The OMB and JCT both derive their figures from Internal Revenue Service statistics, for the purpose of projecting the tax credits, deductions, and exclusions that will be claimed under the present-law baseline (JCT, 1993, page 8)[4].

Now, as noted just above, some social-cost analyses add up the OMB or JCT estimates of tax expenditures and represent the total as a social cost of oil use or motor-vehicle use. However, there are methodological problems with this simple addition, and more serious theoretical problems with interpreting the total as a social cost. In the first place, a simple summation does not account properly for the interaction of joint changes in different tax provisions. Second, the JCT and OMB estimates are short-run and static, and do not account for changes in the behavior of firms or individuals or the macro-economy as a result of eliminating a tax expenditure. For these reasons, the simple sum of the OMB and JCT estimates does not represent the difference in tax revenue between the status-quo baseline and a scenario with no preferential taxes. But even if the simple sum was an accurate measure of aggregate tax expenditures, it still would not be a social cost of oil use or motor-vehicle use in the way that expenditures on the highway patrol or the environmental effects of oil spills are. This is because, even though tax expenditures distort prices and economic behavior, *in any economy with*

[4]Although the JCT and the OMB have similar objectives, their estimates of tax expenditures do differ. First, the agencies report expenditures for different time periods. The OMB estimates "cover the usual three-year period of a budget submission - the last fiscal year, the current fiscal year, and the forthcoming fiscal year to which the budget proposals apply. The Joint Committee staff estimates cover the forthcoming fiscal year and the succeeding four fiscal years" (JCT, 1993, page 6). Second, they define taxable income differently, and treat foreign income differently. In addition, the JCT considers a somewhat broader set of tax expenditures than does the OMB.

multiple distortions, we are not necessarily better off if we eliminate any particular tax expenditures. We discuss all of these problems in more detail next.

18.2.2.1 Tax expenditure estimates should not simply be summed

The first problem is that simply summing the OMB and JCT estimates does not account for interaction effects. The Joint Committee on Taxation clearly states that "each tax expenditure is measured in isolation. If two or more items were to be eliminated simultaneously, the result of the combination of changes might produce a lesser or greater revenue than the sum of the amounts shown for each item separately." Because of this, they caution that summing the amounts of the various tax expenditures is of "limited usefulness" (JCT, 1989, page 8).

The OMB provides an excellent example of the problems with ignoring the interaction effects for personal income taxes:

> If the state and local interest exclusion alone were repealed, some taxpayers would be thrust into higher tax brackets, automatically increasing the size of their charitable contribution tax expenditure even if taxpayers did not make larger charitable contributions. Alternatively, if both the interest exclusion and the charitable deduction were repealed simultaneously, the increase in tax liability would be greater than the sum of the two separate expenditures since each is estimated assuming that the other is in force (OMB, 1992, page 2-24).

In this case, if both tax provisions were rescinded, aggregating the individual estimates as published would understate the true change in tax expenditures.

18.2.2.2 Tax expenditure estimates do not account for the microeconomic or macroeconomic effects of eliminating the expenditure

The OMB and JCT figures also do not incorporate any adjustments that firms might make in response to changes in the tax code. Their published estimates of the tax expenditures, or revenue losses, measure the amount of additional revenue the government would receive if the Federal government were to repeal unexpectedly a particular tax provision on the day that the corporations filed their tax returns (so that the firms could make no behavioral adjustments in response to the policy change). Because this unrealistic "snapshot" analysis does not allow for any adjustments that firms will make in the longer run, it does not, as the OMB and JCT clearly state, provide a realistic estimate of the effect of eliminating a tax expenditure.

In reality, firms will change their decisions in response to new tax policies. Let us use the investment tax credit as an example. The estimates published by OMB and JCT assume that if the investment tax credit were eliminated, there would be no change in the investment decisions of the firms. But obviously this is not realistic. The credit is meant to encourage firms to invest; hence, if it were eliminated, firms would invest less, and their tax liability, and hence tax payments might be different than if the tax credit were in effect.

At the macro scale, tax expenditures that favor capital investment, such as accelerated depreciation and the investment tax credit, could impact aggregate income and economic growth. This is relevant to the estimate of the tax expenditures themselves because any changes in the projected growth rates for aggregate national income could alter the tax base against which tax expenditures are measured. The OMB and JCT estimates of growth rates assume that all existing laws will continue. If tax

expenditures are eliminated growth rates might be different than assumed by the OMB and JCT in their original estimates of the tax expenditures.

In sum, quoting from the OMB:

> Tax expenditure revenue loss estimates do not necessarily equal the increase in Federal revenues (or the reduction in budget deficits) that would accompany the repeal of the special provisions, for the following reasons: Eliminating a tax expenditure may have incentive effects that alter economic behavior...Tax expenditures are interdependent even without incentive effects...The annual value of tax expenditures for tax deferrals is prepared on a cash basis (U.S. Office of Management and Budget, 1992, 2-24).

18.2.2.3 Tax expenditures are not necessarily an economic cost, let alone an economic cost equal to the expenditure

There is no doubt that the preferential tax treatments identified by the JCT and OMB affect economic behavior in some way. Furthermore, it is obvious that, were the preferential tax policies the *only* deviations from optimal conditions in the economy (in a second-best world in which the government still raised revenue by taxes, rather than by lump-sum transfers)—i.e., if they were the only reasons that social welfare was not at its potential (second-best) maximum — then eliminating them would be beneficial, because it would restore the second-best optimum. In this one-distortion second-best world, tax expenditures would occasion a real cost, equal to the difference between the maximum social welfare and the social welfare with the tax expenditures.

But note two points. First, in the one-distortion economy, the real cost of the tax expenditure is the difference between social welfare with and without the expenditure, which difference probably will be much less than the expenditure itself. An analogy can be drawn with the true cost of price subsidies, in which the welfare cost of the price subsidy is considerably less than the total subsidy itself. This is illustrated in Figure 18-1, which is discussed later.

Second, but more important, we can be sure that the tax expenditure creates an economic cost only if it is the only imperfect policy in an otherwise perfect (but second-best) world. Although it might sound perverse, it is quite possible that, given all of the distortions in the real economy, some tax expenditures actually could be beneficial: that eliminating them would make society worse off, not better. This anyway is the somewhat discouraging conclusion of the "general theory of the second-best," originally developed and elaborated by Lipsey and Lancaster (1956-57) and Davis and Whinston (1965), and summarized here by Laffont (1990):[5]

> (a) If a distortion [e.g. tax expenditure] exists in one sector (this is, there is some constraint that prevents the first-best optimal conditions from being satisfied in this sector), it is no longer generally desirable to apply the first-best optimality condition in other sectors...
>
> (b) If n distortions (where $n \geq 2$) exist, we cannot claim that the competitive equilibrium with n - 1 distortions is preferable to the competitive equilibrium with n distortions is preferable to the competitive equilibrium with n distortions...

[5]The impacts of policy changes in a distorted economy have been well studied in the literature on trade policy -- e.g., Martin and Alston (1994) and Martin (1994).

(c) The problems of equity and efficiency can no longer be separated unless we use personalized lump-sum transfers as political economic instruments.

(d) The results obtained in second-best analysis may contradict the economist's intuition in the first-best analysis. (Laffont, 1990, page 167; brackets added).

Laffont's conclusions apply to any analysis of tax expenditures in the real world, because the real world is far from being economically ideal. Rarely, if ever, are taxes based on economic principles of pricing, user charges, and cost allocation. Instead, taxes are frequently set according to political, not economic, criteria, and as a result, every sector of the economy is distorted in manifold and difficult-to-quantify ways. Because of these distortions, one must perform a complex general equilibrium/social-welfare analysis in order to determine the effect of tax expenditures on welfare. As mentioned above, there is no reason to believe that such an analysis will reveal that on balance, tax expenditures create economic costs.

Laffont's second comment is the most relevant to our discussion. We are indisputably in an economy which is characterized by $n \geq 2$ distortions. Hence, getting rid of tax expenditures on the oil industry would not necessarily improve social welfare, and could in principle diminish it[6]. This might be the case if everyone was being taxed too much on average; i.e., if the marginal social value of tax resources were higher in the private sector than the public sector. In this case, it might be better to have a few industries taxed less than average than have all industries taxed at the same too-high rate.

In summary, then;

- In the real (economically far-from-perfect) world, any particular tax expenditure does not necessarily create a real cost to society.
- Even if a tax expenditure does create a cost, the cost will not necessarily be equal to the amount of the expenditure—it probably will be less.

18.2.2.4 Tax expenditures are a question of "fairness"

The preceding discussion tell us that we cannot add up estimates of tax expenditures and call the total a social cost. This does not mean, of course, that estimates of tax expenditures are completely useless. Even if they tell us nothing about welfare costs (unless we do a general-equilibrium/social-welfare analysis), they do convey information about how government treats different activities. In short, tax expenditures certainly are of interest in analyses of equity, if not necessarily analyses of efficiency. However, even in an equity analysis, one must recognize the "interaction" and "incentive" problems, discussed above, of aggregating the estimates from the JCT and OMB.

[6]There is another questionhere: with respect to what is a tax expenditure a distortion? Answers to this question inevitably are judgmental.

18.2.3 Tax expenditures versus public-sector costs (agency outlays)

The preceding discussion on preferential tax treatment begets an obvious question: do the problems with estimating tax expenditure subsidies also apply to direct government outlays, such as for highway construction and maintenance? We will argue that they do not, and that public-sector expenditures *can* be considered social costs. (Note that in this report, this question is of theoretical interest only, because we do not actually estimate agency outlays here.)

Certain government outlays related to the use of oil or motor vehicles (e.g., outlays for highways, the highway patrol, and pollution regulation) represent (at least crudely) a true resource or opportunity costs of oil use or motor-vehicle use, whereas as we have just seen tax expenditures associated with oil use generally do not. These government outlays are not merely transfers; they are the long-run public-sector resource costs of oil use or motor-vehicle use. For example, if there were no motor vehicles, then the Environmental Protection Agency's Office of Mobile Sources probably would not exist.[7] If there were no Office of Mobile Sources, then people employed there would do something else, and the capital used there would be put to other uses. These other activities and purposes would be the *foregone real benefits* —the opportunity cost—of devoting people and capital to the Office of Mobile Sources.

By contrast, as explained above, it is not at all clear that there would be real welfare benefits to eliminating tax expenditures. If the oil industry were taxed more, then either other industries would be taxed less, or the government would collect more revenue, or some combination of both. Whether or not it would be beneficial to tax the oil industry more and other industries less would depend on the marginal productivity of the industries and many other factors. Even if it was beneficial—and it might well not be—the magnitude of the net benefit almost certainly would be less than the magnitude of the tax expenditure, because the bulk of the effect simply would be to shift the tax burden. Similarly, whether or not it would be beneficial to tax the oil industry more and provide more government services would depend on the marginal cost to the industry of the tax and the marginal value of the extra government services. Again, even if it were beneficial—and it might well not be—the magnitude of the net benefit would almost certainly be less than the tax expenditure because the benefit (in government goods and services) provided by eliminating the expenditure would be reduced by the cost to the industry.

In addition, government outlays are probably are less intimately related to industry behavior than are tax expenditures, and probably can be added to obtain a total cost. It is reasonable to assume that, for example, the total public-sector resource savings from eliminating the EPA office of Mobile Sources and U.S. Department of Energy spending on research and development simultaneously is approximately the sum of the outlays for each of the programs.[8] It is not necessarily the case that eliminating these will significantly affect either the behavior of industry, or expenditures on other government programs.

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[7] This ignores the small amount of attention to non-highway mobile sources.

[8] Estimating the amount of these expenditures allocated to the oil industry is more complicated.

18.2.4 Public-sector costs versus environmental externalities

Although public-sector costs and environmental externalities both are economic costs of oil use or motor-vehicle use, there is, of course, an important difference between them: the former typically are long-run costs of public-sector decisions, whereas the latter usually are short-run costs of private decisions. If tomorrow many people decide to drive fewer miles, then tomorrow there will be less air pollution from motor vehicles. But there will not be less roadway, or less police service. If the reduction in driving is significant and sustained, then in the long run the public sector might recognize that less roadway and less police service is needed, and adjust the supply accordingly. Thus, we may count [most] public-sector expenditures as a cost of motor-vehicle or transportation-fuel use *only* if we are doing an analysis of large changes in vehicle or fuel use in the long run. By contrast, we may count [most] environmental externalities in *any* kind of analysis.

