PN. ABJ-727

"The Hidden Cost of Public Expenditure"

by

Dan Usher

May 1989

Paper prepared for the Sequoia Institute
Seminar, "More Taxing than Taxes?,
May 25, 1989
Washington, D.C.

The Hidden Cost of Public Expenditure

The full cost of any good, service or transfer provided by the public sector is the sum of the resource cost and of other costs which may, collectively and for the want of a better term, be called hidden costs. Resource cost is the minimum purchase price of what the public sector provides. The resource cost of a road is payment for gravel, usage of machines, labour, etc. The resource cost of a transfer, such as unemployment insurance or the old age pension, is necessarily zero because no resources are used up when A pays a dollar to B. The hidden costs of public expenditures include,

- overhead cost of tax collection and provision of services
- deadweight loss in avoiding taxation due to the tax-induced shift in resources from more taxed to less taxed activities
- concealment cost incurred by the putative tax-payer in tax evasion and tax avoidance
- magnification of deadweight loss in transfer programs
- deadweight loss and waste of resources in seeking eligibility for transfers as people alter their behaviour in light of the prospect of entitlement to public largess
- rent-seeking which is a special case of the above
- public sector inefficiency
- corruption, which is the private sector counterpart of ordinary crime
- intimidation cost of the criminal justice system in constraining officials to behave honestly and citizens to respect the law in their dealings with the government.

To say that public expenditures are costly, or more costly than one might at first suppose, is not to say that public expenditures are unwarranted. Any civilized and prosperous society requires a large public

sector. Among the objects of government expenditure are the three items on Adam Smith's classic list - 1) "the duty of protecting society from the violence and invasion of other societies" 2)"the duty of protecting, as far as is possible every member of society from the injustice and oppression of every other member of it, or the duty of establishing an exact administration of justice", and 3) "the duty of erecting and maintaining certain public works and public institutions which it can never be for the interest of any individual, or small number of individuals to maintain" - together with a number of items that have become essential aspects of governments since Adam Smith's day. Smith's third item can be generalized to the provision of "public goods". In addition, any modern government must deal with externalities - especially the protection of the environment and the control of potentially dangerous medicines. Citizens in a democracy demand a certain amount of redistribution and some public provision of services as insurance against the most devastating effects of poverty.

Nor should it be supposed that actual markets are in any sense ideal for the production and distribution of goods. Actual markets never work as well as the markets described in models of perfect competition. The local grocery store has a bit of monopoly power. Efforts by workers and by firms to prevent accidents on the job are likely to be inadequate. Externalities crop up everywhere because everybody is affected to some extent by the activity of his neighbours. Advertising is often harmful on balance. Much of the activity of the businessman is predatory. Vast resources are wasted in bargaining. Speculation makes little else but millionaires. Large firms exercise dangerous monopoly power and influence over the state. There is no corner of the private sector that an omniscient, omnipotent and benevolent dictator could not improve to some extent. There is little in the private

sector that is not tainted with inefficiency, or that might not be subordinated to some higher public interest.

The study of the costs of the public sector is intended to assist in striking a proper balance between the undeniable benefits of public expenditure, including the correction of certain failures of the market, and the harms that ensue when fallible men are empowered to regulate the economy and to produce goods and service in the public sector. A particular activity belongs in the public sector when total benefit exceed total cost. The amount that should be spent on any particular activity is a balancing of marginal benefit and marginal cost. In each calculation, the benefit is the advantage, if any, of public sector activity as compared with what the private sector would do, and the corresponding cost is the full list as set out in this paper. Over the last fifty years, the public sector has grown significantly in virtually every country in the world. Nothing in this paper can be interpreted as implying that such growth was entirely unwarranted. However, some costs rise significantly with the size of the public sector. The larger the public sector, the more important it becomes to scrutinize every activity of government to ensure that it is still worthwhile when all costs - resource costs and hidden costs together - are taken into account.

Any assessment of the costs and benefits of public sector activity requires a criterion or objective for the public sector. Talk of such a criterion does not commit one to a Hegelian view of the state as an entity with a higher objective than that of its citizens. The criterion may be the citizen's objective for the state rather than the state's objective for itself. But there must be a criterion somewhere if policy is to be counted as effective or otherwise. Cost must be a source of harm. One cannot speak of harm, without at the same time implying that some social objective is

unattained or attained to a lesser degree than might otherwise be the case. Assessment of the benefit side of public expenditure would need to take account of the post-tax and post-transfer distribution of income among citizens as well as of the magnitude of national income, for the benefits of transfer programs can be evaluated in no other way.[1] As my purpose in this paper is to enumerate hidden costs and provide examples of how they arise, I can get by with a cruder working criterion, which is the simple maximization of national income as a whole. "Costs" for this purpose are reductions in total real national income.

(a) Resource Cost: By resource cost, I mean the minimal cost of public activity to the government, abstracting from the effects of dishonesty or want of incentive on the part of public officials and ignoring costs associated with the private sector response to taxation, public services and transfers. The resource cost of running a hospital is what must be paid to the doctors, nurses, janitors, sellers of medical equipment, the electricity company and so on to keep the hospital running. Resource cost would include all purchases of goods and services, regardless of whether these are acquired by contract (as when the government hires a lawyer) or by employment (as when an engineer becomes part of the civil service), and regardless of whether goods are bought (as when the army purchases a tank) or made (as when a prototype of a new product is constructed in the National Research Council.)

(b) Overhead Cost: The term "overhead cost" may be more or less extensive in its coverage. It may be restricted to the fixed cost of the entire public sector, such as Parliament and the Ministry of National Revenue, but it could be broadened to cover the otherwise unallocatable costs of the Ministries of Health and Transport in planning for and establishing specific programs. Overhead costs vary considerably. The old age pension is relatively

inexpensive to administer, for it is obvious who is old and who is not. The subsidization of investment in select firms is more expensive because it is by no means obvious who the appropriate recipients of such programs should be. The provision of welfare to the poor is also expensive - perhaps as much as half the transfer - because a staff of highly-paid professionals is required to determine eligibility and to watch for cheaters[2]. Militar expenditure could be categorized as resource cost or as overhead cost.

(c) Deadweight Loss in Taxation[3]: Deadweight loss is best introduced by an example. Consider a carpenter whose house requires plumbing and a plumber whose house requires carpentry. Both parties can do both jobs, but each is naturally best at his own trade. The carpenter could do the job of plumbing in 10 hours, but the plumber can do it in 6 hours. Similarly, the plumber could do the job of carpentry in 10 hours, but the carpenter can do it in 6 hours. The two jobs may be allocated on a do-it-yourself basis, by barter or by purchase. Obviously the efficient procedures are purchase and barter, for these procedures require a total of twelve hours of work for the two jobs together instead of the twenty hours that would be required if each party did his own repairs. We rule out barter by supposing that the parties are unaware of one another's requirements. That leaves a choice between purchase and do-it-yourself. Suppose the wages of carpenters and plumbers are both $20 per hour, so that the cost of each job is $120. Suppose also that the rate of income tax is 50%. The tax has no effect on time required to complete both jobs on a do-it-yourself basis. But with a 50% tax, each party would need to work 12 hours to earn the $240 that is required to pay for the carpentry or the plumbing out of after-tax earnings. It would, therefore, be in each party's interest to do the job himself in 10 hours, despite the fact that he could hire somebody else to do it in 6 hours. The effect of the tax

in this instance is to induce each party to waste 4 hours of labour, with a social value of \$80. In total, 8 hours or \$160 worth of output or leisure is lost, and not one penny of tax is collected on the transaction. This \$160 is just as much a cost of the public service financed by the tax as is another \$160 that is actually paid for goods purchased by the government.

Generalizing this example, suppose there are only two goods in the economy, one taxed and the other not. Let x be the quantity produced and consumed per head of the taxed good, let $P^D(x)$ be its marginal valuation in terms of the untaxed good and let $P^S(x)$ be its marginal cost in terms of the untaxed good; $P^S(x)$ is the extra amount of the untaxed good that could be produced with the resources that are released when one less unit of the taxed good is produced. In the absence of tax, the demand and supply prices would be the same. With a tax of T per unit, the market equilibrium output of the taxed good is x^0 such that

$$P^D(x^0) - P^S(x^0) = T \tag{1}$$

The market for the taxed good is illustrated in Figure 1, with price on the vertical axis and quantity on the horizontal axis. As shown on the figure, a tax of T yields a revenue of $[P^D(x^0) - P^S(x^0)]x^0$ which is represented by the area d + c. When the tax is increased from T to $T + \Delta T$, the output falls from x^0 to $x^0 - \Delta x$, the demand price rises to $P^D(x^0 - \Delta x)$, the supply price falls to $P^S(x^0 - \Delta x)$, and tax revenue becomes $[P^D(x^0 - \Delta x) - P^S(x^0 - \Delta x)](x^0 - \Delta x)$ which is represented by the area a + b + d. The change in tax revenue, called ΔR, is equal to a + b - c. The effect on the welfare of the consumer, called ΔW, is the sum of two parts, (a) the increase in his tax which is a + b - c and which, with stable demand and supply curves, must correspond to a reduction in his consumption of the untaxed good, and (b) the loss of consumers' and producers' surplus associated with the tax-induced

The Marginal Revenue (a + b - c) and Marginal Deadweight Loss (c)

Resulting From an Increase in the Tax Rate From T to T + ΔT.

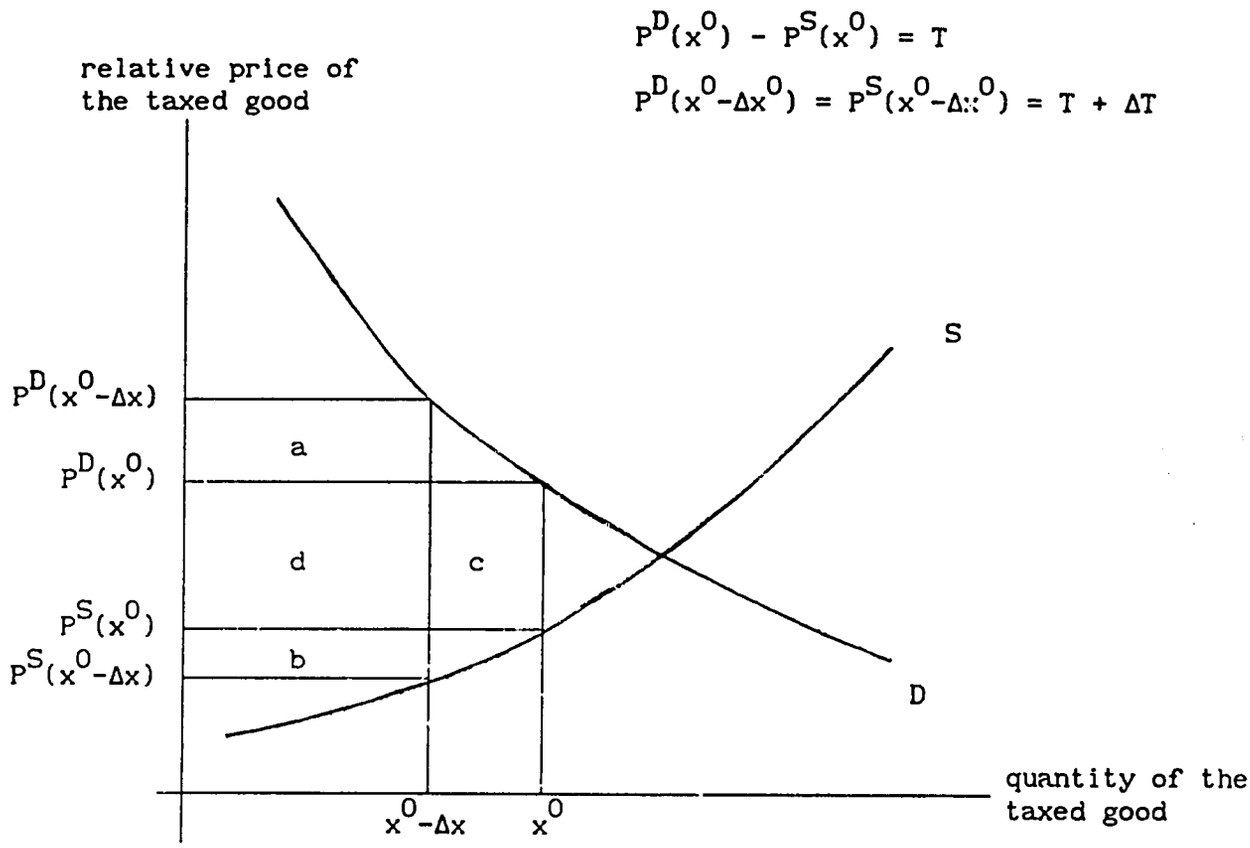


Figure 1

reduction in the consumption of the taxed good. The consumer's marginal reallocation of purchasing power from the taxed to the untaxed good is socially-disadvantageous because the marginal valuation of the taxed in terms of the untaxed good, $P^D(x^0)$, exceeds its marginal cost, $P^S(x^0)$. This second effect, measured by the area of the box c on the diagram, is the marginal deadweight loss associated with the marginal increase in tax; it is similar to the tax-induced waste of 8 hours of labour in our carpenter and plumber example.