18.2.5 A note on government price subsidy programs

Thus far we have talked about tax expenditures, which represent tax revenue foregone because of preferential tax treatment (and which as explained above are not necessarily social costs) and public-sector resource costs, such as the cost of building highways. Some researchers claim that a third class of government expenditures, price or quantity subsidy programs, also are true costs to society. An example of a subsidy program is the Low-Income Home Assistance Program (LIHEAP), which provides assistance to low-income homes with high energy bills. (See Appendix 18-A of this report for more details.)

For our purposes, however, subsidy programs are more like tax expenditures than like true direct resource costs. Price subsidies do affect welfare, but they do so by distorting prices and hence consumption, and so are similar in their effect to tax expenditures. It is relatively easy to show diagrammatically how a single price subsidy, *viewed in isolation*, reduces welfare and hence has a real cost to society. In Figure 18-1, a good is subsidized by the amount P'-P, so that consumers pay P and demand Q. In the absence of the subsidy, consumers would pay P* and demand Q*. As a result of the subsidy, consumers consume marginal units that cost more to produce than they are worth. This cost of excess consumption, due to the subsidized price, is the area of above the demand curve (the marginal value curve) and below the supply curve (the cost curve)—area *xyz* in Figure 18-1. If the subsidy were removed, these net costs would not be incurred. Thus, *xyz* is the welfare cost of the subsidy.

Now, note first that the welfare cost is much less than the total subsidy, which is the subsidy price P'-P multiplied by the subsidized quantity, Q, or area P'yxP. We postulated the same kind of effect in the case of tax expenditures. Furthermore, this analysis isolates the subsidy from the rest of the distorted economy. It is not impossible that, were the subsidy to be analyzed as part of the bigger economic picture, it would not have a cost at all—just like in the case of tax expenditures.

In the end, our distinction between tax expenditures and subsidy programs on the one hand, and some public-sector costs on the other, is mainly a distinction between *moving resources around,* which can be said to have an only "indirect" effect on welfare via price changes, and actually *consuming resources*, in the form of manpower and materials, to provide goods and services. Tax expenditures move resources around (mainly). Highway building (for example) consumes resources.

18.3 TYPES OF TAX EXPENDITURES

In this section, we discuss some of the important tax expenditures which pertain to the oil industry. We describe each kind of tax expenditure, and explain under what conditions it is reasonable to count the expenditure in an "equity" analysis of government support. We emphasize—again—that tax expenditures are relevant in a discussion of equity, but not, in the absence of a general-equilibrium/social-welfare analysis, in a discussion of economic efficiency. That is, we may set up some standard of fairness, and then measure tax expenditures with respect to that, but we may not classify tax expenditures as social costs, or sources of economic (welfare) losses, unless we have done the additional analysis to determine the effect of a tax expenditure on economic efficiency.

Given that (short of much additional analysis) we cannot appeal to economic efficiency in our classification and analysis of tax expenditures, our measurement of tax expenditures becomes partly (if not wholly) arbitrary, in the sense that it is governed by notions of "fairness" or "neutrality", and depends on what one is comparing with what. The EIA report (1992) makes a similar point: "tax expenditures exist when actual tax treatment for particular kinds of taxpayers deviates from standard tax treatment" (p. 21), although "there is disagreement as to what constitutes standard tax treatment..." [p. 21].) Consequently, in the following sections, we merely raise some considerations that might be relevant in estimating and comparing tax expenditures.

Because tax laws change, some of our discussion below may be out of date. For a review of tax and regulatory legislation currently affecting energy industries, see the Earthtrack (2004) website, which is discussed briefly in section 18.4.12.

18.3.1 Accelerated Depreciation

18.3.1.1 Definitions

When determining the level of income upon which they are liable for taxes, firms may deduct any expenses incurred in generating their income. In the case of operating expenses, these are normally deducted in the year in which the expenses are incurred. For capital investment, this is not the case. Because a fixed asset has can be used for many years, firms must depreciate it over its useful life rather than expensing it in the year it was purchased. There is little debate that depreciating an asset is the appropriate means of expensing (deducting) a capital investment. At issue is the appropriate rate at which the asset is depreciated.

Accelerated depreciation can be viewed as any depreciation rate that is faster than some baseline rate of depreciation. Accelerated depreciation changes the timing but the not the total amount of deductions over an asset's life: with accelerated depreciation, a firm deducts more in the early years than it would in the case of "normal" appreciation. This generally is desirable because it generally is desirable to have money now (in the form of reduced tax payments) rather than later.

The OMB estimates tax expenditures due to accelerated depreciation by comparing actual depreciation deductions with the deductions that would obtain with straight-line depreciation, in which the value of an assets declines linearly with time. If one believes that straight-line depreciation is the appropriate baseline, and more generally, that favoring capital investment is "unfair," then it is appropriate to use the OMB and JCT estimates of accelerated depreciation tax expenditures.

18.3.1.2 Considerations

One can argue that the depreciation tax expenditures should be calculated not with respect to straight-line depreciation necessarily but rate with respect to the true economic rate of depreciation, which is not necessarily always linear over time. Some kinds of assets wear out or devalue more quickly in the earlier stages of use. For these assets, the claimed "accelerated" depreciation might actually be the true economic rate of depreciation, in which case there is no tax expenditure with respect to the true depreciation rate. Generally, we expect that tax expenditures will be less with respect to true economic depreciation than with respect to straight-line depreciation.

Consideration of inflation also affects estimates of tax expenditures. According to the Joint Committee on Taxation, "The measurement of income from capital under the normal income tax structure[9] does not take into account the effects of inflation on such items as depreciation...As a result, some tax expenditure estimates will generally be larger than would be the case if the normal tax structure provided for inflation adjustments in these items" (Joint Committee on Taxation, 1991, p.6). In other words, a depreciation baseline that accounts for inflation will look more like an accelerated depreciation, because the "inflated" part of remaining value will be removed.

More generally, one can ask under what conditions accelerated depreciation, however measured, should be counted as a tax expenditure. Accelerated depreciation (however measured) is available to all firms, and provides favorable treatment of capital investments in general. It is not a tax break for energy over other industries, or oil over other energy industries: virtually all major energy sources require large investments in capital. For this reason, the EIA (1992) excludes accelerated depreciation in their study of energy "subsidies". In their words: "Programs that provide incentives for broad classes of economic activity, such as investment in fixed capital or investment in basic research, have been excluded, because they affect neither the choice between energy and non-energy investment, nor the choice among particular forms of energy" (EIA, 1992, page 3).

However, accelerated depreciation does in some sense favor capital-intensive means of producing energy over less capital-intensive alternatives such as end-use efficiency. For this reason, Heede (1985) and Koplow (1993), who were comparing efficiency and "soft" energy sources (such as solar power) with traditional energy sources (such as coal, oil, and nuclear), both consider accelerated depreciation to be an energy "subsidy".

More subtly, one can argue that the corporate income tax itself discourages capital investment, and that accelerated depreciation mitigates this disincentive. The corporate tax rate raises the pre-tax rate of return an investment must generate to preserve the after-tax return (Pechman, 1987, page 147). However, historically this negative effect of the corporate income tax has been "cushioned by substantial increases in capital-consumption allowances. Whereas straight-line depreciation was the rule before World War II, the postwar tax law allowed more accelerated methods and sharply reduced the period over which depreciation was taken" (Pechman, 1987, page 149). One might argue, then, that if accelerated depreciation is to be counted as a tax expenditure, then the disincentive of the corporate income tax should be counted as a tax penalty (negative tax expenditure).

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[9] The normal income tax structure assumes straight line depreciation.

18.3.1.3 Modified Accelerated Cost Recovery System (MACRS)

The 1986 Tax Reform amended but did not repeal accelerated depreciation allowances. In order to eliminate areas of contention between taxpayers and the IRS over the appropriate useful life and salvage value, the Modified Accelerated Cost Recovery System contains eight classes of assets, each of which has a specific useful life and depreciation method. Salvage value is ignored under MACRS. "With these rules, possibilities for abuse using unrealistic values for useful life and salvage value are essentially eliminated (Pratt and Kulsrud, 1993, page 9-5). Prior to the revision, capital costs were recovered over a period which was much shorter than the useful life of the asset. According to Pechman, "depreciation allowances in the MACRS are closer to, but still somewhat more liberal than, economic depreciation for equipment" (Pechman, 1987, page 162). Because tax expenditure estimates use a baseline of straight-line depreciation, accelerated depreciation should still be considered an active provision, and not residual as asserted by Koplow (1993). Both the JCT and the OMB project that the total tax expenditures resulting from this will continue to grow over the next few years.

Depreciation allowances under the MACRS became effective for property in place on or after January 1, 1986.

18.3.2 Investment Tax Credits

The investment tax credit was effective from January 1, 1962 to December 31, 1985, with the exception of two brief periods in the late 1960's. It was eliminated by the 1986 Tax Reform Act. The credit allowed firms to deduct from their tax liability 10 percent of the costs of any new investment that had a recovery period exceeding three years. This had an effect similar to a depreciation allowance greater than 100 percent of the cost of the asset (Pechman, 1987). Recent estimates of tax expenditures for both OMB and JCT no longer include figures for investment tax credits. Presumably, there are no longer any residual effects from this provision.

18.3.3 Percentage Depletion (in excess of cost depletion)

An excellent description of percentage depletion can be found in the Federal budget:

> Independent fuel mineral producers and royalty owners are generally allowed to take percentage depletion deductions rather than cost depletion on limited quantities of output. Under cost depletion, outlays are deducted over the productive life of the property based on the fraction of the resource extracted. Under percentage depletion taxpayers deduct a percentage of gross income from mineral production at rate of ...15 percent for oil...Unlike depreciation or cost depletion, percentage depletion deductions can exceed the cost of the investment. (OMB, 1992, page 2-29)

In 1975, percentage depletion was eliminated for major oil companies, and between 1976 to 1984 percentage depletion allowances for smaller independent oil producers were eventually reduced to the current rate of 15 percent of gross income from production.

Percentage depletion provides oil producers with incentives to increase the development of existing oil fields since the total depletion deduction which they claim may exceed their original investment (EIA, 1992). This allowance favors any mineral fuel source over alternative energy sources which do not require mineral extraction, including energy efficiency.

18.3.4 Expensing of Exploration and Development Costs (Intangible Drilling Costs)

This provision allows oil companies to expense costs incurred in developing an oil field, rather than amortize these costs over the life of the property. Major oil companies are permitted to expense 70% of these cost of successful domestic wells in the current year, and amortize the remaining 30% over five years. All of the costs of unsuccessful domestic wells may be expensed in the year they are incurred. Independent oil producers can expense 100% of the costs of successful and unsuccessful domestic wells.

Tax expenditures for intangible drilling costs can be negative, and that in fact is what both Koplow (1993) and EIA (1992) report. That is, in 1989, this tax provision actually provided "extra" tax revenues for the government—revenues that it would not have received had the policy not been in place. This is possible because, in any given year, the expensing provision will have two countervailing effects. On the one hand, current expenses taken in the given year will reduce taxable income and hence reduce tax payments, compared to what would be the case were there no expensing provision. By this effect (of current expensing), the government loses tax revenue on account of the expensing provision. On the other hand, had there been no expensing provision in years past, then firms would have had to spread their past expenses over several years, in some cases up to the given year. In that case, had there been no expensing provision, firms would have reduced their tax liability in the given year rather than in past years. By this effect (of past expensing), the government receives tax revenues in the current year on account of the expensing provision.

The net effect of having and having had an expensing provision is the sum of these two countervailing effects. (The same reasoning applies if one does a future rather than a historical analysis of the expensing provision.) If current expenses exceed foregone past expenses in the current year, then the tax expenditure will be positive; otherwise, it will be negative. In a normal growth period, the tax expenditure is positive, but the EIA (1992) explains that the sharp decline in oil prices has resulted in decreased exploration and development expenditures, and hence relatively low current expenses.