Pulling all this together, we see that the ratio of the full marginal cost to consumers to marginal revenue generated by a small increase in tax is

$$\frac{\Delta W}{\Delta R} = \frac{\Delta \text{ tax paid} + \Delta \text{ deadweight loss}}{\Delta \text{ tax paid}}$$

$$= \frac{(a + b - c) + c}{a + b - c} = \frac{a + b}{a + b - c}$$

$$= \text{(as may be seen from Figure 5)} \frac{1}{1 - \frac{T\Delta X}{X\Delta T}}$$

$$= \frac{1}{1 - \varepsilon^T} \qquad (2)$$

where ε^T is defined as the absolute value of the elasticity of the tax base[4] x, with respect to the tax rate T. It is easily shown that[5]

$$\varepsilon^T = \frac{T\varepsilon^S\varepsilon^D}{P^D\varepsilon^S + P^S\varepsilon^D} \qquad (3)$$

where ε^D is the absolute value of the elasticity of demand for the taxed good and ε^S is the corresponding elasticity of supply. With the aid of equation (15), the ratio $\Delta W/\Delta R$ can now be determined from the values of T, P^D, P^S, ε^S and ε^D.

It follows immediately from equation (3) that there is no deadweight loss to taxation if either $T = 0$ or $\varepsilon^S = 0$ or $\varepsilon^D = 0$, for in each of these

three cases the value represented by the area of the box c would be just equal to zero. The conditions $\varepsilon^S = 0$ and $\varepsilon^D = 0$ correspond to a situation in our carpenter and plumber example where their purchases of taxed goods are independent of the rate of tax because the carpenter and the plumber cannot do one anothers jobs at all. On the other hand, it is easy enough to pick plausible values of ε^S, ε^D and T for which the ratio $\Delta W/\Delta R$ is very large. For example, the set $\varepsilon^S = \frac{1}{2}$, $\varepsilon^D = \frac{1}{2}$, and $T = P^S$ (which is equivalent to a sales tax of 50% of the retail price) yields a value of $\Delta W/\Delta R$ of 1.2, the set of $\varepsilon^S = 1$, $\varepsilon^D = 1$ and $T = P^S$ yields a value of $\Delta W/\Delta R$ of 1.5, and the set $\varepsilon^S = 10$, $\varepsilon^D = 2$ and $T = P^S$ yields a value of $\Delta W/\Delta R$ of 11, signifying that the full social cost of taxation would be eleven times the tax revenue in that case!

In fact, a not unreasonable choice of ε^S, ε^D and T could produce a negative value of $\Delta W/\Delta R$, which, paradoxical as this may at first appear, has a simple economic interpretation. As is evident from Figure 2, the marginal deadweight loss (c) associated with a marginal increase in the tax must become progressively larger as the tax itself increases, but the corresponding marginal revenue (a + b - c) becomes progressively smaller until it eventually turns negative. From here on, there is everything to lose and nothing to gain from further increases in the tax rate, for a greater deadweight loss and a smaller revenue would be generated. The value of $\Delta W/\Delta R$ becomes negative when this occurs.

The value of $\Delta W/\Delta R$ can be read off the Laffer curve as illustrated in Figure 2. The curve itself is a U-shaped relationship between total revenue, measured on the vertical axis, and the tax rate measured on the horizontal axis. Think of the Laffer curve in Figure 2 as pertaining to the market described in Figure 1. By definition, total revenue, R, is the product of the tax base, x, and the tax rate, T. Consequently, the increase in revenue

resulting from an increase in T is

$$\frac{dR}{dT} = x + T\frac{dx}{dT} = x(1 - \varepsilon^T) \tag{4}$$

and the elasticity of the Laffer curve is

$$\frac{T}{R}\frac{dR}{dT} = 1 - \varepsilon^T \tag{5}$$

which is the inverse of the marginal social cost of tax revenue, $\Delta W/\Delta R$. The marginal social cost of tax revenue is positive and growing on the good (left) side of the Laffer curve. It rises to infinity at the top of the curve, signifying that a further increase in the rate of tax has costs but no benefits. It is negative on the wrong side of the Laffer curve signifying that a reduction in the rate of tax would have benefits but no costs.

The contraction of the tax base that accounts for the hump in the Laffer curve and for the corresponding deadweight loss in taxation is a consequence of the fact that not all goods are taxed at the same rate. If all goods were taxed equally, there would be no diversion of purchasing power from taxed to untaxed goods, no marginal deadweight loss and no discrepancy between ΔW and ΔR in equation (2). We have been considering an example with only two goods, one taxed, the other not. The argument applies directly to the contrast between ordinary goods and services that are subject to tax (income tax, excise taxes, etc.) and leisure, do-it-yourself activities and goods acquired by barter that are exempt from tax. The argument can be extended to a market with many goods that are taxed at different rates.

Among the most important of the disparities in tax rates is the double taxation of saving in the income tax. If the price of apples is and will remain at 50¢ each and if the rate of interest, interpreted as a reflection of the marginal rate of substitution in production between present and future goods, is 5% a year, then the social cost, P^S, of providing one apple thirty

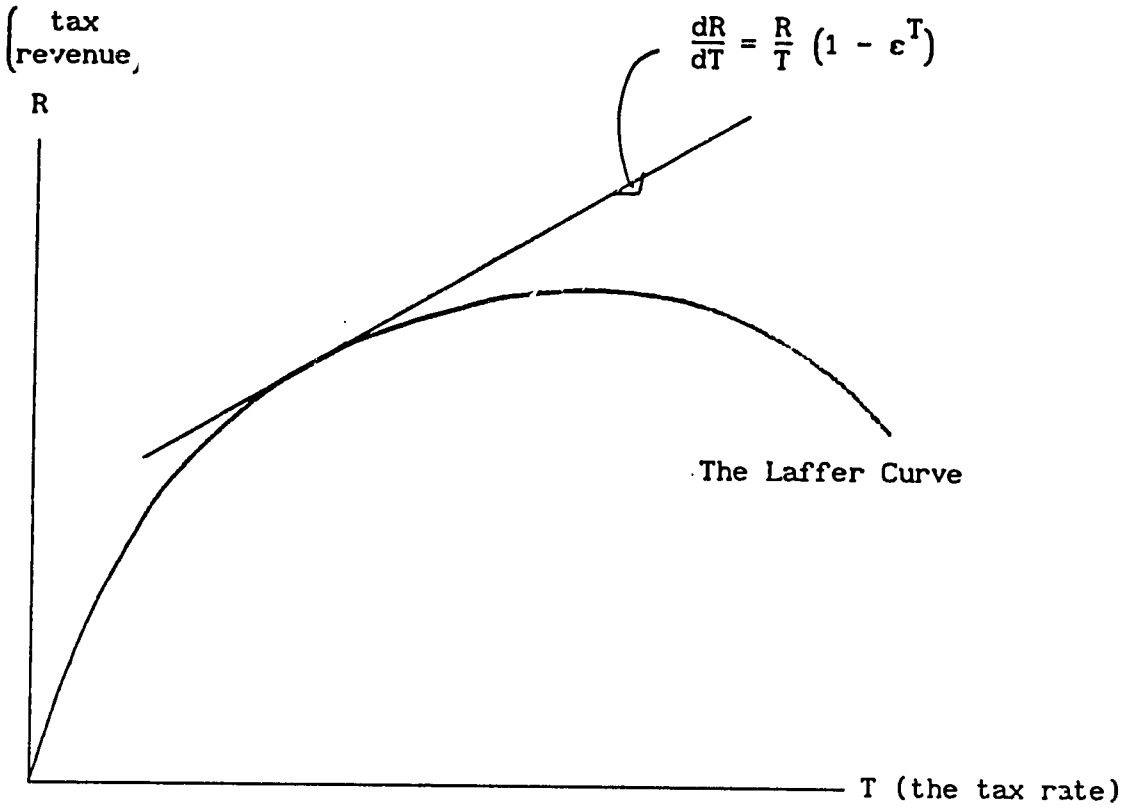

tax revenue
R
$\frac{dR}{dT} = \frac{R}{T}\left(1 - \varepsilon^{T}\right)$
The Laffer Curve
T (the tax rate)

Figure 2

years hence is 11.16¢; $P^S = 50e^{-.05x30} = 11.16$. When the rate of the income tax is 50%, a person who wishes to put aside enough money today to buy himself an apple thirty years hence has to invest considerably more than 11.16¢. Ignoring transaction cost, a firm that can earn 5% on its capital is prepared to pay that rate on its loans, and the saver can expect to earn 5% on his money. But the annual interest on one's saving is counted as part of one's income and subject to the income tax. Thus, if one can earn 5% before tax, he can only earn 2.5% after tax. The present value of 50¢ spent thirty years ahead when the net rate of interest of saving is only 2.5% is 23.62¢; $P^D = 50e^{-.025x30} = 23.62$. This is the sum one must put aside today to buy an apple then. When the interest rate is 5%, and the rate of the income tax is 50%, the effect of the double taxation of saving on the prices today of apples delivered thirty years hence is to create a gap between the demand price of 23.62¢ and the supply price of only 11.16¢, as though "future apples" were being taxed at a rate of 47% of the retail price.

The income tax is logically equivalent to a pair of excise taxes on consumption and saving where the tax on saving is approximately twice the tax on consumption. There is a bias against saving in the income tax which creates a disincentive to save and opens a wedge between ΔW and ΔR of the sort we have been discussing.

(d) <u>The Concealment of Taxable Income</u>[6]: The contraction of the tax base in response to an increase in the tax rate has so far been attributed to the tax-induced shift of purchasing power from more valuable taxed goods to less value untaxed goods. A similar contraction, with a similar impact on the ratio of marginal cost to tax-payers per unit of marginal tax revenue, occurs when an increase in the tax rate induces tax-payers to devote extra resources to tax avoidance. In fact, equation (2) which was derived to account for

A Market with Tax Avoidance

(the distance between the curve A and the curve S is the marginal cost of evading tax on one unit of the taxed good)

$$T = P^0(x^0) - P^S$$

$$T + \Delta T = P^0\left(x^0 - \Delta x^0\right) - P^S$$

$$x = x^0 - x^a$$

$$\Delta x = \Delta x^0 + \Delta x^a$$

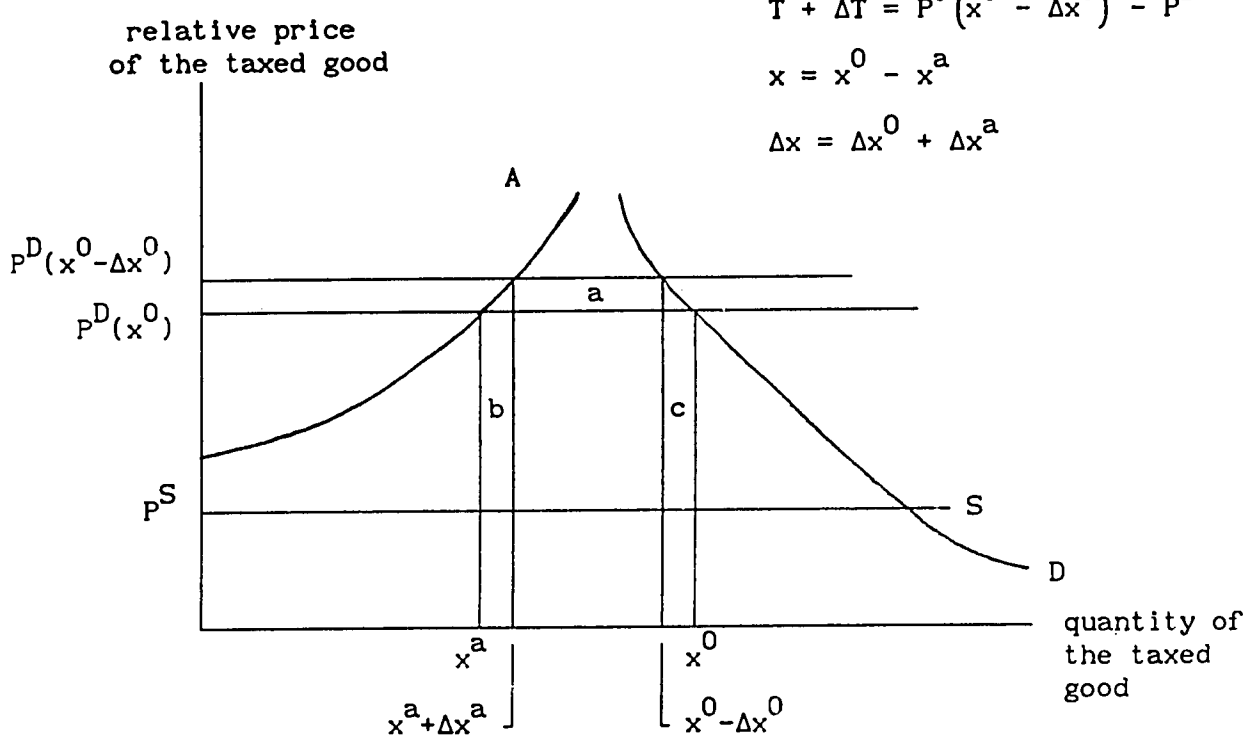


Figure 3

the effects on $\Delta W/\Delta R$ of the shift of purchasing power from taxed to untaxed goods is equally valid when the contraction in the tax base is brought about by a marginal increase in the resources devoted to tax avoidance.