The EIA (1992, page 106) explains the impact of this policy:

> This tax deferral provision has historically been one of the most important for oil and gas producers. The rapid write-offs have added to other incentives to engage in exploration and development. As a result, domestic crude oil production has been greater than it would otherwise have been and capital has been diverted from more productive activities. The increased output has contributed to oil prices being lower than they otherwise would be, despite OPEC's price controlling position, and to constrained growth for non-conventional forms of energy.

More recent estimates suggest that this provision may now result in a positive tax expenditure. In 1989, the total tax expenditure outlay equivalent for both oil and gas was a negative $65 million. The 1993 estimate is a positive $185 million. However, the oil share of this is uncertain. OMB forecasts between 1993 and 1999 show a declining trend in the tax expenditures, but the estimates remain positive.[10]

[10]Apparently, some in the oil industry believe that the fiscal impact of these expensing provisions should not be counted as a tax expenditure, presumably on the ground that the provisions are part of a broadly

18.3.5 Expensing of Tertiary Injectants

This provision allows oil companies to expense the costs of certain chemical injectants used to enhance the process of recovering oil (EIA, 1992, page 108). The effects of this policy have been insignificant. Estimates of the tax expenditures associated with this do not exceed $20 million. Their primary effect is to increase the life of certain oil wells beyond the economically efficient life.

18.3.6 Exception from Passive Loss Limitations

Passive losses (or income) are those losses (or income) which result from activities in which the tax payer did not materially participate. Prior to the 1986 Tax Reform, tax payers could use losses from one activity to offset the income generated by another. This created a strong incentive to invest in tax shelters which would incur accounting losses in order to reduce the overall tax liability of the firm. Usually these losses were artificial, in the sense that often they were the result of mismatching expenses and revenues in the early years of an investment. The 1986 Tax Reform did not completely eliminate this provision, but it did place strong restrictions on the ways in which the passive losses could be used to offset income from other activities. However, owners of working interests in oil and gas properties are exempt from these limitations.

The passive loss limitations, and the oil and gas exemption, primarily apply to partnerships and individuals, not corporations. Hence, this provision creates an incentive for unlimited-liability partnerships to develop oil-and-gas properties. Also, the exemption does provide some incentives to increase exploration and development of oil properties because the subsidy attracts new capital. However, because of the large risks associated with an unlimited liability partnership, the effects of this provision are likely to be small (Pratt and Kulsrud, 1993; EIA, 1992).

18.3.7 Alternative Fuel Production Credit

This credit applies to qualified fuels that are from wells drilled or facilities in place between January 1, 1980 and December 31, 1992 and are sold before the end of 2002. There are a number of alternative fuels which are eligible for this credit, including oil produced from shale or tar sands.[11] Qualifying firms receive a tax credit of $3 (in 1979 dollars) for each barrel of oil-equivalent fuel produced, provided the price per barrel of oil remains below $23.50 (in 1979 dollars). The credit is gradually phased out as the price of oil increases from $23.50 to $29.50 (in 1979 dollars).

The credit is in effect a price subsidy. It is meant to encourage production of alternative fuels by minimizing the economic risks associated with low market prices for oil. Koplow (1993) estimates that the oil industry received between $2.5 and $5.0 million dollars in alternative fuel production credits in 1989—an evidently minor

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equitable tax policy, and are not exceptional or preferential. Although in the end this is a matter of judgment, we note that to our eye, the expensing provisions look exceptional.

[11] The fuels which qualify for this credit are: (1) oil produced from shale and tar sands; (2) gas from pressurized brine, Devonian shale, coal seams, tight formations or biomass; (3) liquid, gaseous, or solid synthetic fuels produced from coal; (4) fuel from qualified processed wood; and (5) steam from agricultural by-products. The most fuel most affected by this credit is probably gas produced from coal seeams (EIA, 1992).

amount. However, between 1989 and 1994, the *total* tax expenditure (not necessarily the oil share) associated with this provision increased almost a hundred-fold. The OMB estimate of the total outlay equivalent rose from $10 million in 1989 to $900 million in 1994. The OMB and JCT only report the data, and provide little analysis of trends. Hence, the cause of this increase is unclear, although a significant share of it can probably be attributed to the changes that resulted from the Energy Policy Act of 1992, which provides additional support for the development of alternative fuels. It is unlikely that the oil industry share of the benefits from the alternative fuel production credit has increased dramatically.

18.3.8 Research and Development Tax Credit

"The tax credit is 20 percent of the qualified expenditures in excess of each year's base amount" (OMB, 1990, page A63). This credit expired in July 1995 (OMB, 1995).

18.3.9 Expensing of Long-term Research and Development

"Research and experimentation (R&E) projects can be viewed as investments because their benefits accrue for several years when they are successful. It is difficult, however, to identify whether a specific R&E is completed and successful and, if it is successful, what its expected life will be. For these reasons, the statutory provision that these expenditures may be expensed is considered part of the reference law. Under the normal tax method, however, the expensing of R&E is viewed as a tax expenditure. The baseline assumed for the normal tax method is that all R&E expenditures are successful and have an expected life of five years" (OMB, 1992, page 2-29).

18.3.10 Deferral of Tax on Shipping Companies

"Certain companies that operate U.S. flag vessels receive a deferral of income taxes on that portion of their income used for shipping purposes, primarily construction, modernization and major repairs to ships, and repayment of loans to finance these qualified investments" (OMB, 1990, page A67).

Although this provision is intended to maintain the U.S. merchant marine, a share of the benefits accrues to the oil industry since some oil travels via U.S. flag vessels.

18.3.11 Special Treatment of Alaskan National Corporations

"Tax law restricts the ability of profitable corporations to reduce their tax liabilities by merging or buying corporations with accumulated net operating losses (NOLs) and as yet unrefunded claims to investment credits. Alaska Native Corporations have a limited exemption (fifteen years after the NOL or credit was first experienced) from these restrictions that includes NOLs and credits claimable prior to April 26, 1988" (OMB, 1990, page A67).

18.3.12 Safe Harbor Leasing

"Under this provision, a corporation, otherwise unable to utilize the accelerated depreciation allowances and investment credit, might sell to, and then lease from, another corporation assets acquired after December 31, 1981. The term of such leaseback agreements, absent the safe harbor leasing provision, would not qualify the lessor corporation as the owner of the assets and allow it to utilize the investment incentives for tax purposes. The selling corporation could gain at least part of the financial advantage provided by the investment tax incentives by successfully

negotiating leaseback agreements below market costs. Although this provision was repealed in 1982, its budget effects persist for the duration of the safe harbor lease entered into in 1981" (OMB, 1990, page A66).

The 1991 federal budget contains estimates of the tax expenditures associated with this provision. By 1995, estimates were no longer provided. Presumably, the residual effects from this item no longer persist.

18.4 LITERATURE REVIEW

In this section we review a number of the "tax-subsidy" studies done over the last 15 years, and one study of state and local "subsidies". Most of these studies have tried to quantify preferential Federal tax treatment of energy industries in general. We, however, will review only the parts of these studies relevant to the oil industry.

Over the past 15 years tax provisions have changed considerably—most dramatically on account of the 1986 Tax Reform. Consequently, we will focus mainly on the better of the more recent studies (EIA, 1992; Koplow, 1993), and relatively little on the pre-1986 studies (Cone et al., 1980; Heede et al.1985). Readers interested in a more comprehensive review of these and other studies should see Koplow and Dernbach (2001)[12].

We limit this review to studies of tax expenditures specifically, or of "subsidies" more broadly. We do not review studies of the total social cost of oil use or motor-vehicle use, even if they include estimates of tax expenditures, because virtually all such social-cost studies are literature reviews themselves.

For a comprehensive listing of federal intervention in oil markets, see Earthtrack (2004).

18.4.1 Cone et al. (1980)

This study was prepared by Battelle Memorial Institute for the U.S. Department of Energy primarily as a response to the 1973 oil crisis and consequent desire to make the U.S. more self-sufficient in energy production. The purpose of the analysis was to assist in the "study and recommendation of Federal incentives for the development of solar energy" (Cone et al., 1980, p. 1). The authors recognized that in order to develop a coherent strategy for the development of solar energy, they needed to identify the distortions in the energy market which resulted from Federal incentives to stimulate energy production. The study covered nuclear energy, hydroelectricity, coal, oil natural gas and electricity.

18.4.1.1 Definition of an incentive

Unlike most of the other studies, this report did not attempt to quantify "subsidies" to the oil industry. Rather, it focused on "incentives." The intent was to

[12] Koplow and Dernbach (2001) review studies of federal subsidies to fossil-fuel use, and then discuss the implications of reforming these subsidies on policies designed to abate emissions of greenhouse gases. Thus, their purpose is not to estimate "subsidies" as true social costs. They identify three kinds of measures of subsidies: i) the value of specific government programs to particular industries; ii) the difference between the domestic (subsidized) price of energy and the foreign (unsubsidized) price of energy; and iii) the producer or consumer subsidy equivalent, which is meant to capture direct government-industry transfers and the effects of pricing distortions.

determine how Federal policy influenced the *mix* of energy sources. In Cone et al. (1980), any action which the government can take to expand residential and commercial use of an energy source is an incentive.

18.4.1.2 Data and estimates

The study identifies two major areas of oil energy incentives: (1) exploration and production, and (2) refining and product transportation. The key contribution of this study was to recognize that past as well as present policies, decisions, and events can distort present energy markets. Because these historical events and decisions can play an important role in the current state of the industry, simply eliminating presently-distortionary policies might not sufficiently "correct" energy markets to enable emerging alternatives (such as solar power, in the Cone et al. Study) to compete fairly. Cone, et al. estimate that between 1916 and 1978, Federal oil incentives totaled $123.6 billion (in 1978 dollars). The results of their analysis are shown in Table 18-1.

18.4.2 Heede et al. (1985)

18.4.2.1 Definition of "Subsidy"

According to Heede et al. (1985), a "subsidy" is "any Federal expenditure that makes energy appear cheaper to final consumers than its full economic cost."

18.4.2.2 Data and estimates

This study identifies the Federal interventions in the energy market during fiscal year 1984 that target the following energy sources: crude oil, natural gas, coal, synfuels, electricity (four sources of generation), non-hydroelectric renewables, and efficiency. Subsidies were classified into three categories:

Tax expenditures were special provisions in the Internal Revenue Code that resulted in revenue losses to the Treasury. These provisions allowed exemptions or deductions from gross income or provided a special credit, a preferential tax rate, or a deferral of tax liability (page 6). Heede, et al estimate that fiscal year 1984 Federal tax expenditures that benefited the oil industry amounted to $7.3 billion.

Agency program outlays were usually made to ameliorate certain market failures (page 6). Examples of this included expensive or risky research and development projects undertaken by the Federal government on the behalf of the private sector and the Strategic Petroleum Reserve. Heede et al. (1985) estimate that $1.3 billion in agency outlays benefited the oil industry in 1984.

Loans and loan guarantees were the costs to the Treasury of providing interest-free subsidies and paying for occasional defaults (page 6). Heede et al. did not estimate these costs to the oil industry.

Heede et al. (1985) identify their data sources clearly but do not detail their estimates. This probably does not matter now, because the study was done before the 1986 Tax Reform and so is of limited relevance today. However, the study wascomprehensive at the time, and did provide a useful framework for subsequent studies (particularly Koplow's).

The results of his study are shown in Table 18-2.

18.4.3 Kosmo (1987)

Kosmo (1987) defines a subsidy as the difference between the domestic and world prices, and on this basis does a comparison of different countries. This effort is outside of our scope, and is not considered further reviewed here.

18.4.4 U.S. Energy Information Administration (1992)

This report was prepared by the Energy Information Administration (EIA) of the U. S. Department of Energy, in response to a mandate by Congress to prepare a report which covered both direct and indirect Federal energy subsidies, methods of valuing those subsidies, and a survey of the subsidies currently in place.