The marginal social cost of tax revenue in the presence of tax avoidance is illustrated in Figure 3 which is a development of Figure 1. To simplify matters, the supply curve is assumed to be flat so that there is no deadweight loss on the supply side of the market. Once again the quantity of the taxed good is x, the demand and supply prices are P^D and P^S, and the quantity demanded at a tax T is x^0. The new feature of the diagram is the cost-of-tax-avoidance curve labelled A. The height of the curve is the marginal cost of the taxed good when, by careful planning or with the aid of shrewd legal advice, one acquires the good without paying the tax. The curve is intended to reflect the fact that substantial resources are devoted to tax avoidance. Tax avoidance activity is carried on to the point where the marginal benefit of tax avoidance is just equal to the tax that would otherwise be paid, where it becomes cheaper to pay the tax than to search for ways to avoid tax.

The demand price, P^D, is the sum of the supply price, P^S, and the tax, T. Of the x^0 units of the good consumed when the tax is equal to T, a quantity x^a is untaxed and a quantity x, where $x = x^0 - x^a$, is taxed. Raise the tax to $T + \Delta T$, and the tax base x shrinks by an amount Δx, where Δx is the sum of Δx^0, the reduction in the quantity demanded at the new higher price, and Δx^a, the increase in the amount of the good on which no tax is paid. The increase in tax avoidance, Δx^a, occurs because additional expenditure on tax avoidance (the area b) is made profitable by the new higher price of the good. The change in tax revenue brought about by the increase in the tax is

$$\Delta R = a - (b + c) \tag{6}$$

and the change in the welfare of the consumer is

$$\Delta W = a \tag{7}$$

Thus,

$$\frac{\Delta W}{\Delta R} = \frac{1}{1 - \left(\frac{b+c}{a}\right)} = \frac{1}{1 - \varepsilon^T} \tag{8}$$

$$= \frac{1}{1 - \left(\frac{T}{p^D}\right)\left(\varepsilon^A \frac{x^a}{x} + \varepsilon^D \frac{x^0}{x}\right)} \tag{9}$$

where, once again, ε^T is the absolute value of the elasticity of the tax base with respect to the tax rate and where ε^A is the elasticity of the "supply" of tax-free consumption of the taxed good with respect to price, inclusive of the supply price of the good and the cost of tax avoidance.[7]

The important feature of equation (8) is the near symmetry between ε^A and ε^D. The marginal cost to the taxpayer associated with an increase in public revenue may be high <u>either</u> because ε^A is high <u>or</u> because ε^D is high. Anything that causes the tax base to contract as the tax rate increases drives up the marginal social cost of public revenue. Notwithstanding the differences in their origins and in their derivations, equation (5) and equation (6) are identical.

Tax evasion differs from tax avoidance in that one is illegal while the other is not, but, from the point of view of an amoral tax payer, the two courses of action are very much the same. Each entails the non-payment of tax at some cost - the use of resources to discover ways of making income tax-exempt in one case and the use of resources to hide income, together with the risk of punishment, in the other. Each course of action proceeds up to the point where its marginal cost per dollar of tax saved is just equal to

one. Each drives up the marginal cost of public funds by causing the tax base to shrink as the tax rate increases, as indicated in equations (1) and (8).

The illegality of tax evasion is irrelevant from the point of view of the amoral tax payer when tax evasion is costly but foolproof, when it is expensive to hide income from the tax collector but there is no risk of detection once the proper expense has been incurred. In that case, tax evasion and tax avoidance are exactly alike. They differ whenever the tax-evader must bear some risk of detection and punishment. If the punishment for tax evasion is a fine of f dollars per dollar of tax evaded and the probability of detection, π, is a function of the amount of income, x, on which tax is evaded, then an amoral, risk-neutral tax payer evades tax up to the point where the sum of the marginal resource cost of hiding income and the marginal expected punishment, $(\partial\pi/\partial x)fx$ is just equal to the marginal tax evaded. A risk averse person would evade less tax.

Tax evasion also differs from tax avoidance in that it imposes additional cost upon the government - costs of detection and punishment of tax evasion. There are public costs of tax avoidance as well. When I hire a shrewd lawyer to help me minimize my tax bill, the government must hire an equally-shrewd lawyer to defend its tax revenue. Ideally, when punishment for tax evasion takes the form of a fine, the cost to the tax evader is actually a benefit to the rest of society. None the less, the overall cost to the public of tax evasion tends to be very much larger than the overall cost of tax avoidance, for punishment of tax evaders must sometimes take the form of imprisonment and the detection of tax evasion is often very expensive.

Tax avoidance and tax evasion combine to reduce the effective tax base as the tax rate increases, creating a considerable wedge between the marginal cost of tax to the tax payer and the marginal tax revenue from an increase in the tax rate. Estimates of the ratio $\Delta W/\Delta R$ have varied considerably, but a number as high is 2 is not considered preposterously large. If 2 were the correct number, it would signify that all public goods and public programs are really twice as expensive as they appear to be. Ignoring ordinary overhead cost, the payment by the government of a dollar for military equipment, in the transfer of income to the poor or to subsidize investment would have an effect upon the tax payer that is equivalent to a lump sum (and therefore non-distortionary) tax of two dollars. Arguments for public expenditure to defend ourselves, to provide infrastructure, to correct for market failure, or to provide transfers for worthy groups of people seem less compelling when the cost to the tax payer is two dollars for each dollar of expenditure than when the cost is only one. To be sure, many activities of government are fully worth the price. If the protection of the ozone layer of the atmosphere requires large public expenditure, then that expenditure must be borne, regardless of whether a dollar of revenue costs the tax payer one dollar or two.

Equation (9) is especially instructive in this context. Think of T as representative of the entire tax system so that the critical term, T/P^D, can be taken as an indicator of the economy-wide tax rate or as the share of the public sector in the economy as a whole. The equation shows that the marginal cost of tax to the tax payer is approximately equal to marginal tax revenue when government is small and the ratio T/P^D is close to zero. A gap opens between the marginal cost to the taxpayer and marginal tax revenue as the tax rate increases, and the gap widens without limit as T/P^D grows. The

moral of the story is that the marginal cost of government increase with the size of the public sector; it is precisely because there is so much a modern government must do, that the marginal cost of government is high.

The central proposition to emerge from our examination of tax evasion and tax avoidance is that private manoeuvers to avoid tax place a wedge between the marginal cost of tax to the tax payer and the marginal revenue acquired. There is a comparable proposition about the expenditure side of the budget. A similar, and additional, wedge is created by private manoeuvers in response to public provision of goods, transfers or privileges. The place to begin in the analysis of this matter is with a form of transfer payments that avoids this difficulty, but only at the cost of expanding the private cost of public funds.

(e) How Transfers Magnify Deadweight Loss:[8] There can be no manoeuvering for privileges in a program of redistribution of income where everybody is an equal recipient and where the redistribution occurs because the tax to finance the program is proportional to the income of the tax payer. Since benefits are the same for all, there is nothing anyone can do - no way to rearrange one's affairs - to affect one's benefits under the program, and no counterpart on the expenditures side of the ordinary deadweight loss in taxation. The difficulty with this method of transfer is that each net dollar of benefit to the ultimate recipients requires an additional tax revenue of considerably more than one dollar, while the deadweight loss from taxation depends on total tax revenue rather than upon the net transfer in the program. Not benefits to the ultimate recipients fall short of total tax revenue because the ultimate recipients pay part of the tax and the ultimate benefactors receive part of the transfer.

Imagine an economy with two classes of people, the recipients whom, for one reason or another, the government wishes to favour and the payers who constitute the remainder of the population. Assume for simplicity that people within each group are identical, let there be n^r recipients whose gross income per head is y^r, and let there be n^p payers whose gross income per head is y^p. The problem is posed rather generally, in terms of payers and recipients so as to cover transfers between rich and poor, between old and young, between some industrial groups and the rest of society and between the employed and the unemployed, all within the same set of formulae.

We now make two strong assumptions. Recall from the discussion surrounding Figure 1 that the marginal burden of tax resulting from a small increase in the tax rate is the loss of consumer's surplus as measured by the area "a" while the marginal increase in tax revenue is the difference between the areas "a" and "c" in the special case where the supply curve of the taxed good is flat and the area "b" is necessarily zero. Our first assumption is that the supply curve is indeed flat. From this assumption, it follows that equation (8) becomes $\Delta W/\Delta R = a/(a-c) = 1/(1-\varepsilon^T)$. Our next assumption is that the elasticity of the tax base to the tax rate is the same for both groups. From this, it follows that the ratio of the marginal burden of tax to the marginal tax collected is also the same for both groups. Define S to be the common value of $\Delta W^r/\Delta R^r$ and $\Delta W^p/\Delta R^p$ where the superscripts refer to receivers and payers and where ΔR^T and ΔR^p are the marginal increases in taxes paid by the two groups to finance an increase in the transfer. Specifically

$$\Delta W^r/\Delta R^r = \Delta W^p/\Delta R^p \equiv S \tag{10}$$

The effect of the transfer on the two groups - the net recipients and the net payers - depends on how the transfer is allocated between them. Let ΔT^r be the increase in payment per head to the net recipients and let ΔT^p be the

increase in payment per head to the net payers. The accounting identity between total public revenue and total public expenditure requires that

$$n^r \Delta T^r + n^P \Delta T^P = n^r \Delta R^r + n^P \Delta R^P \tag{11}$$

We now define the net marginal benefit per head of the recipients to be

$$B^r \equiv \Delta T^r - \Delta W^r, \tag{12}$$

the net marginal cost per head of the payers to be

$$B^P \equiv \Delta W^P - \Delta T^P \tag{13}$$

and the net cost to all payers per dollar of net gain to all recipients to be

$$Q = n^P B^P / n^r B^r = n^P(\Delta W^P - \Delta T^P)/n^r(\Delta T^r - \Delta W^r) \tag{14}$$

Note that in the absence of deadweight loss in taxation, the value of S would have to be 1, the values of ΔW^r and ΔR^r would have to be the same, the values of ΔW^P and ΔR^P would have to be the same as well, and it would follow immediately from equation (11) that Q = 1. Otherwise - when S > 1 - the value of Q may be quite high.

Three general types of transfers can be identified: In the first, only the ultimate payers are taxed and only the ultimate receivers are allowed to share in the transfer. This is approximated by welfare payments to the very poor where the payments are financed by an income tax with a high enough personal exemption that the very poor are exempt. In the second type of transfer, both payers and receivers are taxed at the same rate but only the net receivers are eligible for benefits. This is approximated by subsidies to farmers or for investment in selected industries. In the third type of transfer which is our main concern in this section, both groups are gross recipients as well as tax payers but taxes are proportional to income while transfers are constant per head so that the poor may be net recipients and the rich net payers. The old age pension is a transfer of this kind. We shall consider these types in turn.

The first type of transfer is defined by the property that the net receiver pays no tax and the net payer receives no transfer, specifically that $\Delta R^r = \Delta T^P = 0$ so that ΔW^r is also equal to zero and Q becomes

$$Q^1 = n^P(\Delta W^P)/n^r\ \Delta T^r = S \tag{15}$$

because $\Delta W^P = S\ \Delta R^P$ and $n^P\ \Delta R^P = n^r\ \Delta T^r$ by equation (11).

The second type of transfer is defined by the property that, once again, the net payer receives no transfer (i.e. $\Delta T^P = 0$) but now both groups are taxed proportionally to income so that $\Delta R^P/\Delta R^r = y^P/y^r$. The value of Q becomes

$$\begin{aligned}
Q^2 &= n^P\ \Delta W^P/n^r\ (\Delta T^r - \Delta W^r) \\
&= n^P\ \Delta R^P S/n^r\ (\Delta T^r - S\ \Delta R^r) \quad \text{by equation (10)} \\
&= n^P\ \Delta R^P S/n^r \left\{\frac{n^r\ \Delta R^r + n^P\ \Delta R^P}{n^r} - S\ \Delta R^r\right\} \quad \text{by equation (11)} \\
&= Sn^Py^P/\left\{n^ry^r + n^Py^P - Sn^ry^r\right\} \quad \text{because } \frac{\Delta R^P}{\Delta R^r} = \frac{y^P}{y^r} \\
&= S/\left\{1 - (S-1)(n^ry^r)/(n^Py^P)\right\}
\end{aligned} \tag{16}$$

which is necessarily greater than S as long as $S > 1$. Note that Q is only positive when

$$(S-1)(n^ry^r) < (n^Py^P)$$

which in turn requires that

$$S < (n\bar{y})/(n^ry^r) \tag{17}$$

where $\bar{y}$ is average income per head. The meaning of this inequality is that the transfer is on balance costly to the recipients as well as to the payers whenever S exceeds the inverse of the recipient's share of the national income, because the benefit of the transfer would be outweighed in that case by the recipient's share of the burden of the tax required to finance the transfer. Thus, for example, if the total incomes of payers and receivers were the same so that $(n^ry^r)/(n^Py^P) = 1$, then the value of Q^2 becomes $S/(2-S)$

which turns negative when S exceeds 2 signifying a transfer is of no net benefit to the ostensible recipients unless $S < 2$.

In the third case where transfers are universal in the double sense that everybody pays the same <u>rate</u> of tax and everybody receives the same <u>amount</u> of transfer, the marginal tax payments are constrained so that $\Delta R^P/\Delta R^r = y^P/y^r$ and the transfer per head becomes $\Delta T^P = \Delta T^r = (n^P \Delta R^P + n^r \Delta R^r)/(n^P + n^r)$ (18)

Consequently, the value of Q is

$$Q^3 = n^P(\Delta W^P - \Delta T^P)/n^r(\Delta T^r - \Delta W^r)$$

$$= \frac{n^P[S\,\Delta R^P - (n^P \Delta R^P + n^r \Delta R^r)/(n^P + n^r)]}{n^r[(n^P \Delta R^P + n^r \Delta R^r)/(n^P + n^r)) - S\Delta R^r]}$$

$$= \frac{n^P[Sy^P - (n^P y^P + n^r y^r)/(n^P + n^r)]}{n^r[((n^P y^P + n^r y^r)/(n^P + n^r)) - Sy^r]}$$

$$= n^P(Sy^P - \bar{y})/n^r(\bar{y} - Sy^r) \qquad (19)$$

In this case, the transfer can only be beneficial to the net receivers if $S < \bar{y}/y^r$, that is if the marginal cost of public funds is less than the ratio of average income per head in the population as a whole to the average income per head of the net beneficiaries of the transfer. Otherwise the net beneficiaries' share of the transfer is less than its share of the burden of taxation, and the transfer is of no net benefit to anybody at all.

It may be useful to compare the costs of the three forms of transfer within the same numerical example. Suppose $S = 1.5$, $n^r = n^P$, $y^r = 1$, $y^P = 3$ and, accordingly, $\bar{y} = 2$. Then

$$Q^1 = 1.5$$

$$Q^2 = 1.5/[1-(1.5)(1/3)] = 3$$

and $$Q^2 = [(1.5)(3)-2]/[2-(1.5)] = 5$$

Even a low marginal cost of public funds yields a high marginal cost of transfers when a great deal of money has to flow through the public sector to

effect a small net transfer between one group and another.

The "obvious" moral to be drawn from the comparison of the costs of these three forms of transfers is that the first is the cheapest and therefore the best. The moral is that transfer programs should be targeted as closely as possible to the group or groups that are the intended beneficiaries; programs designed to better the condition of the poor should be means-tested rather than universal. There is some force to this argument but it is not decisive. On the other side is the moral argument that means-tested programs should be avoided because they are humiliating to the recipients, and the economic argument that restricted transfers may give rise to private behaviour that is similar in kind and no less costly than the private response to taxation which is the source of ordinary deadweight loss.

(f) Deadweight Loss in Transfer-seeking:[9] Suppose once again that society consists of two classes of people, now called the prosperous and the ruined (to preserve the old superscripts). Suppose, in addition, that each person has the same prospects at birth represented by a probability of becoming prosperous, $p(E)$, which is a function of his effort, E, where of course, $p'>0$ and where $p''<0$. For convenience, suppose each prosperous person earns a gross income y^p and each ruined person earns a gross income y^r, where $y^r < y^p$. Finally suppose that each person's utility is a function of his consumption, C, which is a "good" and his efforts to become prosperous, E, which is a "bad". Consumption and income are connected by taxation and redistribution of income. Specifically,

$$C^r = (1 - t)\, y^r + T \tag{20}$$

$$C^p = (1 - t)\, y^p \tag{21}$$

and

$$n^r T = t\, (n^r y^r + n^p y^p) \tag{22}$$

where T is the transfer to each ruined person and t is the rate of the income tax.

From the original utility function connecting C and E, there can be constructed a derived utility function connecting p and E (one's probability of becoming prosperous and one's effort). From the derived utility function, can be constructed a set of indifference curves each representing the locus of equivalent combinations of p and E, as shown in Figure 4. However the shapes of these indifference curves are not independent of the transfer. In principle, the transfer T could be set so large that a person no longer cares whether he is prosperous or not. Utility would then depend on E alone, and the indifference curves would be set of parallel straight lines with utility increasing to the left. Lower the transfer and (before tax and transfer) prosperity becomes desirable once again, causing the indifference curves connecting p and E to tilt clockwise. The smaller T, the flatter must these indifference curves be.

Two sets of indifference curves - a relatively flat set corresponding to a low value of T and a relatively steep set corresponding to a high value T - are illustrated in Figure 3. Also in the figure is the effort function p (E) showing how one's chance of becoming prosperous increases with one's effort to better oneself. The curve p(E) is the locus of combinations of p and E among which a person may choose; it is one's constraint in the space of p and E. A person chooses E to place himself on the highest possible indifference curve consistent with the constraint p(E). It is immediately evident from the diagram that when the transfer is low, one chooses a high level of effort E.

This is a classic "moral hazard" problem. If people could form binding contracts for effort and redistribution of income, they would choose full insurance (a value of T high enough that $C^P = C^r$) and a value of E high

enough to maximize utility in that case. Where such contracts are not enforceable, the value of T must be very much lower to provide people with an incentive for effort. The essential point in the context of hidden effects of public expenditures is that any selective transfer creates incentives for people to bring about (or not to take steps to avoid) the conditions under which the transfer is granted, and that these steps - by lowering effort or by same other means - may bring about a reduction in the total national income.

This general principle has many manifestations: Unemployment insurance reduces the incentive of those with jobs to keep them, of those currently unemployed to look for jobs, and of all workers to acquire assets to tide them over possible periods of unemployment. Provision of welfare reduces one's incentive to avoid becoming poor. Provision of special benefits to unmarried mothers is often claimed to be a major cause of the recent increase in illegitimacy among the poor. Medicare reduces one's incentive to keep well and avoid accidents. Bailouts to firms that would otherwise fail reduce the firms' incentive to avoid actions that might lead to failure. Deposit insurance diminishes the bank's incentive to be prudent in its investments. As with the deadweight loss in taxation, these private incentives generated by public activity have to be counted as part of the cost of this activity, cost which is worth bearing when the benefit is substantial, but not otherwise.

(f) Commodity Effects: A second and complementary principle about the effect of public expenditure on private incentives is that small in-kind transfers have no effect on the market as a whole. Suppose it is determined that lettuce is particularly good for you, and there is a public decision to

Optimal Effort at Alternative Transfers to the Unprosperous

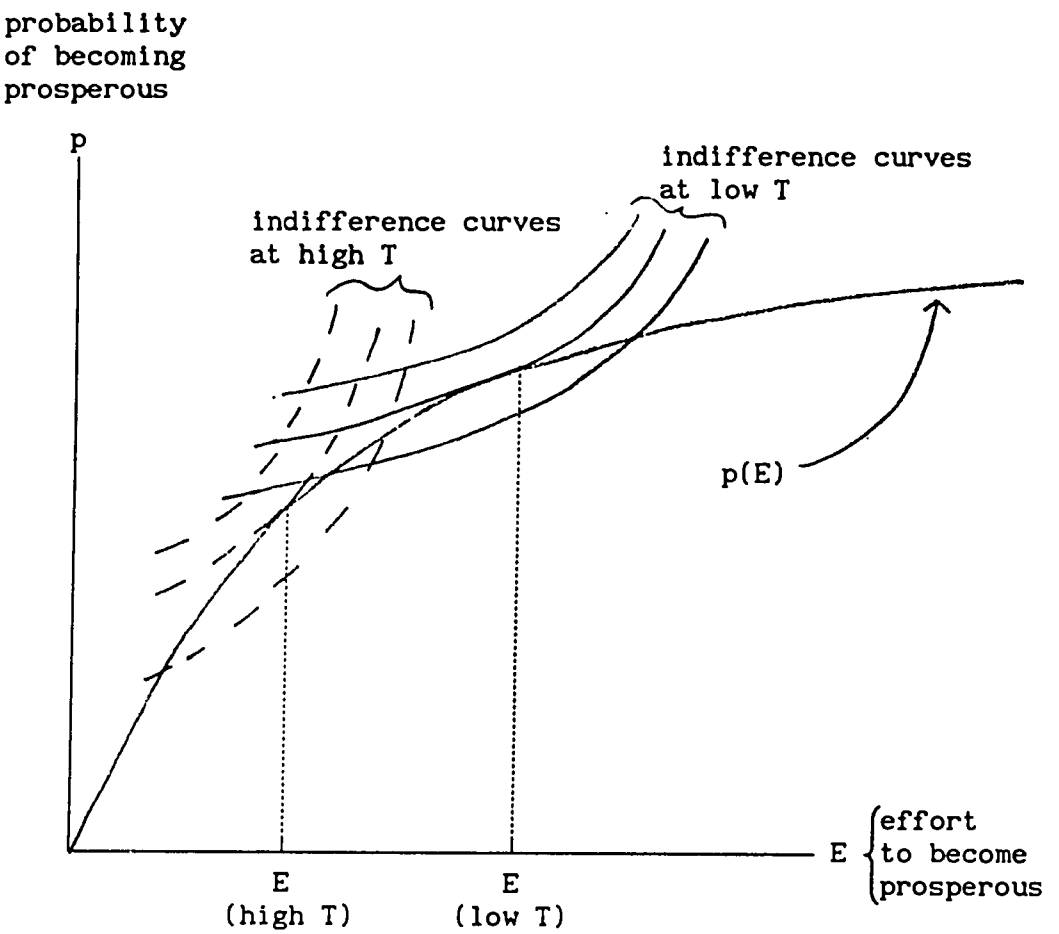


Figure 4

induce people to consume more lettuce by providing each person with one free (that is, tax-financed) head of lettuce per month. The policy would have some effect if many people were accustomed to eating less than one head of lettuce per month. It would have no effect at all if everybody normally ate, for example, three head of lettuce per month. Given one lettuce free, people would merely reduce their normal purchase and would consume the same amount as before. To influence lettuce consumption, the government would need to provide more than people normally consume or to subsidize <u>all</u> lettuce consumption.

The general principle that a small public provision of a good has no effect on the market equilibrium is illustrated in Figures 5a, 5b, and 5c. All three figures contain identical demand and supply curves. Price, P, is measured on the vertical axis, quantity, Q, is measured on the horizontal axis, the supply curve is flat at a price P^S, and the market equilibrium quantity in the absence of public provision or subsidization of consumption is Q^0. Suppose the government mistakenly believes that it can induce people to consume more of the good by providing an amount Q^S where $Q^S < Q^0$. As illustrated in Figure 9a, the effect of the public provision of Q^S is to reduce private provision by that amount, so that total provision - designated as $\bar{Q}$ - remains unchanged at Q^0. The recipients of the public provision must gain at the expense of those who are taxed to pay for it, but that gain is no different in its effect on the recipients than if they had received a transfer of income of $\$P^SQ^S$. If everybody received a transfer of Q^S units financed by an increase in each person's tax of $\$P^SQ^S$ then everybody would become worse off to the extent of the deadweight loss from the tax.