18.4.4.1 Definition of "Subsidy"

"EIA incorporated a broad definition of subsidization including most governmental actions which had as their function alteration of energy markets benefiting some group of producers or consumers" (EIA, 1992, p. ix).

18.4.4.2 Data and estimates

Unlike Heede (1985) and Koplow (1993), the EIA limits its analysis to programs whose primary purpose is to directly influence energy markets. Thus, because accelerated depreciation and investment tax credits benefit capital investment in general, the EIA does not include these. It is worth noting that these two items represent a significant percentage of the subsidy estimates in these other studies. In the Heede et al. (1985) report, accelerated depreciation and investment tax credits account for 78 percent of the total tax expenditures, and 66 percent of the total subsidy to oil. In Koplow's (1993) study, these provisions represent between 62 and 79 percent of the total tax expenditures, and between 22 and 43 percent of the total subsidy to oil.[13] Also, the EIA omits the costs of the Strategic Petroleum Reserve on the assumption that is meant to provide national security and public transport.

EIA defines two kinds of subsidies:

> Direct subsidies are direct payments to producers or consumers, and tax expenditures (as defined in the Federal tax code), provided conditional on the recipient engaging in energy production or consumption.
>
> Indirect subsidies consist of government actions (other than direct subsidies) which involve some form of Federal financial commitment that affects the cost of consumption or production of some form of energy. They include the provision of energy at below-market rates, loans or loan guarantees, government assumption of risk, research and development, and provision of regulatory services.

The EIA's (1992) estimates are summarized in Table 18-3. Note that the EIA (1992) counts as a *negative* subsidy any excise taxes—mainly the portion of the Federal excise tax on gasoline that is earmarked for deficit reduction—that go into the general

[13] It appears that the principle cause of the difference in the share of the total oil subsidy that these two provisions represent is due to Heede's lower estimate of total government outlays. We are not sure because Heede et al. (1985) do not provide details on their estimates.

fund. This $3.1 billion negative subsidy swamps the other subsidies (which total $947 million) and results in an overall negative subsidy to the oil industry.

Is it reasonable to count the deficit-reduction portion of the gasoline tax as a negative subsidy (tax expenditure)? Only the EIA (1992) does. The California Energy Commission (1993), in its analysis of the social cost of motor-vehicle use, believes that the EIA should not have included the negative subsidy, because according to the CEC (1993) funds from excise taxes are earmarked for a specific purpose and are usually a mechanism for paying for government goods and services—that is, they are like a user fee, not a general tax. Thus, since revenue collected from these taxes does not contribute to the general fund, the CEC (1993) contends that it should not be included in the analysis. However, the CEC (1993) apparently is mistaken, because the EIA (1992) has counted only those excise taxes (mainly the deficit-reduction tax on gasoline) that do indeed go into the general fund.

We agree with the EIA that any excise tax revenues that contribute to the general fund and are not used for a specific purpose may be counted as negative tax expenditures. However, excise taxes collected specifically for the purposes of offsetting external or government costs of fuel production or consumption (e.g., the Oil Spill Liability Trust Fund) should not be included in an analysis of general government tax expenditures, government tax subsidies, or government tax fairness.

There is, however, one important caveat to our concurrence that it is acceptable to count general excise taxes as a negative tax expenditure. If one classifies the deficit-reduction tax on gasoline as a general tax, like an income tax, rather than as a road-user fee (like most of the rest of the excise tax on gasoline), then, in an analysis of the social-cost of motor-vehicle use, one cannot also count the general excise-tax revenues as user-fee payments for the highways, to be credited against government outlays for highways. The deficit-reduction portion of the excise tax may be credited against government expenditures on the highways, or against government expenditures for general purposes, but not both. (In Report #17, we count it as a payment for highways, rather than as a contribution to the general fund.)

The results of their analysis is shown in Table 18-3[14].

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[14]Although this report is concerned mainly with tax expendiures, and not with government outlays, we think it useful to remind the reader that the EIA has not included in its estimates several kinds of government outlays -- such as for the SPR -- that other studies have included. The EIA (1992) excluded the SPR on the grounds that it is meant to provide national security and benefits the oil industry only indirectly. We do not agree with their reasoning for excluding the cost of the SPR *as a government outlay* . Although it may be true that the SPR was developed in the interests of national security, the correct question to ask -- in an analysis of the social cost or public-sector-cost of oil use -- is whether or not a reduction in oil consumption would reduce the cost of the SPR. If it would, then the SPR is by definition a cost of oil use. Although we do not know the precise relationship between oil consumption and the cost of the SPR, especially at the margin (in large part because the behavior of government decision makers is hard to predict), we do believe that the SPR is at least a long-run cost of *all* oil use. Thus, the cost of the SPR is appropriately included in an analysis of the social cost of oil use.

There are of course many complications. For example, it might be that the SPR is constrained politically to an economically suboptimal size. If so, then the size of the SPR might not be reduced if oil consumption is reduced. But then, in this case, one also must account for the "residual" energy security costs -- those not mitigated by the SPR -- because they will decline with declining oil consumption if the size of the SPR does not.

18.4.5 Koplow (1993)

18.4.5.1 Definition of "Subsidy"

In this report, subsidies are: "(1) government-provided goods and services, including risk-bearing, which otherwise would have to be purchased in the marketplace; and (2) reductions in tax burdens compared to standard treatment for a similar activity" (p. i).

18.4.5.2 Data, methods, and estimates

Koplow (1993) focuses on Federal interventions in the energy market targeted at coal, oil, gas, solar (non-grid), ethanol, biomass (non-grid), energy efficiency, and electricity (including eleven sources of generation). The study is modeled after that of Heede et al., (1985), but is a more comprehensive analysis and a significant improvement. It is based on the 1989 tax laws and accounts the effects of the 1986 Tax Reform Act.

"Subsidies" are classified into three categories:

Tax Benefits are defined as any tax provision that reduces the effective rate of taxation. This includes tax credits, reductions in the tax rate, reductions in the tax basis, and alterations in the taxable entity. Koplow (1993) estimates that the total tax-benefit subsidy to the oil industry ranged between $1.8 and $4.6 billion in 1989.

Federal Agency Programs include a wide range of government activities that benefit energy sources directly or indirectly. These include government R&D expenditures, low-interest loans, and losses on government enterprises.

Other Market Interventions include government assumption of risk, changes in the rules by which people may buy or sell energy services, and Federal procurement of energy services. Koplow does not quantify these other market interventions in the oil market.

All subsidy estimates are calculated using a zero government spending and policy baseline, and include all stages of energy use such as research, exploration, extraction, refinement, distribution, consumption and waste disposal. This baseline assumes that there is no government budget, no tax benefits and no energy policy. Deviations from this baseline are considered a subsidy.

Koplow (1993) provides both a low and a high estimate of the subsidies. In general, the low estimate reflects the government costs of providing the particular benefit, and the high estimate represents the market value of the subsidy to the industry. Koplow asserts that the latter is the preferred measure of the market distortions and barriers to entry for emerging energy sources. Overall, Koplow's (1993) analysis is one of the most comprehensive.

According to Koplow, "it cost taxpayers at least $20 billion in 1989 to subsidize the energy sector. This $20 billion includes two components - $7.7 billion in tax

expenditures and $12 billion in Federal budget outlays" (Koplow, 1993, p. 24).[15] Koplow's (1993) estimate of $7.7 billion in energy-related tax expenditures (a portion of which is allocated to the oil industry) is derived from OMB and JCT figures, which, as discussed above, do not sum to a meaningful total. Koplow acknowledges this problem when he admits that it is difficult to determine how much of the $20 billion total really would have been saved, because "eliminating one subsidy might allow businesses and consumers to re-direct their energy choices toward another subsidy" (Koplow, 1993, p. 24). However, he appears to leave this concern aside, for he goes on to conclude that "if the total level of all subsidies for individual supply-side resources, for instance, were reduced to the level of subsidies for end-use efficiency ($570 million), taxpayers would have saved about $19 billion of the $20.4 billion spent in 1989." For our part, we think that the difficulties with summing the OMB and JCT estimates should not be dismissed so lightly.

Koplow's estimates are summarized in Table 18-4.

18.4.6 Management Information Services, Inc. (MIS) (1993)

The purpose of this report was to quantify the magnitude of federal government support for the energy industry over the last fifty years. However, the authors do not provide a clear definition of "support", and provide little details on their methods.

MIS estimates that the total subsidy to the oil industry through 1992 totaled $239 billion (in 1992 dollars). Federal energy-related activities are classified into one of six categories (with total oil industry benefits through 1992 in parenthesis): research and development ($5 billion)[16], regulation ($85 billion)[17], taxation ($121 billion)[18], disbursements ($4 billion)[19], government services ($21 billion)[20] and market activity ($3 billion)[21]. They do not explain how these estimates were derived.

Because of the incomplete details and a lack of analysis in the report it is difficult to comment further on their results.

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[15] Note that these figures respresent his estimates to the energy industry as a whole, not the oil industry exclusively.

[16] Includes federal research and development expenditures for the oil industry and the pro-rated costs of US Geological Survey and Bureau of Mines data collection costs.

[17] Includes exemption from price controls for stripper wells and the costs of oil industry regulation.

[18] These tax expenditures resulted primarily from percentage depletion allowances and intangible drilling costs.

[19] Consists primarily of subsidies for construction and operation of oil tankers.

[20] Consists primarily from the pro-rated costs of maintaining ports and inland waterways.

[21] This refers to the oil-related activities of the Bureau of Land Management.

18.4.7 Loper (1994)

This study, which is a companion to Koplow (1993), is the only detailed study of state and local tax policies available.[22] In 1991, state and local governments collected a total of $525 billion in revenues (roughly 80 percent of what the Federal government collected) including $40 billion from energy taxes. Loper estimates that nationwide, state and local taxes on end-use energy products are 30 percent lower than the average sales tax. This preferential treatment resulted in $7.4 billion in foregone tax revenue, $4.1 billion of which could be attributed to petroleum products.

18.4.7.1 Objective

Loper (1994) focuses on state and local tax policies that impact the 10 most widely used end-use energy products and services: petroleum, electricity and natural gas for residential, industrial and office use, and gasoline for highway use. The primary goal of the study is to estimate foregone state and local tax revenues, which he calls "net energy tax subsidies," on account of preferential tax treatment for energy. He estimates the net energy tax subsidy (foregone revenue) on the basis of the difference between an "energy tax rate" and the general sales tax rate for each state. The energy tax rate is discussed below.

18.4.7.2 Data, methods, and estimates

The study identifies four ways in which tax biases for energy-related activities may occur: (1) different statutory tax rates, (2) partial or total tax exclusions, (3) tax refunds or credits, and (4) additional special taxes. Loper analyzed all areas of the tax codes, including general sales taxes, gross receipts taxes, highway fuel taxes, income taxes, and property taxes, along with numerous lesser-known taxes imposed on or containing some special treatment of energy or energy businesses. From this he compiled a database of over 1,000 energy-related state and local tax code provisions that were in place as of July 1993. The study includes only those taxes and tax provisions that are likely to be borne by end-use consumers.

Loper (1994) notes that there are some important tax issues which are not addressed in his report. For example, the report includes only state and local tax provisions that specifically affect energy consumers or producers. Hence, accelerated depreciation and investment tax credits are not included. Passive tax provisions (tax breaks passed through from the Federal income tax code) are not included. The study also omits non-tax interventions, such as government regulations and spending.

Loper calculates the "energy tax rate," as a percentage of the pre-tax retail price of energy, in four steps. First, he identifies taxes imposed on energy products. The two main energy tax categories which are related to petroleum use identified in the study are petroleum taxes (including user fees, which he deducts in the next step), and severance and production taxes.

Second, Loper deducts any user fees included in the first step. He deducts these because user fees are intended to "fund government-provided services that primarily benefit the payer of the taxes, or they are intended to compensate governments for costs incurred as a result of the taxable activity." These include highway fuel taxes, toll

[22] For the purposes of this study, the District of Columbia is considered a state.

collections and vehicle registration fees, environmental fees and assurances,[23] and petroleum inspection fees.