Two ways for the government to influence total consumption are illustrated in Figures 5b and 5c. The first, illustrated in Figure 5b, is to

Possible Effects of Public Provision on Total Consumption

Q^0 = quantity consumed with no public provision

Q^S = the amount of public provision

$\bar{Q}$ = quantity consumed with some public provision

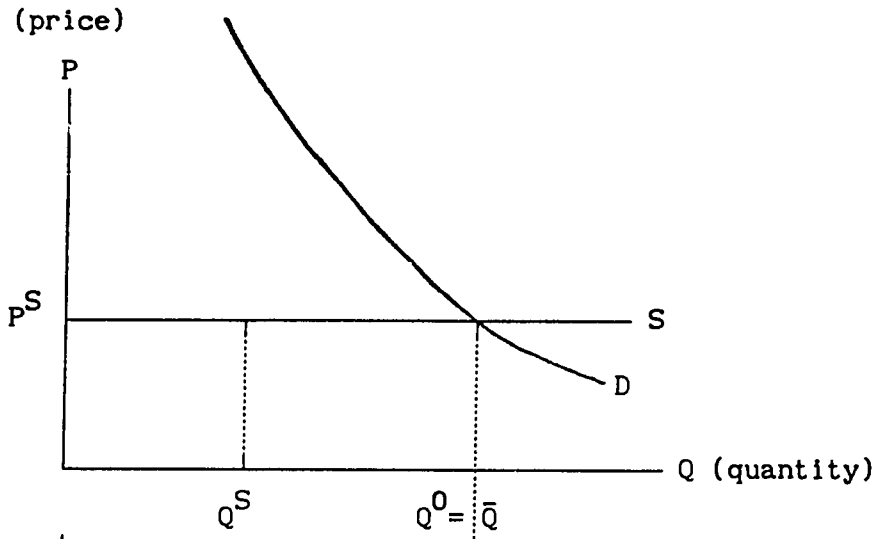
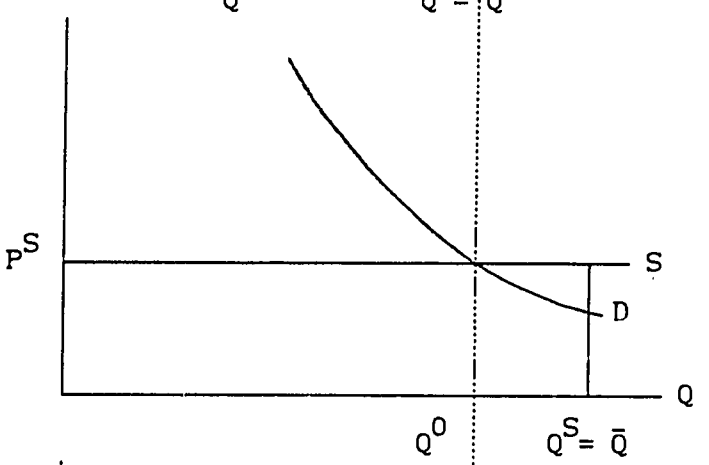


Figure 5a



Figure

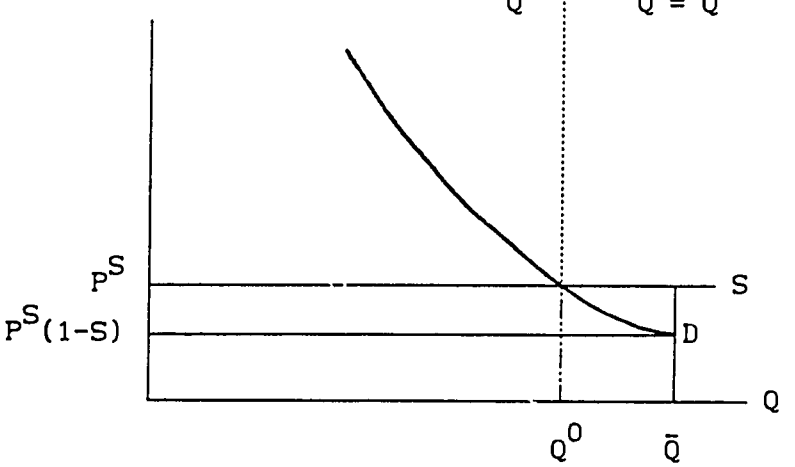


Figure 5c

provide more of the good than people would be prepared to buy for themselves at the going price. Here $Q^S > Q^0$. The effect of public provision in this case is to drive out all private provision. The public provision of Q^S has effected a net increase in consumption of $Q^S - Q^0$. Public policy is beneficial in such a case if the social gain, however measured, from the extra provision of the good, $Q^S - Q^0$, exceeds the marginal excess burden of the tax required to finance the purchase of total consumption, Q^S.

The same extra provision, $Q^S - Q^0$, can be obtained at lower cost to the treasury by subsidization as illustrated in Figure 9c. A subsidy of a portion s of the cost price, reduces the market price from P^S to $P^S(1-s)$ and increases the quantity demanded from Q^0 to $\bar{Q}$. In this case, an increase in consumption of $\bar{Q} - Q^0$ has been bought with an expenditure of $sP^0\bar{Q}$ per person rather than an expenditure $P^0\bar{Q}$. The saving is not just a reduction in the transfer from all tax papers to consumers of the subsidized good; it is a saving of real resources that would otherwise be wasted in tax evasion or tax avoidance.

The general principle that you cannot affect a market by a partial subsidization has many applications. The improvement of the housing of the poor brought about by public housing is nowhere near commensurate with the amount of housing provided under the program and might in certain circumstances be altogether illusory. Public housing could actually worsen the accommodation of the poor if, for example, each poor family would have occupied 1000 square feet in the absence of public housing and is offered 900 square feet at a low rent under the public housing program. Of course, even in this extreme case where public housing fails to improve accommodation, it must succeed as a vehicle for transferring purchasing power to the poor if the public housing is occupied at all. What is more likely, however, is that

public housing offers most beneficiaries of the program a better accommodation than they would otherwise rent, so that the situation is more like that depicted in Figure 5c than like that depicted in Figure 5a.

The principle is also exemplified, with some complications, by the old age pension[10]. Consider a bachelor whose sole motive for saving is to provide for his old age, who retires at age 65 and who, in the absence of a publicly-funded old age pension, would have accumulated $200,000 of capital at that time. If the public pension provides of a stream of income with a present value at his 65th birthday of $100,000, it would be rational for that person to accumulate $100,000 less over the course of his working years, especially if he is taxed during those years to finance the old age pensions of others. If the public pension is funded, then the reduction of $100,000 in cumulative private saving is matched by an increase of $100,000 in cumulative public saving and there is no net effect upon total investment or capital formation, though the title to the capital has changed. However, if the publicly-provided pension is unfunded and pay-as-you-go, then there is no public saving to match the decline in private saving, and there must be a reduction in net capital formation. What appears to the recipient of the old age pension as a substitution of public saving for private saving may constitute a reduction in saving for the economy as a whole, depending on how the public pension is financed.

It is essential to the argument that the recipient of the old age pension be a bachelor. The polar opposite case is that of a family whose capital today has been accumulated over many generations and whose investment decisions take account of the interests of many generations to come. For such a family, a pay-as-you-go old age pension can have no affect whatsoever on consumption and saving today because future benefits from the old age

pension and future taxes to finance those benefits just cancel out, leaving the present value of post-tax and post-transfer income as it would be without the old age pension and without the taxes to finance it. A family's allocation of consumption over time is no more affected by the taxes and transfers associated with the old age pension than a person's allocation of consumption over the months of a year is affected by the fact that the income tax is collected all at once in April. In both cases, lending and borrowing are timed to effect the optimal stream of consumption within the given resource constraint.

Even for the bachelor, there are important qualifications to the argument that the pension leads to a reduction in private saving, dollar for dollar. The income of the old is certainly augmented by the old age pension if the amount of the pension exceeds what the person would have provided for himself in its absence. The case where the pension has no affect on the consumption of the old is covered by Figure 5a where Q is annual consumption of the retired and P is the rate of substitution in use between consumption in one's working years and consumption in retirement. The case where the pension does affect the consumption of the old is covered by Figure 5b. A country's decision to establish an old age pension is in part a manifestation of the political influence of the old, but it is also in part a judgment that there are enough people whose savings in the absence of a pension would be less than the pension - the circumstances described in Figure 5b - to justify the social cost of the circulation of income through the tax and transfer system of the government.

Very much the same considerations apply to the firm-specific subsidization of investment. Public subsidization of investment may be general or firm-specific. Subsidization is general when, for example, all

investment is made eligible for a tax credit. Subsidization is firm-specific when the government selects particular investments by particular firms, awards subsidies to these investments, and denies them to all others. Firm-specific subsidization may be undertaken by ad hoc decisions of Cabinet. It may also be arranged in programs designed to favour investments in specific areas of the country, industries, types of firms (such as firms owned by native people), or projects that are especially innovative and different from the normal run of business activity. Sometimes a project is only considered for a subsidy if it would not be commercially viable otherwise. Firm-specific subsidies are often alleged to "create jobs", a claim that attributes the total employment associated with the subsidized project to the subsidy itself. Politicians running for office or public officials justifying their activities will proudly point to the many jobs "they" have created with the subsidies to investment that they grant.

Such claims may be justified. Though the social value of investment is usually reflected in private profitability, there are instances where this is not so, and there may be a case for subsidization when such instances are identified. Investments to create new products may generate social benefits that cannot be captured in the return to the entrepreneur. Even the grant of a patent may be insufficient to enable the innovator to cover the cost of investment, though the consumer surplus from the new product may be more than sufficient. Similarly, an investment in a depressed region may be privately unprofitable without a subsidy but socially advantageous if the investment provides work to those who would otherwise be on welfare because they have no other source of employment.

While it is true that firm-specific subsidization of investment may be socially-advantageous in certain cases, it is highly unlikely that a program

of firm-specific subsidization or that ad hoc subsidization by politicians or bureaucrats will be socially-advantageous or balance. A distinction must be drawn here between the benefit of the subsidy and the benefit of the subsidized investment. Obviously the investment itself must be beneficial on balance for the subsidization to be justified. That is a necessary but not sufficient condition for the subsidy to be socially advantageous. An additional, but absolutely necessary, requirement for the subsidy to be beneficial is that the investment would not be profitable otherwise. The reason why firm-specific subsidization is unlikely to be beneficial in practice is that it is difficult, bordering on impossible, for public officials to determine with any acceptable degree of certainty whether these two conditions obtain in any particular case.

Knowing that subsidies are available, there is an incentive for firms to claim that projects are unique when they are not or that projects would not be commercially viable without subsidization. Such claims are difficult to verify and even more difficult to refute by the public officials whose task it is to determine whether they are valid. Dishonesty is surely endemic in such an environment. More importantly, projects can be substitutable in many subtle ways. The introduction of a subsidized project in a region may drive up the wage of labour, and thereby drive out an established firm that would have remained viable otherwise. Or the introduction of the subsidized project might forestall the development of another yet unrecognized project that would not require a subsidy at all. The subsidized project might use up local savings that would otherwise be channeled by the banks to other investment in the region. Firm-specific subsidization of investment might possibly increase the total investment in the favoured categories, but there is no assurance that this will occur, and there is a virtual certainty that

the increment to investment, if any, will be well short of the total value of subsidized investment. The jobs "created" may in reality be transferred from other projects or firms. Subsidized firms might bump unsubsidized firms, just as public provision bumps an equal amount of private provision in the circumstances of Figure 5a.

These difficulties with firm-specific investment subsidies are compounded by a problem of information. Public officials administering a program of firm-specific investment subsidies must either rely on judgment and intuition in deciding whether a project is appropriate for subsidization, or fall back on simple general rules - such as to subsidize all investment within a region - that lead inevitably to the support of many projects that would go forward regardless. Furthermore, the same want of a precise criterion that makes the initial evaluation problematical removes all possibility of a proper ex post audit. It can, of course, be determined whether the subsidized investment actually takes place and whether the new project employs as many workers as was claimed in the initial application. What cannot be determined ex post is whether the subsidy was really necessary, whether the subsidized firm bumped some pre-existing firm from the market or forestalled another investment that would have appeared if the subsidy had not been granted. The usual measure of "success" in this context - that the subsidized project is thriving - might equally-well be treated as a measure of failure.

Absence of a solid criterion for evaluating firm-specific investment subsidies creates an opening for dishonesty in government. A perfectly-administered subsidy program would convey no net advantage to the recipients, for the subsidies would be no larger than necessary to induce firms to engage some socially-advantageous but privately-unprofitable behaviour. But an

imperfect program, such as any actual program must be, necessarily conveys large windfall-gains to many if not all of the recipients, who, as owners of firms, are normally rich and who might be inclined to reward their benefactors. Malfeasance in connection with firm-specific investment subsidies could in principle be constrained by ex post audits to determine whether grants were warranted or by the right of deserving firms that are denied grants to sue the grantors. Absence of sold information makes these remedies infeasible. The culprit would have to be caught with his hand in the till.

The probable redundancy of a good portion of the firm-specific investment subsidies raises the possibility that a large program of subsidies may inhibit more investment than it promotes. The mechanism by which this perverse outcome may occur is this: Each dollar of investment generated by firm-specific investment subsidies requires an expenditure of x dollars, where x is almost certainly greater than 1; x might be less than 1 in a perfectly-administered program because only part of the cost of the investment would be covered by the subsidy, but x would almost certainly exceed 1 in any actual program because many subsidized projects would have gone forward regardless and because some subsidized projects bump established firms or other unsubsidized projects. The x dollars must be financed through the tax system which entails some deadweight loss. The required increase in tax revenue can only be obtained from a marginal increase in tax rates which in turn could easily induce tax payers to shift purchasing power from saving to consumption because of the double taxation of saving.

If y is the reduction of private saving per dollar of tax revenue raised, then a requirement to raise x dollars must reduce private saving by xy. Total investment is increased or decreased by a program of firm-specific

investment subsidies according to whether the reduction of xy dollars of private saving is exceeded by the sum of the public saving inherent in the subsidy program and the increased provision of funds from foreign countries. One cannot say a priori whether the primary effect of the subsidization of projects that would not be viable in the absence of subsidies is outweighed by the secondary effect of the churning of money through the tax system. The balance could go either way.

(g) The Relative Efficiency of the Public and the Private Sectors of the Economy:[11] It is often said that government is inefficient, by which is meant that more man-hours are typically required to do a given job in the public sector than in the private sector. Among the alleged reasons are that the public sector, by virtue of its monopoly of the services it provides, is more likely to fall prey to union restrictions, and that civil servants, who have little fear of being fired, have relatively little incentive to work hard. There is some evidence that the government is less efficient than private firms at a number of tasks, notably garbage collection which is sometimes performed by the government directly and sometimes performed by the private sector under contract. Many departments of government are such that their work could not be contracted out to the private sector, and the private sector is less likely to perform well when privatization requires the establishment of a monopoly than when a number of firms in competition can share in what were once functions of government.

(h) Rent-Seeking:[12] The term "rent-seeking" is usually employed in the context of quotas rather than of public expenditure, but the basic principle applies to both. Whenever the government establishes a valuable prize, be it a patent for innovative research, entitlement to import a product protected by tariff or an industrial subsidy granted on any principle whatsoever, there

is created an incentive for people and firms to devote resources in competing for the prize. In some instances, the notable example being patents, the activity that counts as effective competition is socially desirable. In other instances, it is not. The term rent-seeking, though very broad, is normally restricted to forms of competition that are per se wasteful.[13]

In the context of public expenditure, rent-seeking occurs when governments exercise discretion as to who the recipient of a subsidy or valuable contract shall be. Suppose, for example, that the government proposes to let a large contract at a price that guarantees a profit (a surplus over and above the normal return to the firm) of $1,000,000. There are n equally-eligible firms, and each eligible firm, i, can increase its probability of getting the contract by expenditure on rent-seeking, R_i, to persuade officials that it is more eligible than the rest. Specifically, suppose that the probability of success of firm i is

$$p_i = R_i \Big/ \sum_{j=1}^{n} R_j \tag{23}$$

Note that the sum of all n of the p_i adds up to 1, as it must when the p_i are probabilities.

Now each firm chooses p_i to maximize its expected profit

$$\pi_i = p_i \ (1{,}000{,}000) - R_i \tag{24}$$

It follows[14] that every firm's optional choice of rent-seeking expenditure is

$$R = \left(\frac{n-1}{n^2}\right) (1{,}000{,}000) \tag{25}$$

which is equal to 0 when n = 1 because a single eligible firm has no incentive to engage in rent-seeking expenditure (for it receives the rent regardless) and which approaches 1,000,000/n as the number of eligible firms becomes very large. With 10 eligible firms (that is, for n = 10), each firm's optional rent-seeking expenditure becomes $90,000, so that nine-tenths of the

subsidy is wasted if rent-seeking expenditures has no intrinsic social product.

Two qualifications to this argument are important. The first is that expenditure to procure a contract or some other benefit provided by the government may be socially useful. Research expenditure to procure a patent has already been mentioned. Another example of useful "rent-seeking" expenditure is competition over design. Each of ten firms may be ex ante equally eligible for a contract but they may propose designs for the project that one ex post different one from another and not equivalent in the assessment of the public officials who are awarding the contract. The R_i in this case is socially useful expenditure on design before it is known who the winner of the contract will be. The winner of the contract must be guaranteed an above normal profit as an inducement to all eligible firms to risk the expenditure on designs in circumstances where (n-1) out of n such expenditures will be wasted.

The second qualification is that rent-seeking expenditures need not use up the entire prize. Suppose that each firm's probability of winning the prize were

$$p_i = R_i^{\alpha} / \sum_{j=1}^{n} R_i^{\alpha} \tag{26}$$

where $0 \leq \alpha \leq 1$. Equation (25) above is a special case of this formula where $\alpha = 1$. Now optional rent-seeking expenditure becomes[15]

$$R = \frac{\alpha(n-1)}{n^2} (1,000,000) \tag{27}$$

which means that, even as the number of firms becomes very large, the proportion of the total rent wasted can never exceed α, the remainder, $1 - \alpha$, accruing as a windfall profit to the eligible firms. Note that as α approaches zero, each firm's probability of winning the prize approaches 1/n,

regardless of R_i, so that no firm has anything to gain from rent-seeking expenditure and there is none. This is equivalent to saying that there is no rent-seeking activity if firms cannot affect their chances of winning the prize.

(i) Corruption:[16] Assessment of the cost of a program or project in the public sector must take account of the possibility that the administrators of the program or project will turn out to be corrupt, for perfect and constant honesty is not to be expected in this imperfect world. Corruption may take many forms: kickbacks on government contracts, bribes to the police to overlook infractions of the law, selling of offices, selling of credentials, or demanding payment for licenses to which the applicants are entitled. Corruption may be more or less conspiratorial, ranging all the way from uncoordinated acts of impropriety by officials, through organized malfeasance by entire police departments or branches of government, to government-wide predatory activity that is in the limit indistinguishable from despotic government.

It is sometimes argued that corruption involves no social cost because it is a mere transfer of income from people in the private sector or from firms to public officials. This argument is generally false in my opinion, no less for corruption than for theft which is also a transfer from one person to another. The cost of corruption stems from the tenuousness of the connection between private gain to the corrupt official and the social loss from his actions. Consider an amoral official who is weighing the pros and cons of a corrupt act - granting one firm a contract that should by rights go to another, etc. The benefit to the official if his misbehaviour is undetected is valued at x. The probability of his being detected is π. His punishment if detected is f; that is, he gains x if his act is undetected and

he losses f if his act is detected. Like any would-be criminal, he acts corruptly if, ignoring risk aversion, the expected benefit is positive, that is, if

$$(1 - \pi)x + \pi f > 0 \tag{28}$$

Note particularly that the social cost of the corrupt act is no part of the official's calculation. His calculation is a weighting of his benefit if the corrupt act is undetected, his cost if the corrupt act is detected, and the risk of detection. The social cost of his action can be very much larger than his expected gain, but that is none of his concern, except in so far as the punishment, f, and the probability of detection are connected to the social cost. A reasonable government would try to choose f and π to be commensurate with the social cost - in this case as in setting punishments for any ordinary crime - but the attempt may not be entirely successful. In particular, if the amoral official is sure that a corrupt act will be undetected (i.e., $\pi = 0$), he will commit the act regardless of how small the value of x or how large the social cost, as long as he has no more lucrative alternatives.

A privilege inappropriately granted to firm A yields a benefit of $10 to that firm and a cost of $2,000 to the general public. Firm A offers the official a bribe of $5. Obviously, the official rejects the bribe if there is a significant probability of detection and if the punishment is severe. He also rejects the bribe if those who are harmed in the transaction can come up with a larger competing bribe, as they could well-afford to do, for they would willingly pay, say, $15 to avoid a $2,000 loss. Neither of these conditions need obtain. Firm A may be in a position to offer an undetectable bribe, while those harmed by the official's decision may be too dispersed to organize for the provision of a competing bribe or they may be unable to make

the bribe undetectable, for a subscription to finance an official might well come to the notice of the police. The undetectable bribe, on the other hand, might take the form of an unspoken offer of employment at an unspecified time when the official retires from the public service.

The social cost of public sector malfeasance may take many forms: the loss of potential benefit when a contract is granted to the less efficient firm, the reduction in usage of a licensed service when the cost is driven up by bribes paid by practitioners, the harm to consumers of services when licenses are granted to unqualified practitioners, and the waste of resources in rent-seeking when opportunities for rent-seeking behaviour are deliberately created for the benefit of the dispersers of rent. This last point needs some elaboration.

Wasteful rent-seeking may be advertising or bribery. It is advertising when firms compete for prizes or privileges by extolling their virtues as modern, progressive, public-spirited institutions or when firms acquire unnecessary plant and equipment because ownership of such plant and equipment is the criterion by which privileges are awarded. Rent-seeking becomes bribery when the steps to attain the prize are beneficial to the prize-giver and illegal. It is irrelevant from the point of view of the rent-seeker whether the appropriate steps in his case are advertising or bribery. His only concern is to draw the best balance among the size of the prize, his total expenditure to increase his chance of getting it, and his probability of success.[17]

As long as there is some component of bribery in rent-seeking, it may be in the interest of corrupt governments to create circumstances where privileges are to be dispersed. Suppose - for good reasons or for bad - an industry is to be protected and the government must choose whether to protect

the industry by tariffs or by quotas. Tariffs are preferable in most circumstances because they generate public revenue while quotas do not. An honest, predatory government would levy a tariff and use the proceeds to augment officials' wages. A corrupt government, that cannot use tariff revenue to augmenting officials' wages directly but is quite willing to increase officials' income if that can be accomplished secretly, might prefer quotas. The quotas would be awarded to privileged firms, rather than auctioned off, to ensure that the recipients of quotas are beholden to the people who grant them. With a reasonable degree of collaboration among officials at different levels of the hierarchy, policy can be designed to create privileges to be dispersed to grateful firms within the private sector.

Our numerical example can easily be reformulated so that it pertains to rent-seeking in the subsidization of investment. Suppose that a $2,000 subsidy is certain to be dissipated in wasteful rent-seeking but that the dispenser of the subsidy can expect to skim off $5 of benefit with no risk of detection. The subsidy generates a riskless gain to officials of $5 and a loss to the general public of $2,000 in the form of taxation to finance the subsidy or of loss of genuine public services that could have been financed instead. The operation is advantageous to officials when no alternative form of corruption is more profitable.

A more extended example illustrates the complex interaction between public and private benefits when officials are inclined to be corrupt. An official is entrusted with the task of licensing doctors. He is to grant a license to any would-be doctor who is qualified to practice medicine and to deny a license otherwise. He is paid a wage, W, and is expected to not charge doctors for granting the license. Suppose

(i) The license is the patients' only source of information as to whether a doctor is qualified or not.

(ii) The official would never grant a license to an unqualified person, perhaps for fear the coroner would eventually discover what the official has done.

(iii) There is a cost c of acquiring the qualifications to practice medicine.

(iv) The demand for medical services may be represented by an inverse demand function P(n), where P is the marginal valuation of the services of one doctor, n is the number of doctors and $P' < 0$. In this context, the term P is a present value rather than an ordinary price. On the assumption that the day-to-day market for medical services is competitive, it is at once the cumulative discounted value of the services of the doctor over his working life, and the cumulative discounted value of his earnings.

(v) The official demands bribes for granting licenses to qualified doctors.

(vi) It is costless for the government to determine whether a person is a qualified physician; this assumption which is never completely true is a generalization of the fact that it is often much cheaper for the government to acquire accurate information about whether a doctor is qualified or whether a drug has harmful side effects than it would be for the user of medical services.

(vii) The official bears no risk that his bribery will be detected.

The equilibrium number of doctor's is that for which

$$P = a + b + c \tag{29}$$

where P is the present value of the doctor's life-time earnings, c is the

cost of acquiring medical qualifications (medical school), b is the bribe to get a license to practice medicine, and a is the alternative cost - the doctor's earnings in the job he would have chosen had he not become a doctor, less his training cost in that job.