Third, Loper makes adjustments for related income and property tax provisions. Although some states have exemptions from income and property taxes for petroleum related activities, these are not included in the analysis because the author believes that these benefits will not be passed on to end-use consumers. Thus, there are no adjustments made for the oil industry.

Finally, Loper adds in the applicable general sales taxes. Only eight states subject gasoline to sales taxes, although most have some sales tax provision for petroleum used in homes, offices and industries.

In sum, Loper calculates the energy tax rate, as a percentage of the pre-tax retail sales price, as all applicable energy taxes except user fees plus applicable sales taxes. Loper (1994) then compares this energy tax rate with the prevailing general sales tax rate, and calculates the taxes that would have been collected had energy been taxed at the general sales tax rate rather than the estimated energy-tax rate, *assuming that sales prices and quantities were unchanged*. The estimated foregone revenues are the net energy tax subsidy.

Based on the difference between the energy tax rate and the general sales tax rate, Loper finds that 38 states under-taxed petroleum for highway use, 24 states under-taxed petroleum for residential use, 31 states under-taxed petroleum for industrial use, and 5 states under-taxed petroleum for office use. The net energy tax subsidy attributed to petroleum, i.e. the revenue impact on state and local governments, totaled $4.1 billion in 1991.

Loper's (1994) estimates are summarized in Table 18-5. The appendix to Loper's report provides a detailed listing of the energy-related tax provisions for each state.

18.4.8 Domestic Fuels Alliance (1995)

This report by the Domestic Fuels Alliance (DFA) is a response to oil-industry lobbying efforts to eliminate any Federal incentives that promote alternative-fuel use. Unfortunately, the estimates in this report are merely pieced together—often uncritically and inconsistently—from other studies of tax subsidies.

DFA's summary table, presented on page 5 of its report, is difficult to interpret. It presents the table as a "total Federal energy subsidy costs to government on an annual basis," drawn from eight different studies conducted over the last 20 years. One of these eight is the 1992 study by the World Resources Institute (Mackenzie et al., 1992), which estimated that costs of motor-vehicle use "not borne by drivers" in the United States amounted to some $300 billion. However, the $300 billion of Mackenzie et al. (1992) included all kinds of environmental externalities and other costs "not borne by drivers" (such as free parking); tax expenditures and government-agency outlays constituted but a small fraction of the $300 billion. In light of this, we do not know exactly what DFA is purporting to measure.

Similarly, we do not understand DFA's presentation, in their section titled "Federal Petroleum Subsidies," of the analysis done by the EIA (1992). The DFA states, correctly, that the EIA (1992) estimated that Federal energy "subsidies" were about $5 to $10 billion. This, however, was the subsidy to all energy sources. As we noted above, the EIA (1992) estimated that the "subsidy" to petroleum specifically—and the DFA is

[23] A number of these taxes fund environmental actions required as a result of oil spills.

presenting the estimate in a section called "Federal Petroleum Subsidies"—was a *negative* $2.2 billion.

Because the DFA study is derivative and difficult to interpret, we do not summarize the results here. The American Petroleum Institute (1995) offers a critique of the DFA study.

18.4.9 Union of Concerned Scientists (UCS) (Hwang, 1995)

The UCS estimates hidden "subsidies" to the oil industry. It defines "subsidy" to include:

i) reduced corporate income taxes for the oil industry;
ii) lower than average sales taxes on gasoline;
iii) government funding of programs that primarily benefit the oil industry and motorists, and
iv) "hidden" environmental costs such as air, water, and noise pollution.

As discussed above, we are not concerned here with expenditures for government goods and services (subsidy iii in the USC's accounting), or environmental externalities (subsidy iv in the USC's accounting). The UCS's estimates of reduced corporate income taxes, and lower-than-average sales taxes, are relevant, but either are based on the work of Koplow (19930 or Loper (1994) or else are similar to the analysis presented here. Therefore, we do not analyze the UCS work further.

18.4.10 Energy Information Administration (1999, 2000)

In 1999 and 2000, the EIA updated it's 1992 study on Federal Energy Subsidies. The 1999 report examines Federal programs that provide a specific financial benefit to producers of primary energy, and the 2000 report examines programs targeted at the energy transformation and end-use sectors. The 1999 and 2000 reports use a narrower definition of "subsidy" than did the 1992 report and include a couple of tax expenditures not in the 1992 report, but otherwise the methods and data sources in the reports are similar. Table 18-3 shows the EIA's 1999 and 2000 estimates alongside the 1992 estimates.

18.4.11 Green Scissors (2004)

The annual *Green Scissors* (2004a) report identifies tax expenditures, direct government expenditures, R&D programs, loan programs, and other government fiscal programs and policies that the authors believe are environmentally harmful and generally wasteful. The 2003 report includes a discussion of oil royalty exemptions and specific road and highway projects.

A different Green Scissors (2004b) focuses more specifically on "tax breaks" (similar to our "tax expenditures") and "spending subsidies" (similar to our "direct government spending") for energy industries. They estimate that existing tax breaks for the oil industry cost $2.6 billion per year, an estimate that turns out to be similar to our independent estimate derived in section 18.5. The Green Scissors (2004b) estimates are summarized in Table 18-6.

18.4.12 Earthtrack (2004)

The Earthtrack website keeps tabs on tax expenditures, direct government spending, government loans, and government research and development outlays that

affect energy industries. In the case of oil, Earthtrack (2004) lists all of the expenditure categories in section 18.3 of this report, plus a couple of others: tax relief for certain oil producers from the Alternative Minimum Tax, and exclusion of interest on IDBs for seaports and marine terminals. Earthtrack also tabulates direct spending by government agencies that benefits the oil industry. For the most part the web site does not present estimates of the magnitude of the tax expenditures.

18.5 ESTIMATES OF CORPORATE-INCOME TAX AND SALES-TAX EXPENDITURES, BASED ON AVERAGE TAX RATES

18.5.1 Corporate income-tax expenditures for the oil industry

All previous estimates of tax expenditures identify individual "preferential" tax provisions, estimate the revenue losses owing to each provision, and then sum the losses to produce the total tax expenditure. In our view, this method has two shortcomings. First, it is piecemeal, and liable to inconsistency and incompleteness. It requires that the researcher decide upon a standard tax treatment and then examine every tax provision consistently with respect to that standard. Second, the estimates are derived from OMB and JCT figures, which as discussed do not sum to a meaningful total expenditure estimate.

An alternative approach is to estimate and compare overall actual tax rates—taxes actually paid as a fraction of some measure of income or value. This method has several advantages: it uses aggregated data on overall taxes, rather than estimates of individual provisions, and therefore will include the effect of all provisions, favorable or unfavorable (so that one is not liable to the charge of having omitted the countervailing effect of any unfavorable tax provisions); it uses data on actual tax payments and income, rather than OMB and JCT estimates; and it uses an intuitively appealing and straightforward basis of comparison: actual tax rates. Of course, there is at least one disadvantage to using aggregated data: they do not reveal potentially important details.

To develop our average-tax estimates we use industry-level corporate Federal tax and income data published by the Internal Revenue Service (1994, 2003). In Table 18-7 (which presents data for "income-year" 1991) we divide Federal income taxes and Federal income taxes after credits by net income and taxable income, for various industry groupings. Part A of the table shows the actual income and tax payments, and Part B shows the calculated tax rates based on the data in Part A. The tables show the taxes for each major industry group, and then for oil and motor-vehicle-related industries within the major group. Totals are presented for all industries, oil-related industries, motor-vehicle related industries, other industries, and the motor-fuel and motor-vehicle-related industries.

The results of the 1991 analysis are illuminating. The income tax liability of the oil industries, *before tax credits are taken*, and expressed as a fraction of net income (not taxable income), is actually relatively high—higher than the average for other industries. However, as one would expect, the tax liability expressed as a fraction of taxable income is similar in all industries. From this we infer two things: i) that on average most industries are in the same tax brackets, and ii) that the oil industry did not exempt as much of its net income as did other industries. For every $100 of taxable income, most industries, including the oil industries, had a tax liability of about $35. However, the oil industry had about $120 of net income for every $100 of taxable

income, whereas other industries had about $160 of net income for every $100 of taxable income.

However, the standings change when we consider income tax after credits—that is, income tax actually paid, which undoubtedly is the more equitable basis of comparison. The last two columns of Table 18-7 reveal that the oil industry paid a relatively small amount of income tax as a fraction of its net income—considerably less than did other industries, on average. Comparison of columns 1 and 3 indicates that in the oil industry, tax credits were more than half of the pre-credit tax liability, whereas in other industries they were less than one quarter. Line-by-line (i.e., industry-group by industry-group) comparisons of the results in column 3 of the third part of the table (oil industries) with the results in column 3 of the second part (industries excluding oil) show that the oil industry pays on the order of half as much tax per dollar of net income as do other industries[24].

What would the oil and vehicle industries had paid if they had paid income tax after credits at the national average rate for all industries *other than* the oil and vehicle industries? Table 18-8 answers this question. It shows how tax payments would have changed if the tax rate were at the average for other industries rather than the actual in 1991, for each of the four tax-rate metrics. We see that if the oil industry had paid income tax after credits at the national average rate (for other industries) with respect to net or taxable income, it would have paid $2.1 to $3.9 billion more in taxes after credit than it actually did. (The change in the motor-vehicle industry is very small.) This is similar to Koplow's (1993) estimate of $4.5 billion in income-tax subsidies to the oil industry in 1989 (Table 18-4), and Green Scissor's (2004b) estimate of $2.6 billion/year as of 2002 (Table 18-6). If the calculation is done on the basis of the national average rates for all industries *including* the oil and vehicle industries, the oil industry would have paid $2.0 to $3.6 billion more in taxes after credit. (The "subsidy" amount is less because the average rate including the oil and vehicle industries is less than the average rate including them.)

When the analysis is done for motor-vehicle industries plus the highway-fuel share of oil industries, the results are similar to those for motor-vehicle + oil industries, except that the estimated tax expenditures are smaller because only a fraction of the oil industry (which receives the largest subsidies) is counted as being motor-fuel related. Corporate income-tax expenditures associated with the motor-vehicle and motor-fuel industries amounted to $1.4 to $2.8 billion in 1991, with essentially all of this deriving from motor- fuels (the oil industry) rather than from the motor-vehicle industry.

Table 18-9 shows the same calculations done with "income-year" 2000 corporate income-tax data. The tax rates, shown in Part A of the table, are similar to those estimated for 1991 (Table 18-7) with one exception: the difference between the ratio of income tax after credits to net income for the oil industry and the ratio for all industries (or all other industries) is less than what it was in 1991. As a result, the total "subsidy" calculated on this basis (Part B of Table 18-9) is the same as it was in 1991 (about $2 billion) even though net income increased substantially from 1991 to 2000 while overall tax rates remained about the same.

For income-year 2000, the tax expenditures for motor-vehicle industries plus the highway-fuel share of oil industries are $0.9 to $7.4 billion when the baseline is the

[24] The data are not available to conduct a formal statistical test of whether thes ratios actually are statistically significant from each other.

average tax rate in all *other* industries (Table 7), and $0.8 to $6.5 billion when the baseline is the average rate in all industries *including* oil and vehicle-related industries.

18.5.2 Sales-tax expenditures related to the use of motor vehicles and motor fuel

Most states and some cities and counties assess a sales tax on most retail transactions. Different rates apply to different products and to retail-sector vs. wholesale-sector vs. service-sector transactions, and as a result one may estimate tax expenditures (positive or negative) on sales of particular goods and services relative to any number of "fair" baselines.

To estimate the sales-tax expenditures related to motor-vehicle use, one must decide the rate at which sales of motor vehicles, parts, and fuels *should have been* taxed, and compare that to the rate at which they actually *were* taxed. Table 18-10 presents comprehensive data on sales of and sales taxes on motor vehicles and parts, motor-fuel, and automotive services, at the retail and wholesale levels, and national data on sales and sales taxes in the entire retail, wholesale, and service sectors. With these data, we can make a number of comparisons of sales taxes actually paid on vehicles, parts, and fuel with the amount that would have been paid at different "fairer" baseline tax rates. The last part of Table 18-10, from lines 26L to 30H, shows tax expenditures calculated with respect to different baseline tax rates, beginning with the highest rate (which results in the highest expenditures or "subsidies" to motor vehicles and fuels) and ending with the lowest rate, which actually results in a negative tax expenditure (because the actual tax rate on motor vehicles and fuels is higher than the lowest baseline rate).