The bribe-taking official is a monopolist in the market for licenses to practice medicine. Since bribe-taking bears no risk of detection or punishment (an assumption soon to be relaxed), he chooses a bribe, b, to maximize his income, Y, where

$$Y = bn = \left[P(n) - (a+c)\right] n \tag{30}$$

Alternatively, the official may be seen as choosing a number of doctors, n, where his income per doctor is P(n) - (a+c). He picks that n for which the marginal revenue from issuing licenses, $\frac{d}{dn}(P(n)n)$, is just equal to the marginal cost, (a+c). The demand for and supply of qualified physicians is illustrated in Figure 6a. Had there been no bribery, the number of doctors would have been n^0 at which the marginal valuation of doctors, as indicated by the height of the demand curve, is just equal to marginal cost, as indicated by the height of the supply curve. When the official demands the optimal bribe, the number of doctors is reduced to n^b and the price of medical services rises from (c+a) to P^b. The official's revenue is the rectangular cross-hatched area, and there is a dead weight loss equal to the area of the shaded triangle. The corrupt official acts like an ordinary monopolist in this case.

The obvious question at this point is whether the community is better off with a license-grantor who demands bribes than with no licensing of doctors at all. The answer depends upon a number of considerations. If the alternative to licensing is to have no qualified doctors at all (because, for example, the return to the practice of medicine is insufficient to cover the

cost of acquiring qualifications when one has to compete with unqualified charlatans who cannot be distinguished from the genuine article), then licensing with bribery is preferable to no licensing, for, as may be seen in Figure (10a), there remains a consumers' surplus when $P = P^b$ and the transfer to the corrupt official is not pure waste.

A market without licensing might be preferable if, contrary to assumption (i) above, the doctors could somehow inform patients about their qualifications. Presumably, it is costly for a doctor to convey this information, for, otherwise, the licensing procedure would have been superfluous. Suppose that a payment of m per doctor is sufficient to enable patients to distinguish qualified doctors from unqualified people posing as doctors. Then patients are better off with licensing and bribe-taking than with no licensing whenever $m > b$; they are worse off whenever $m < b$ and no unlicensed person may practice medicine, regardless of his qualifications. Whether the patient's view of the matter is the whole story depends on the weight that society attaches to the act of bribery. A dollar's worth of bribery may be considered as worse than a dollar's worth of resource cost if law-breaking in the public sector contributes to a general disrespect for the law or places difficulties in the way of law enforcement elsewhere in the economy, and thereby creates social costs associated with crimes other than bribery. Alternatively, bribery may be given less weight than ordinary resource cost if it is seen as a mere transfer of income from one party to another, or if some account can be taken of the expected return from bribery in the determination of the official's wage.

In the extreme where no social cost is attached to a transfer of income through bribery from consumers to officials, the choice between licensing and not licensing becomes a trade-off between the deadweight loss associated with

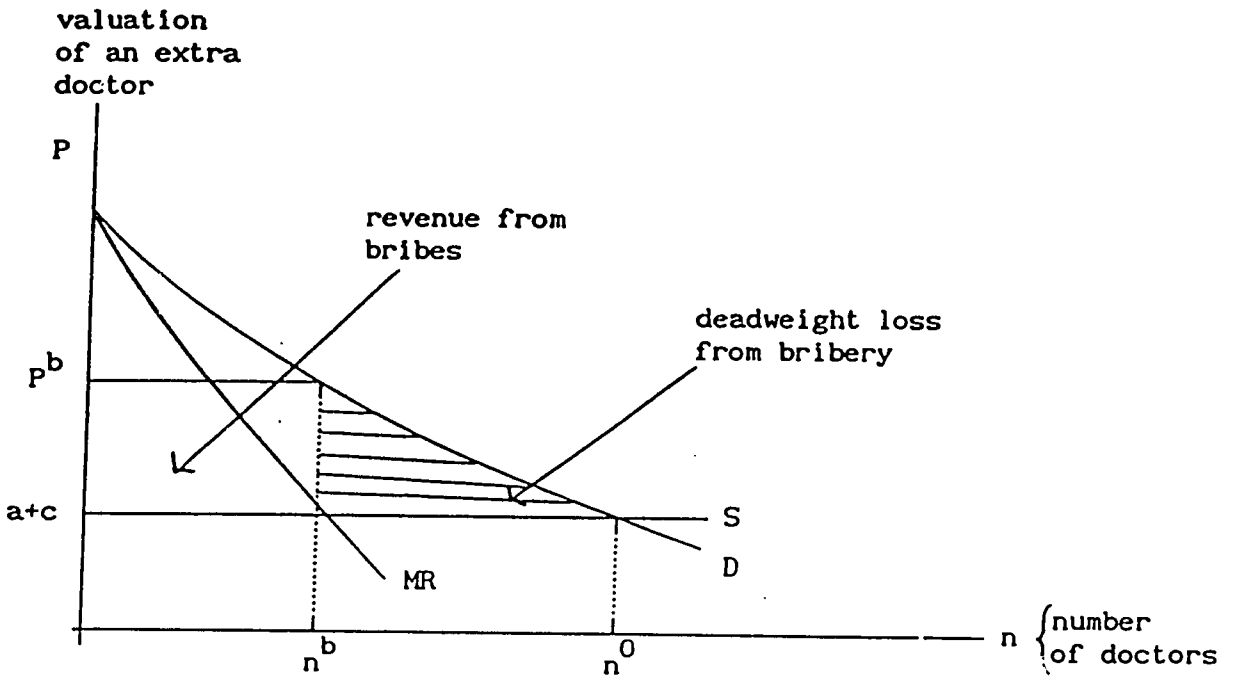


Figure 6a

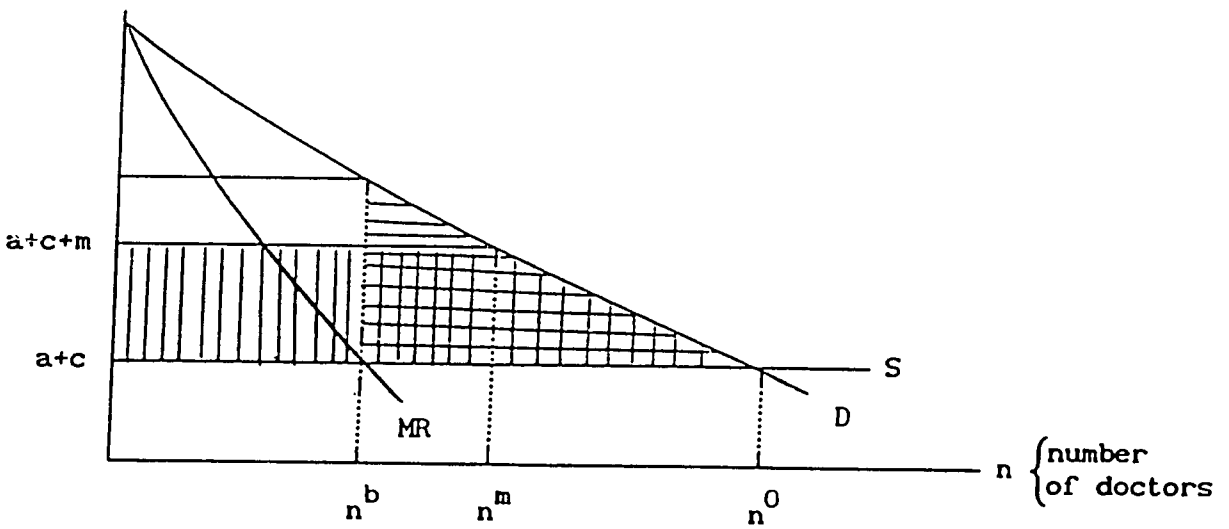


Figure 6b

bribe-taking and the sum of the resource cost and deadweight loss resulting from private effort to determine whether alleged doctors are qualified. The comparison is shown in Figure 6b which reproduces the demand and supply curves for doctors from Figure 6a and shows how the cost of doctors is increased by the identification cost, m. The deadweight loss associated with bribe-taking is the horizontally-shaded triangular area carried over from Figure 6a. The social cost of private effort to determine who is qualified as a doctor is the vertically-shaded area representing the sum of the resource cost mn^m (where m is the cost per doctor of verifying qualifications and n^m is the corresponding number of doctors demanded) and the deadweight loss, which is approximately equal to $m\ (n^0 - n^m)/2$, associated with the reduction in the demand for doctors resulting from the socially-unnecessary cost of verification. Licensing with bribery is clearly preferable to private verification if the socially-unnecessary private cost of verification is equal to the optimal bribe from the point of view of the official. The cost of verification, m, has to be quite a bit less than the optimal bribe, $P^b - (a+c)$, before it becomes advantageous not to license doctors at all.

The effect of punishment on the incidence and social cost of bribery depends very much on the severity of punishment and on the determinants of the probability of getting caught. Relax assumption (vi) above, and assume instead that the official faces a probability π that his bribe-taking is detected, that π increases with the size of the bribe ($\pi = \pi(b)$ where $\pi' > 0$), that either all or nothing of his bribe-taking is detected and that an official whose bribe-taking is detected must pay a fine of f per dollar of bribes. An official caught taking a bribe, b, from each of n licensed doctors must pay a fine of fnb. The expected income of an official who accepts bribes becomes

$$Y = W + nb + \pi fnb = W + (1-\pi f)\ nb \tag{31}$$

Suppose, for simplicity, that the official is risk neutral. Also suppose that f is small enough that $(1 - \pi f) > 0$, for a risk neutral official would accept no bribes unless this were so. Once again, the official maximizes his income with respect to n. Now that bribery carries a risk of punishment, the income-maximizing value of n is identified by the condition that

$$MR - MC - \frac{\pi f}{1-\pi f} E_{\pi b}\ P' = 0 \tag{32}$$

as long as the value of n for which the equality holds is less than n^0, so that some positive bribe can be demanded. In equation (31), MC is the marginal cost of a doctor (the distance a + c in Figure 6), MR is the marginal revenue of the official in his capacity as monopolist bribe-taker, P′ is the slope of the demand curve for doctors and $E_{\pi b}$ is the elasticity of the function $\pi(b)$ representing the effect of the size of the bribe on the probability of detection. Since, by assumption, $E_{\pi b}$ is positive and P′ is negative, the value of MC must be greater than the value of MR when the size of the bribe is optimal, implying, as may be seen immediately in Figure 10a, that the optimal bribe is smaller and the corresponding number of doctors is larger when bribery incurs a risk of detection when it does not. The size of the bribe diminishes and the number of doctors who receive licenses increases with the size of the fine, up to the point where $n = n^0$ and bribery ceases to pay at all.

The prospect of punishment alters the balance of advantages and disadvantages of licensing when the official demand bribes. The cost of bribery to the users of medical services is necessarily reduced when the risk of punishment leads to a reduction in the size of the bribe that the official demands, but there is an extra cost borne by the government in detecting bribe-takers and administering punishment. Let this cost be $C(\pi, f, n)$

where it is reasonable to suppose that all three partial derivatives are positive; $C_\pi > 0$, $C_n > 0$, and $C_f > 0$. The first inequality, $C_\pi > 0$, signifies that the total cost of detecting and punishing bribery increases with the probability of detection. The second inequality, $C_n > 0$, signifies that the cost increases with the number of bribes; it costs more to detect and punish, for example, 10% of 100 cases of bribery than to detect and punish 10% of 200 cases. The third inequality is less intuitively obvious. Since the fine is a transfer from the guilty party to the rest of society, one might suppose that an increase in the fine is a source of extra revenue, not extra cost. The difficulty with this line of reasoning, as has already been discussed in connection with the deterrence of ordinary crime, is that it leads to the implication that all bribery can be eliminated by the imposition of a sufficiently large fine. The mere fact that bribery is not entirely eliminated must signify that increases in f are costly rather than revenue-generating. Think of f as representing the severity of punishment, and not just monetary payments from the detected bribe taker to the government. As is well-known to students of the economics of crime, there are several reasons why some crime remains undeterred when the severity of punishment is optimal.

(j) Intimidation Cost: Virtually any task that the public sector is called upon to perform involves the establishment of rules. Rules require enforcement, and enforcement entails costs which must be counted as part of the total cost of public programs. Among these costs are the citizens' time and money devoted to evading the rules without getting caught, the government's expenditure of resources to enforce compliance, and (except where punishment takes the form of fines) the cost to convicted rule-breakers of the punishments that they must bear. Intimidation cost must be included

among the hidden costs of public expenditures.