If the baseline rate is assumed to be state and local *posted* sales-and use-tax rates, then tax expenditures on items related to motor-vehicle use are quite high, about $15 billion in 1990 and almost $40 billion in 2004 (lines 26L and 26H). This however does not seem a reasonable basis, because average actual tax rates clearly are well below the posted rates. Indeed, if one goes to the other extreme and assumes that the appropriate baseline tax rate is total national sales and use taxes divided by total final sales to consumers (which excludes wholesale sales), and compares this with actual average sales tax rate on motor-vehicle related goods and services in the retail and service sectors, one finds the latter exceeds the former, with the result that motor-vehicle related items currently are overpaying sales and use taxes by at least $10 billion (lines 30L and 30H). An intermediate case, in which one calculates the baseline tax rate for sales in the service, wholesale, and retail sectors that actually are subject to sales taxes (i.e., excluding in this case all "exempt" sales from the baseline, whereas in cases 30L and 30H exempt sales are included in the baseline), results in tax expenditures on motor-vehicle and fuel-related sales on the order of $2 billion per year in 1990 and up to $15 billion at present (lines 28L and 28H). If one considers just the retail sector, then the actual average rate on motor-vehicles and fuels of about 2.6% is less than the national average rate of around 4%, and tax expenditures are on the order of $6 billion in 1990 and about $15 billion at present (Lines 27L and 27H).

Finally, we can compare our estimates with Loper's (1994). As we mentioned in section 18.4.7, Loper (1994) estimates that in 1991 state and local sales-tax expenditures on all petroleum products totaled $4.1 billion, of which approximately $2.5 billion pertained to highway fuels specifically (based on the ratios of Table 18-5). Our own estimate is that $122 billion in sales of fuels and lubricants was taxed at 1.8%, versus a national average of 3.6% for all retail sales (Table 18-10), resulting in a sales-tax expenditure of $2.1 billion. This is close to Loper's (1994) estimate.

18.5.3 Summary

We estimate that sales-tax and corporate-income-tax expenditures related to motor vehicles and motor fuels, estimated as the difference between what tax payments would have been at a "fair" baseline rate and what tax payments actually have been, may be on the order of several billion dollars per year. However, we emphasize again that these estimates must be considered with respect to questions of fairness, not economic efficiency. The question of how the income of different industries (or individuals) should be taxed is primarily an equity issue, to be evaluated by normative criteria. We do not undertake a normative analysis here.

We do, however, apply our estimates of tax expenditures in our analysis of user payments for government-provided motor-vehicle infrastructure and services, in Report #17. In that report, we point out that if certain kinds of general taxes are counted as payments by motor-vehicle users for government-provided motor-vehicle infrastructure and services, then it is reasonable to count general tax expenditures related to motor-vehicle use as subsidies to motor-vehicle users. Therefore, in Report #17, we deduct tax expenditures from estimated user payments. The deducted tax expenditures of more than $20 billion are about 7% of estimated user payments, a small but not trivial fraction of total payments.

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TABLE 18-1. CONE ET AL. (1980) SUMMARY OF OIL INCENTIVES BY TYPE FROM 1916 - 1978 (MILLIONS OF 1978 DOLLARS)

Incentive area	Estimate
Research and development	1,287
Exploration and production	
U.S. Geological Survey - data	574
Bureau of Land Management - leasing	498
Bureau of Mines - data	18
Stripper well price incentives	16,840
Incentives for new oil	33,340
Economic Regulatory Administration [a]	1,708
Intangible drilling expense	15,449
Percentage depletion allowance	40,033
Refining and transportation	
High yield on pipelines	5,601
Maintenance of ports and waterways	6,923
Subsidies for tankers	1,301
Total	123,572

Source: Cone et al. (1980), page 240.

[a] Includes the Strategic Petroleum Reserve

TABLE 18-2. HEEDE ET AL. (1985) FY1984 FEDERAL SUBSIDIES TO OIL (MILLIONS OF 1984 DOLLARS)

Federal tax expenditures	
Intangible drilling costs	890
Percentage depletion allowance	740
Accelerated cost recovery	3,780
Investment tax credits	1,890
Total tax expenditures	*7,300*
Federal agency outlays[a]	*1,270*
Total Federal oil subsidies	**8,570**

Source: Heede et al. (1985), page 12.

[a] Includes expenditures from the following agencies: Department of Energy, Army Corps of Engineers, Environmental Protection Agency, Naval Petroleum and Oil Shale Reserves, Internal Revenue Service, Minerals Management Service, Coast Guard, Strategic Petroleum Reserve, Bureau of Land Management, United States Geological Survey, and Federal Energy Regulatory Commission. Detailed estimates for each agency were not provided in the report.

TABLE 18-3. EIA ESTIMATES OF FY1992 AND FY 1999 OIL SUBSIDY ELEMENTS IN FEDERAL PROGRAMS ON A BUDGET OUTLAY BASIS (MILLIONS OF 1992 OR 1999 DOLLARS)

Type of subsidy	**1992** (10^6 1992 $)	**1999** (10^6 1999 $)
Income tax expenditures[a]	395	263
LIHEAP[b]	262	n.e.
Cost of regulators[c] /direct expenditures	215	255
Excise tax contributions without offsetting liabilities[d]	(3,132)	n.e.
Research and development	75	49
Total Federal subsidies	**(2,185)**	**567**

Sources: 1992 data from EIA (1992) p. 7; 1999 data from EIA (2000) p. 54.

[a] Most of the EIA (1992) estimates of tax expenditures are taken from the Federal budget and from the Joint Committee on Taxation.

[b] The Low Income Housing Energy Assistance Program (LIHEAP) disburses money to the States for the purpose of providing assistance to approximately 5.8 million low-income households for payment of utility bills and weatherization of residences. In FY1992, LIHEAP totaled $1.1 billion in outlays. EIA (1992) estimates that approximately $262 million of this can be attributed to petroleum products (pages 7, 11-12). See Appendix A for details.

[c] "Cost of regulators" in the 1992 report, "direct expenditures" in the 1999/2000 reports. The cost of regulators includes the Office of Surface Mining Reclamation and Enforcement and the Department of the Interior minerals management programs.

[d] See the discussion in the text.

TABLE 18-4. KOPLOW (1993) ESTIMATES OF FY1989 FEDERAL SUBSIDIES TO OIL (MILLIONS OF 1989 DOLLARS)

Tax benefit subsidy allocations	Status[a]	Low	High
Tax credits			
Alternative fuel production credit	active	2.5	5.0
ITCs: new machinery and equipment	residual	242.4	616.8
R&D tax credit	active	28.3	72.0
Other reductions in the effective tax rate			
Activities or products exempt from taxation			
Tax exempt bond issues: pollution control	residual	148.8	181.5
Tax exempt bond issues: seaports, etc.	narrowed	52.6	53.5
Reductions in the effective taxable basis			
Expensing of costs normally capitalized			
Expensing of long-term R&D	active	50.9	79.2
Expensing of oil & gas exploration and development	narrowed	(44.3)	(204.5)
Expensing of tertiary injectants	active	20.0	20.0
Accelerated depreciation of certain assets			
ACRS/accelerated depreciation of machinery and equipment	residual	873.8	2,996.6
Deferral of required income tax payments			
Deferral of tax on shipping companies	active	6.3	60.0
Special deductions			
Percentage of depletion benefits	narrowed	245.1	333.1
Special definitions of the taxable entity			
Benefits due to special congressional exemptions			
Passive loss restrictions	active	92.0	204.5
Special treatment of Alaskan national corporations	residual	102.4	186.9
Foreign research expense, offset of domestic income	active	0.0	0.1
Benefits due to transfer pricing			
Sale harbor leasing		(24.9)	(51.2)
Total tax benefit subsidy allocations		**1,795.9**	**4,553.5**

Agency spending, loans & loan guarantees	Status	Low	High
Executive Branch			
International Development Assistance: multilateral development banks	active	14.3	14.3
Department of Defense			
Army Corps of Engineers civil program	active	417.7	417.7
Navy Supervisor of Salvage	active	0.0	18.5
Department of Energy			
Energy R&D, waste management and administration	active	120.8	120.8
Strategic Petroleum Reserves	active	1,736.7	2,061.9
Energy Information Administration	active	31.0	31.0
Federal Energy Regulatory Commission	active	(0.4)	(0.4)
Naval Petroleum and Oil Shale Reserves	active	0.0	103.9
Department of Health and Human Services			
Family Support Administration: LIHEAP	active	347.7	347.7
Department of the Interior			
Minerals Management Service	active	93.1	93.1
Department of Transportation			
Coast Guard	active	406.2	406.2
Maritime Administration	active	111.3	111.3
Federal Railroad Administration	active	0.8	1.5
Independent Agencies			
Export-Import Bank	active	85.1	98.7
Total government support		**3,364.3**	**3,826.2**

Total Federal subsidies to oil in FY 1989	Low	High
Tax benefits plus government support	5,160.2	8,379.7

Source: Koplow (1993), Appendix A-8, A-9.

a *Active* refers to those policies that were still in effect in 1989.
Residual refers to those policies which were repealed or expired before 1989, but which still affected tax expenditures in 1989 on account of transitional rules, or stored credits.
Narrowed refers to those provisions which were still in effect in 1989, but for which eligibility had been tightened.

TABLE 18-5. LOPER (1994) ESTIMATES OF 1991 STATE AND LOCAL TAXATION OF PETROLEUM (MILLIONS OF 1991 DOLLARS)

Category	Petroleum				
	Highway	*Home*	*Industry.*	*Office*	*Totals*
1. Energy tax revenues	22,003	51	251	236	22,541
2. User fee revenues (included in above)	21,368	36	110	26	21,540
3. General sales tax revenues	2,168[b]	232	861	339	3,600
4. Net energy tax subsidies[a]	(2,677)	(467)	(733)	(190)	(4,067)

Source: Loper (1994), page 46.

[a] Negative numbers represent under-taxation. For two reasons, the net energy tax subsidies shown here cannot be calculated from the data shown in this table, or for that matter, from the data shown in Loper (1994). First, the net energy tax subsidy is the difference between net energy tax revenues and revenues that would have been generated had energy been taxed at the general sales-tax rate, and neither this table nor Loper's report show the latter. Second, the net energy tax revenues are not exactly equal to line 1 minus 2 plus line 3 (as one might expect on the basis of Loper's method), because "of the different expenditure bases used to calculate revenues for each tax category. In particular, energy tax revenues [and] user fee revenues.. are based on energy expenditures that exclude both energy and general sales taxes, [whereas] general sales tax revenue" are based on energy expenditures excluding sales taxes, but including energy taxes.. (Loper, 1994, p. 46).

[b] In Report #17 of this social-cost series, we use data from the U.S. Census to estimate that in 1991, sales taxes on highway fuels and lubricants generated $2.18 billion in sales-tax revenues. This is virtually identical to Loper's estimate of $2.17 billion.

TABLE 18-6. GREEN SCISSORS (2004B) ESTIMATES OF EXISTING TAX-BREAK SUBSIDIES TO THE OIL INDUSTRY IN 2002

Type of tax break	Cost/yr (10^6 $)
Enhanced oil recovery	280
Intangible drilling costs	920
Non-conventional fuel production credit	900
Passive loss	20
Percentage depletion allowance for fossil fuels	440
Total tax breaks	*2,560*

Source: Green Scissors (2004b).

TABLE 18-7. OUR ESTIMATES OF U.S. FEDERAL CORPORATE INCOME TAX RATES, INCOME-YEAR 1991

PART A: CORPORATE INCOME TAXES OF ACTIVE CORPORATIONS (10^3 1991 DOLLARS)

Industry Group	Net income	Taxable Income	Income Tax Before credits	Income Tax After Credits
Agriculture, forestry, and fishing	*3,774,209*	*1,875,241*	*520,185*	*473,493*
Mining	*7,721,788*	*4,495,495*	*1,814,367*	*1,041,082*
Oil and gas extraction	5,818,875	3,187,606	1,302,585	645,160
All other mining	1,902,913	1,307,889	511,782	395,922
Construction	*14,965,305*	*6,662,049*	*2,008,680*	*1,722,422*
Heavy construction	3,575,418	2,343,458	800,148	602,173
Manufacturing	*181,884,248*	*152,624,397*	*53,891,094*	*32,104,071*
Petroleum refining	23,747,357	22,605,091	7,927,594	2,826,449
Motor vehicles and equipment	1,123,915	692,399	277,809	201,320
All other manufacturing	157,012,976	129,326,907	45,685,691	29,076,302
Transportation and Public Utilities	*53,590,652*	*47,111,134*	*17,143,124*	*15,793,417*
Wholesale Trade	*29,096,847*	*16,267,870*	*5,340,458*	*4,649,750*
Petroleum and petroleum products	3,270,404	1,832,262	627,077	211,213
Motor vehicles and auto. equip.	1,913,058	1,397,644	498,907	493,011
All other wholesale trade	23,913,385	13,037,964	4,214,474	3,945,526

Retail Trade	*35,151,817*	*23,994,992*	*7,862,574*	*7,343,538*
Gasoline service stations	451,697	201,452	53,083	51,198
Motor vehicle dealers	1,704,165	555,345	159,309	152,368
All other retail trade	32,995,955	23,238,195	7,650,182	7,139,972
Finance, Insurance and Real Estate, Other	*174,249,613*	*80,797,221*	*27,281,531*	*24,850,137*
Services	n.e.	n.e.	n.e.	n.e.
Auto repair and maintenance	1,246,131	584,960	180,171	154,139
Totals				
All industries	535,816,622	350,009,712	121,121,231	92,566,319
Oil industries[a]	33,288,333	27,826,411	9,910,339	3,734,020
Motor-vehicle industries[b]	5,987,269	3,230,348	1,116,196	1,000,838
Oil and vehicle industries	39,275,602	31,056,759	11,026,535	4,734,858
All other industries	496,541,020	318,952,953	110,094,696	87,831,461
Motor-vehicle and motor-fuel related[c]	31,076,325	24,746,152	8,665,043	4,064,016

Source: Internal Revenue Service (1994). The taxes in this table include only the Federal corporate income tax. They do not include any other federal taxes (e.g. excise taxes and other non-income taxes) or any state and local taxes. The data are for "income year" 1991, which refers to corporate accounting periods ending between July 1 1991 and June 30 1992.

[a] Comprises oil and gas extraction, petroleum refining, petroleum and petroleum products, and gasoline service stations.

[b] Comprises motor vehicles and equipment (under manufacturing), motor vehicles and auto equipment (under wholesale trade), motor vehicle dealers, and automobile repair and maintenance.

[c] Equal to the amount for each motor-vehicle or oil industry multiplied by the fraction of the amount in the industry that actually pertains to motor-vehicles or motor fuels, summed for all motor-vehicle or oil industries. For example, petroleum refineries produce products other than highway fuels, which in this accounting we wish to exclude. We count 100% of motor-vehicle industries as being motor-vehicle related (actually, 99%of motor-vehicle dealers, because these sell a few off-highway vehicles), and the following fractions of oil industries as being motor-fuel related: 30% of oil and gas extraction, 78% of petroleum refining, 57% of petroleum and petroleum products (wholesale), and 93% of gasoline service stations. We also

count 38% of heavy construction (the portion we estimate is for streets and roads). The fractions are the same as those used in the analysis of user payments in Report #17, and ultimately are from Report #10 in the social-cost series.

PART B: CORPORATE INCOME TAX RATES, INCOME-YEAR 1991

Industry Group	Tax ÷ Net Income	Tax ÷ Taxable Income	Tax After Credits ÷ Net Income	Tax After Credits ÷ Taxable Income
Agriculture, forestry, and fishing	*13.8%*	*27.7%*	*12.5%*	*25.2%*
Mining	*23.5%*	*40.4%*	*13.5%*	*23.2%*
Oil and gas extraction	22.4%	40.9%	11.1%	20.2%
All other mining	26.9%	39.1%	20.8%	30.3%
Construction	*13.4%*	*30.2%*	*11.5%*	*25.9%*
Heavy construction	22.4%	34.1%	16.8%	25.7%
Manufacturing	*29.6%*	*35.3%*	*17.7%*	*21.0%*
Petroleum refining	33.4%	35.1%	11.9%	12.5%
Motor vehicles and equipment	24.7%	40.1%	17.9%	29.1%
All other manufacturing	29.1%	35.3%	18.5%	22.5%
Transportation and Public Utilities	*32.0%*	*36.4%*	*29.5%*	*33.5%*
Wholesale Trade	*18.4%*	*32.8%*	*16.0%*	*28.6%*
Petroleum and petroleum products	19.2%	34.2%	6.5%	11.5%
Motor vehicles and auto. equip.	26.1%	35.7%	25.8%	35.3%
All other wholesale trade	17.6%	32.3%	16.5%	30.3%

Retail Trade	*22.4%*	*32.8%*	*20.9%*	*30.6%*
Gasoline service stations	11.8%	26.4%	11.3%	25.4%
Motor vehicle dealers	9.3%	28.7%	8.9%	27.4%
All other retail trade	23.2%	32.9%	21.6%	30.7%
Finance, Insurance and Real Estate, and Other	*15.7%*	*33.8%*	*14.3%*	*30.8%*
Services	n.e.	n.e.	n.e.	n.e.
Auto repair and maintenance	14.5%	30.8%	12.4%	26.4%
Overall averages				
All industries	22.6%	34.6%	17.3%	26.4%
Oil industries	29.8%	35.6%	11.2%	13.4%
Motor-vehicle industries	19.7%	35.4%	17.9%	32.0%
Oil and vehicle industries	28.5%	35.6%	12.0%	15.0%
All other industries	22.2%	34.5%	17.7%	27.5%
Vehicle & motor-fuel related	27.9%	35.0%	13.1%	16.4%

Source: Calculated from the data in Part A of the table.

TABLE 18-8. OUR ESTIMATES OF THE EFFECT ON INCOME-TAX PAYMENTS OF PAYING AT THE U. S. AVERAGE RATE (FOR ALL OTHER INDUSTRIES) RATHER THAN THE ACTUAL RATE, INCOME YEAR 1991 (10^3 DOLLARS)

Industry Group	Income tax rate basis[a]			
	Tax ÷ Net Income	Tax ÷ Taxable Income	Tax After Credits ÷ Net Income	Tax After Credits ÷ Taxable Income
	Δ tax	Δ tax	Δ tax after credits	Δ tax after credits
Oil industries	(2,529,541)	(305,348)	2,154,241	3,928,660
Motor-vehicle industries	211,321	(1,160)	58,230	(111,283)
Oil and vehicle industries	(2,318,220)	(306,507)	2,212,470	3,817,377
All other industries	0	0	0	0
Vehicle and motor-fuel related	(1,774,698)	(123,281)	1,432,971	2,750,440

A negative number means a decrease in tax payments; i.e., that taxing at the average rate for all other industries would decrease income-tax payments by the amount shown.

[a] The rate basis used to calculate the effect of changing from the actual rate to the average rate for all other industries. These correspond to the rates calculated in Table 18-7.

TABLE 18-9. CORPORATE INCOME TAXES, RATES, AND "SUBSIDIES," INCOME-YEAR 2000

PART A. TAX RATES, INCOME-YEAR 2000.

Industry Group	Tax ÷ Net Income	Tax ÷ Taxable Income	Tax After Credits ÷ Net Income	Tax After Credits ÷ Taxable Income
All industries	19.9%	35.0%	15.3%	26.8%
Oil industries	31.1%	35.4%	12.7%	14.4%
Motor-vehicle industries	22.8%	36.1%	16.8%	26.6%
Oil and vehicle industries	28.6%	35.6%	13.9%	17.3%
All other industries	19.1%	34.9%	15.4%	28.1%
Vehicle and motor-fuel related	28.6%	35.6%	14.4%	17.9%

Source: Calculated from income and tax data for corporations whose accounting periods ended between July 1 2000 and June 30 2001 (IRS, 2003).

PART B. THE EFFECT ON INCOME-TAX PAYMENTS OF PAYING AT THE U. S. AVERAGE RATE (FOR ALL OTHER INDUSTRIES) RATHER THAN THE ACTUAL RATE, INCOME-YEAR 2000 (10^3 DOLLARS).

Industry Group	Income tax rate basis[a]			
	Tax ÷ Net Income	Tax ÷ Taxable Income	Tax After Credits ÷ Net Income	Tax After Credits ÷ Taxable Income
	Δ tax	Δ tax	Δ tax after credits	Δ tax after credits
Oil industries	(9,348,671)	(302,016)	2,099,162	9,376,047
Motor-vehicle industries	(1,233,426)	(244,529)	(465,005)	330,436
Oil and vehicle industries	(10,582,096)	(546,545)	1,634,157	9,706,483
All other industries	0	0	0	0
Vehicle and motor-fuel related	(8,540,633)	(470,286)	927,156	7,418,725

A negative number means a decrease in tax payments; i.e., that taxing at the average rate for all other industries would decrease income-tax payments by the amount shown.

[a] The rate basis used to calculate the effect of changing from the actual rate to the average rate for all other industries. These correspond to the rates calculated in Part A of this table.

TABLE 18-10. SALES-TAX EXPENDITURES RELATED TO THE USE OF MOTOR VEHICLES

	1990	1991	1994	2000	2004
Sales or receipts from (10^6 $):[a]					
1. Retail of motor vehicles	297,496	285,604	407,310	557,858	670,048
2. Retail of auto parts and supplies	64,271	61,745	68,810	72,931	68,813
3. Retail of fuels and lubricants	122,827	121,755	126,293	176,903	213,051
4. Total retail sales (Line1+Line2+Line3)	*484,594*	*469,105*	*602,413*	*807,692*	*951,913*
5. Wholesale of motor vehicles and parts (SIC 501)	365,583	379,576	454,085	698,780	935,176
6. Automotive service sector (SIC 75)	73,722	71,542	91,287	139,831	185,406
7. Total motor-vehicle related sales or receipts (Line4+Line5+Line6)	*923,900*	*920,223*	*1,147,784*	*1,646,302*	*2,072,494*
Sales tax as a fraction of:[a]					
8. Retail sales of motor vehicles	0.025	0.026	0.024	0.025	0.024
9. Retail sales of auto parts and supplies	0.039	0.040	0.044	0.051	0.056
10. Retail sales of fuels and lubricants	0.017	0.018	0.019	0.020	0.022
*11. All retail sales motor vehicles, parts, and fuels (Line15*1000÷Line4)*	*0.025*	*0.026*	*0.025*	*0.026*	*0.026*
12. Wholesale of motor vehicles and parts (SIC 501)	0.005	0.005	0.005	0.005	0.005
13. Automotive service receipts (SIC 75)	0.032	0.033	0.036	0.042	0.046
*14. All motor-vehicle related sales or receipts (Line18*1000÷Line7)*	*0.018*	*0.018*	*0.018*	*0.018*	*0.018*
General sales taxes from (10^9 $):					
15. Retail sales of vehicles, parts, & fuel (Line1*Line8+Line2*Line9+Line3*Line10)÷1000	11.97	12.04	15.34	21.03	24.88
16. Wholesale of motor vehicles and parts (SIC 501) (Line5*Line12÷1000)	1.83	1.90	2.27	3.49	4.68
17. Automotive service sector (SIC 75) (Line6*Line13÷1000)	2.38	2.37	3.26	5.81	8.51
18. All motor-vehicle related sales or receipts (Line15+Line16+Line17)	*16.19*	*16.31*	*20.88*	*30.33*	*38.06*
*19. Total with low adjustment (Line18*LA)*[b]	16.19	16.31	20.88	30.33	38.06
*20. Total with high adjustment (Line18*HA)*[b]	19.42	19.57	25.05	36.40	45.68

Table continued on next page.

TABLE 18-10. SALES-TAX EXPENDITURES, CONTINUED

	1990	1991	1994	2000	2004
Baseline national sales-tax rates					
21. Posted state and local average rate[c]	0.058	0.059	0.061	0.064	0.067
22. Sales tax fraction in retail sector[d]	0.036	0.036	0.037	0.039	0.041
23. Sales-tax fraction in retail sector, wholesale sector, and service-sector SICs subject to sales tax[e]	0.020	0.020	0.021	0.023	0.025
24. Sales-tax fraction in retail, wholesale, and service sectors[f]	0.017	0.016	0.017	0.018	0.019
25. Sales-tax receipts as a fraction of final national sales[g]	0.021	0.021	0.020	0.022	0.020
Tax expenditures based on (10^9 $):					
26L. Posted state and local average rates, low taxes (Line4*Line21÷1000-Line15*LA)	16.32	15.62	21.25	31.06	39.01
26H. Posted state and local average rates, high taxes (Line4*Line21÷1000-Line15*HA)	13.92	13.21	18.19	26.85	34.03
27L. Sales-tax fraction in the retail sector (Line4*Line22÷1000-Line15)*LA	5.47	4.70	7.03	10.66	13.80
27H. Sales-tax fraction in the retail sector (Line4*Line22÷1000-Line15)*HA	6.57	5.64	8.43	12.79	16.56
28L. Sales-tax fraction in the retail sector, wholesale sector, and service-sector SICs subject to sales tax (Line7*Line23÷1000-Line18)*LA	2.08	1.64	2.84	7.24	12.93
28H. Sales-tax fraction in the retail sector, wholesale sector, and service-sector SICs subject to sales tax (Line7*Line23÷1000-Line18)*HA	2.49	1.97	3.40	8.69	15.52
29L. Sales-tax fraction in the retail, wholesale, and service sectors (Line7*Line24÷1000-Line18)*LA	-0.90	-1.30	-1.29	-0.53	0.72
29H. Sales-tax fraction in the retail, wholesale, and service sectors (Line7*Line24÷1000-Line18)*HA	-1.08	-1.56	-1.55	-0.63	0.87
30L. Sales-tax receipts as a fraction of final national sales of all goods and services , low taxes ([Line4+Line6]*Line25 ÷1000-[Line15+Line17]*LA)[h]	-2.62	-3.30	-4.49	-6.43	-10.40
30H. Sales-tax receipts as a fraction of final national sales of all goods and services , high taxes ([Line4+Line6]*Line25 ÷1000-[Line15+Line17]*HA)[h]	-5.50	-6.18	-8.21	-11.79	-17.08

SIC = Standard Industrial Classification, a scheme for classifying business establishments by the type of activity they are engaged in (Office of Management and Budget,1987); LA = low adjustment factor (1.0); HA = high adjustment factor (1.2), where the adjustment factor accounts for the possibility of under-reporting of taxes to U. S. Census (see Report #17). An "L" or an "H" after a row number (e.g., "28H") signifies the "low-adjustment" or the "high-adjustment" case.

Note that lines 1-20 of this table are identical to Table 17-15 in Report #17. Therefore, see the discussion of Table 17-15, in Report #17, for explanation of the methods and data pertinent to lines 1-20 of this table. The remaining lines in this table (21-30) are documented here.

[a] See Table 17-15 in Report #17.

[b] As discussed in Report #17, it is possible that respondents to the Census' surveys underreport sales taxes, but we assume not by more than 20%.

[c] Loper (1994) states that the income-weighted national average state + local sales tax rate was about 6% in 1993. We assume that this has changed about 1%/year.

[d] Sales-tax fractions in SICs 52-59 (the Retail Trade Division of the SIC) are from the sources used to estimate the values for lines 8 to 10 (see discussion of Table 17-15 in Report #17). .

[e] Equal to $\frac{\sum_{SIC} SF_{SIC} \cdot TS_{SIC}}{\sum_{SIC} TS_{SIC}}$, where SF_{SIC} is the sales-tax fraction in classification *SIC* and TS_{SIC} is total sales in classification *SIC*. The relevant SICs are 50 and 51 (the Wholesale Trade Division of the SIC), 52-59 (the Retail Trade Division), and 70 (except 704), 72, 75, 76, and 79 (the service-sector SICs for which sales taxes are reported). The data for the parameters SF_{SIC} and TS_{SIC} are from the same sources used to estimate the values for lines 1 to 3, 5, 6, 8 to 10, 12, and 13 (see discussion of Table 17-15 in Report #17).

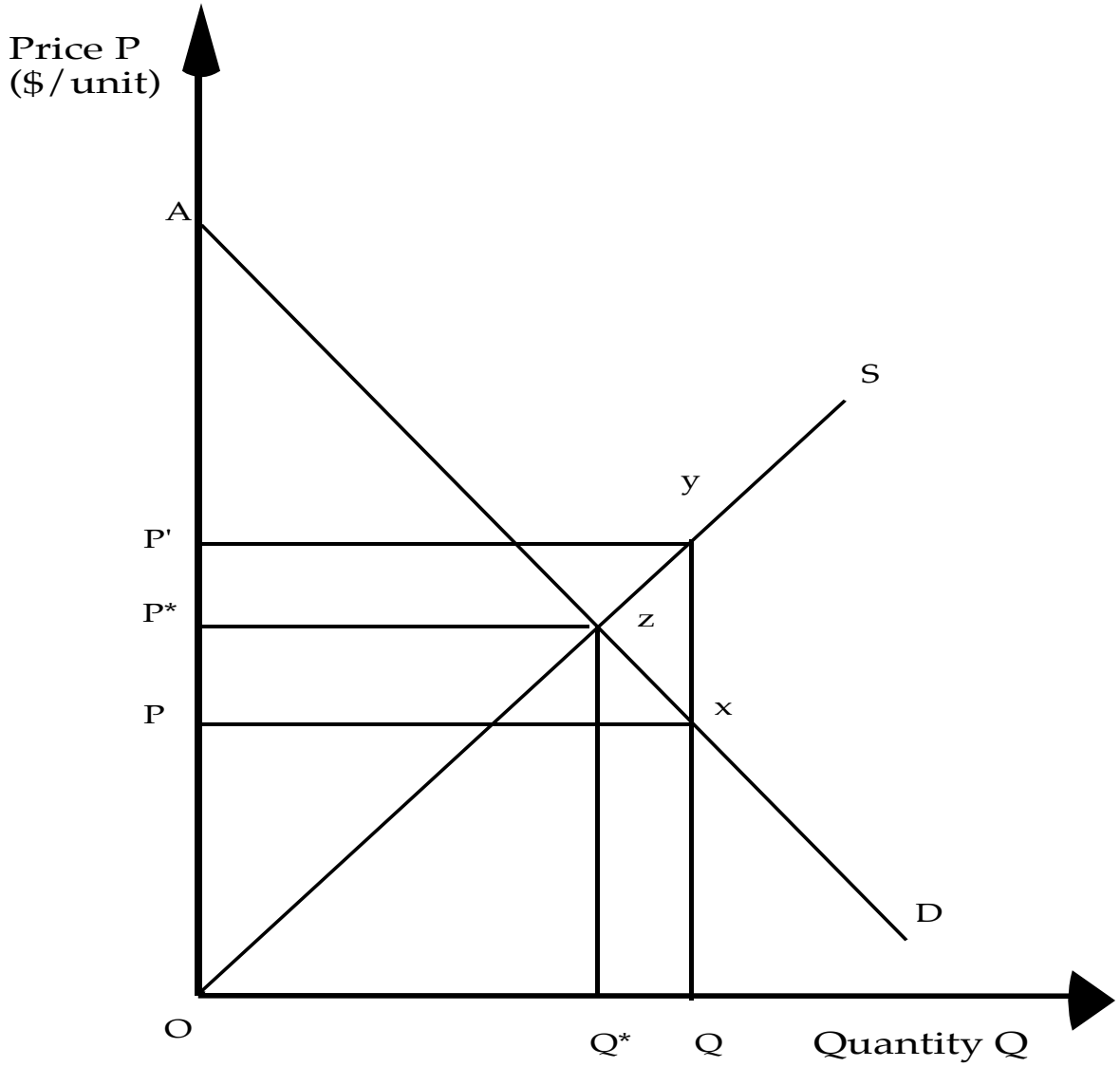
[f] Same as line 23 (see table note *e*) except that for the term $\sum_{SIC} TS_{SIC}$ in the denominator the relevant service-sector SICs are all those from 70 to 89 not exempt from the Federal income tax.

[g] Equal to actual sales and general-use taxes received by state and local governments divided by final national sales to domestic purchasers in the U. S. Sales-tax receipts through 1995 are from the Bureau of the Census, *National Totals of State, and Local Tax Revenue, January 1988-March 1996*, (1997); sales-tax receipts from 1996 to 2004 are from the Bureau of the Census state and local government finances (www.census.gov/govs/www/estimate.html), which is essentially the same as the source used for the data through 1995. (Note that the Census government finance statistics are reported for fiscal years [FY]. To convert the Census fiscal-year data to calendar-year [CY] estimates, I assumed that $CY_Y = 0.6FY_Y + 0.4FY_{Y+1}$, where Y is the year. This required that we estimate FY_{2005} values.)

Final sales to domestic purchasers are equal to gross domestic product plus net imports of goods and services less the change in business inventories. The data on final sales are from Table 1.4.5, "Relation of Gross Domestic Product, Gross Domestic Purchases, and Final Sales to Domestic Purchasers," of the NIPA accounts (www.bea.gov/bea/dn/nipaweb/index.asp).

[h] Because this estimate of the tax expenditure is based on sales-tax receipts as a fraction of final national sales, we do not include sales and taxes in the wholesale sector.

FIGURE 18-1. THE IMPACT OF A PRICE SUBSIDY ON WELFARE



APPENDIX 18-A: THE LOW-INCOME HOME ENERGY ASSISTANCE PROGRAM (LIHEAP) (DEPARTMENT OF HEALTH AND HUMAN SERVICES, FAMILY SUPPORT ADMINISTRATION)

The Low-Income Home Assistance Program (LIHEAP) is carried out through grants administered to States and Indian tribal organizations to aid low-income households with high-energy costs. The program was developed primarily to maintain the standard of living, and in some cases the survival, of people living in low income households. Approximately 5.8 million low-income households receive assistance from LIHEAP to help pay their utility bills and weatherize their homes. Roughly 63 percent of LIHEAP funds are used for winter heating, approximately 18 percent of which is from petroleum-based sources. Of the remaining 37 percent of LIHEAP funds, 1.5 percent is used for cooling, 12 percent for year-round aid, 9 percent for administration, 8 percent for weatherization, and 3 percent for use in non-energy programs (U.S. Department of Health and Human Services, 1991, as cited in EIA, 1992).

The overall impacts of this program on energy consumption are difficult to quantify. The average LIHEAP household consumed about 2.3 percent more energy (including all fuels) that did the average U.S. household, and 10 percent more than did the average low-income household.[25] However, as the EIA notes, this higher average may not be entirely due to the subsidy. It is possible that, on average, LIHEAP recipients tend to live in regions of the country with more severe winters that the U.S. population in general, and they may live in homes with poor insulation and inefficient appliances.

The effect of LIHEAP on oil consumption is even more unclear. On average, LIHEAP recipients consume three percent less energy derived from oil than the national average, and four percent more than the average low-income household. When sampling error is taken into account, it is likely that the annual energy consumption from oil from all three categories are about equal. When the other factors mentioned above are considered (region of country and poor insulation), it is unclear what effect LIHEAP has had on oil consumption.

The LIHEAP program does not discriminate among energy sources—it even is used to promote end-use efficiency through weatherization. The primary criteria for qualifying for assistance is need, not fuel used. LIHEAP only favors the oil industry over alternative fuels to the extent that the alternative fuels are not a common source of energy for home heating. However, it does not appear to create any barriers which would prevent alternative fuels from entering this market.

[25] There figures include all fuels and are based on household BTU consumption.