That completes our list of the hidden costs of public expenditure. Costs associated with raising funds to finance public expenditures affect all expenditures more or less equally, but costs associated with the private sector response to particular public expenditures differ substantially from one type of expenditure to another. In principle, each activity in the public sector should be undertaken up to the point where its marginal benefit just equals its full marginal cost consisting of the sum of all the items on our list which apply in the particular case. The principal use of a list such as I have constructed is to avoid situations where public expenditure is pushed too far or where the public undertakes tasks that are best left to the private sector because some components of cost are ignored. Emphasis on hidden cost may serve as an antidote to the possible tendency on the part of departments of government to promote activities on the grounds that benefits exceed resource costs, ignoring the fact that hidden costs may exceed resource costs by a significant margin.

As this volume is about taxes and tax-like measures in the Third World, it may be useful to conclude with a few remarks on the applicability of the analysis of hidden costs in that context. A useful starting place is the much-repeated allegation that the tools of economics - especially the assumption that actors in the economy are rational and self-seeking, and the models of competition and monopoly - are better suited to the developed economies in which these tools were forged than to the Third World which operates on its own rules and principals. Nothing, in my opinion, could be farther from the truth. To be sure, the models with which economists attempt to make sense of events are, like any models in the social sciences, abstract and less than completely representative of the world around us. There is an

inevitable and ultimately-unbridgeable gap between actual societies and the theories we employ to explain them. This is true of all theory, no matter where or by whom it is constructed. But having said that, one should add that our economic models were developed, during the eighteenth and nineteenth centuries, in Europe which was probably more similar in many respects to the Third World as it is today than to Europe or America. I suspect that Adam Smith would see more that is familiar to him in contemporary Indonesia or Malaysia than in contemporary England or the United States. In particular, I suspect that Adam Smith would be immediately at home with the peasant agriculture, markets and small manufacturing of South East Asia and that he would have little difficulty in slotting Third World trade and industrial policies into the appropriate sections of The Wealth of Nations. On the other hand, he would, I suspect, be quite mystified by the large, hierarchical and powerful corporations of the First World that are neither competition nor monopoly as Smith knew these institutions and whose behaviour is imperfectly rationalized by our models. It is at least arguable that the developed economies are to a large extent out of reach of standard economic analysis while the so-called developing economies fit our models reasonably well. Obviously, each country has its own institutions, customs and peculiarities that have to be taken into account when drawing conclusions about policy from abstract models and reasoning, and a person analyzing institutions or prescribing policy for a country that is not his own must be particularly careful to avoid reasoning as though the institutions of his own country were universal. It does not follow that the models per se are country specific, or that perfect competition is a better model for Canada than for Thailand.

The only remaining proposition I would like to enunciate is that, while the hidden costs of public expenditure are universal, their magnitudes very often depend on the efficiency and honesty of the civil service in each country. In particular, the marginal social cost of tax evasion, tax avoidance, rent-seeking and out-and-out corruption is likely to be very much lower when public administration is effective and honourable than when it is not. From this it follows immediately, that the appropriate scope of the public sector depends critically on what the public sector is able to do well. The case for a publicly-financed old age pension is very different in a society where the civil service can immediately identify who is eligible and who is not and where the accounting has developed to a point where bureaucrats dispensing cheques to the old cannot demand compensation from legitimate recipients, than in a society where these conditions do not obtain. The proposition carries over to unemployment insurance, provision for the very poor, and the subsidization of investment in progressive firms. Thus not only does the classical economic model fit the Third World relatively well, but if public administration is, to use the standard euphemism, "developing" along with the rest of the economy, there may be a better case for the classical, laissez-faire prescriptions in the Third World than in the First.

Footnotes

1. The social welfare function and its relevance to the assessment of the benefits and costs of public expenditure is discussed in most good textbooks of public finance. See, for example, Robin Boadway and David Wildasin, Public Sector Economics, Little Brown, 1984.

2. There is not a great deal of literature on the overhead cost of public expenditure. See, for instance M. Mendelson, The Administrative Cost of Income Security Programs, Ontario and Canada, Occasional Paper #9, Ontario Economic Council, 1979.

3. The concept of deadweight loss in taxation is central to modern public finance. See Boadway and Wildasin cited in note (1)

4. There is a wide variation among estimates of marginal cost of public funds because such estimates are very sensitive to assumptions about the magnitudes of the underlying elasticities of demand and supply. In the earliest empirical paper on the subject, Campbell (Harry Campbell "Deadweight Loss and Commodity Taxation in Canada", The Canadian Journal of Economics, 1975, 441-477) estimates marginal social costs of taxation to be about $1.25 per dollar of public expenditure. Browning (Edgar Browning, "The Marginal Cost of Public Funds", Journal of Political Economy, 1976, 283-298) estimates the comparable figure for the United States to be between $1.09 and $1.16. The papers differ in that Campbell estimates the loss from the reorientation of consumption brought about by excise taxation, while Browning is concerned with the labour-leisure choice as affected by the income tax. Stuart (Charles Stuart, "Welfare Cost per Dollar of Additional Revenue in the United States", American Economic Review, 1985, 352-362) derives a series of estimates varying, according to the assumptions about elasticities of labour supply and other aspects of the economy, between $1.07 and $2.33.

5. In deriving equation 2, we ignore all products of first differences - terms like $\Delta X\ \Delta P^S$ = because these become infinitely small relative to a, b and c as ΔT becomes infinitely small. One can read off Figure 1 that

$$a = X\ \Delta P^D$$

$$b = X\ \Delta P^S$$

and $c = (P^D - P^S)\ \Delta X$

It follows that

$$\varepsilon^T = \frac{T\Delta X}{X\Delta T} = \frac{T\Delta X}{X(\Delta P^D - \Delta P^S)}$$

$$= \frac{T}{\frac{X\Delta P^D}{\Delta X} - \frac{X\Delta P^S}{\Delta X}} = \frac{T}{P^D/\varepsilon^D + P^S/\varepsilon^S}$$

$$= \frac{T\varepsilon^D\varepsilon^S}{P^D\varepsilon^S + P^S\varepsilon^D}$$

where the change in signs in the second line above is to account for the fact that ΔP^D and ΔP^S refer to opposite changes in P^D and P^S.

6. A burgeoning literature on the social cost of tax evasion is surveyed by F.A. Cowell, "The economic analysis of tax evasion: a survey" The London School of Economics: Bulletin of Economic Research, #37, (1985) 36-37. More up-to-date work is discussed in S. Yitzhati, "On the Excess Burden of Tax Evasion" Public Finance Quarterly, 1987, 123-137.

7. $$\frac{\Delta W}{\Delta R} = \frac{a}{a - (b+c)} = \frac{1}{1 - \frac{b+c}{a}}$$

where $a = \Delta T(X^0 - X^a)$

$b = T\Delta X^a$

and $c = T\Delta X^0$

Consequently,

$$\frac{\Delta W}{\Delta R} = \frac{1}{1 - \frac{T(\Delta X^a + \Delta X^0)}{\Delta TX}} = \frac{1}{1 - \varepsilon^T}$$

$$= \frac{1}{1 - \frac{T}{P^D}\left(\frac{\Delta X^a}{\Delta P^D}\frac{P^D}{X^a}\right)\frac{X^a}{X} + \left(\frac{\Delta X^0}{\Delta P^D}\frac{P^D}{X^0}\right)\frac{X^0}{X}}$$

$$= \frac{1}{1 - \frac{T}{P^D}\left(\varepsilon^A\frac{X^a}{X} + \varepsilon^D\frac{X^D}{X}\right.}$$

Note that T/P^D is the tax rate as a portion of the demand price.

8. For empirical work on the cost of transfers, see Edgar K. Browning and William R. Johnson, "The Trade-Off Between Equality and Efficiency", Journal of Political Economy, 1984, 175-203, and Charles L. Ballord, "The Marginal Efficiency Cost of Redistribution", American Economic Review, 1988, 1019-1033. Both papers present ratios of losses to the top four quintiles of the American population to gains to the bottom quintiles. Their estimates depend critically upon assumed elasticities of the tax base to the tax rate. Browning and Johnson's "preferred" estimate is 3.49. Ballard's preferred estimate is between 1.5 and 2.5.

9. On the effect of unemployment insurance upon the incidence of unemployment, see Dale T. Mortensen, "Unemployment Insurance and Job Search Decisions", Industrial and Labour Relations Review, 1977, 505-517, and Robert H. Topel, "On Layoffs and Unemployment Insurance", American Review, 1983, 541-559. The effect of provision of welfare for unmarried mothers upon the incidence of illegitimacy is discussed in Charles Murray, Losing Ground: American Social Policy 1950-80, Basic Books, 1984, and Victor R. Fuchs, How We Live, Harvard University Press, 1983, chapter 4.

10. Two of seminal articles on the effects of public indebtedness and saving are Martin Feldstein, "Social Security, Induced Retirement, and Aggregate Capital Accumulation", Journal of Political Economy, 1974, 905-926, and Robert Barrow, "Are Government Bonds Net Wealth", Journal of Political Economy, 1974, 1095-1117. Both papers apply equally well to public undebtedness financed by bonds and to public indebtedness in the form of promises to pay old age pensions. Feldstein argues that public indebtedness substitutes for private capital formation when one's motivation for saving is to provide for one's old age. Barrow argues that public indebtedness has no effect upon private capital formation when people expect to make bequests for their children.

11. The subject is surveyed in Robert Bish, "Improving Productivity in the Government Sector", in David Laidler, ed., Responses to Economic Change, (Vol. 27 of background studies for the MacDonald Commission) University of Toronto Press, 1986.

12. The concept of rent-seeking was introduced by Gordon Tullock in "The Welfare Costs of Tariffs, Monopolies and Theft", Western Economic Journal, 1967, 224-232. The name "rent-seeking" first appeared in Ann Krueger, "The Political Economy of a Rent-Seeking Society, American Economic Review, 1974, 29-303. Somehow the name stuck. This is a pity, for, in my opinion, the term "rent-seeking" is one of the least expressive terms in the entire lexicon of economics. If rents mean anything at all, then firms always seek rents, in ordinary commercial transactions and in their dealings with government; there is nothing in the term "rent-seeking" to suggest the wasteful competition for public favour that the term has recently come to mean. A number of important papers on rent-seeking, including the two cited above, are included in James Buchanan, et.al., Toward a Theory of the Rent-Seeking Society, Texas A & M University Press, 1980. On rent-seeking and corruption, see Elie Appelbaum and Eliakim Katz, "Seeking Rents by Setting Rents: The Political Economy of Rent Seeking", Economic Journal, 1987, 685-699.

13. The possibility of socially advantageous rent-seeking has been discussed by Robert J. Michaels, "The Design of Rent-Seeking Competitions", Public Choice, 1988, 17-29.

14. Each firm chooses R_i to maximize

$$\pi_i \equiv (1{,}000{,}000)\ p_i - R_i = \frac{1{,}000{,}000\ R_i}{\left(\sum_{j=1}^{n} R_j\right)} - R_i$$

Setting $\partial\pi_i/\partial R_i = 0$ implies that

$$\left[\frac{\sum_{j=1}^{n} R_j - R_i}{\left(\sum_{j=1}^{n} R_j\right)^2}\right](1{,}000{,}000) = 1$$

or $\frac{n-1}{n^2}(1{,}000{,}000) = R$ where, as must be the case in a rent-seeking equilibrium among indentical firms, all R_i are equal to one another and R is their common value.

15. Profit, π_i, becomes

$$\pi_i = \frac{R_i^{\alpha}\ (1{,}000{,}000)}{\sum_{j=1}^{n} R_j^{\alpha}} - R_i$$

Setting $\partial\pi_i/\partial R_i = 0$ implies that

$$\left[\frac{\left[\left(\sum_{j=1}^{n} R_j^{\alpha}\right) \alpha\ R_i^{\alpha}/R_i\right] - \left[R_i^{\alpha}\ \alpha\ R_i^{\alpha}/R_i\right]}{\left(\sum_{j=1}^{n} R_j^{\alpha}\right)^2}\right](1{,}000{,}000) = 1$$

which reduces to

$$R = \frac{\alpha(n-1)}{n^2}(1{,}000{,}000)$$

where R is the common value of each firm's rent-seeking expenditure.

16. On the economics of corruption, see Susan Rose-Akerman, Corruption: A Study in Political Economy, Academic Press, 1978. For a nice collection of examples, see Arnold J. Heidenheimer, ed., Political Corruption: Readings in Comparative Analysis, Holt, Rinehart and Winston, 1970. See also F.T. Lui, "A Dynamic Model of Corruption Deterence", Journal of Puclic Economics, 1986, 215-236.

17. The connection between rent-seeking and corruption is discussed in Elie Appelbaum and Eliakim Katz, "Seeking Rents by Setting Rents: The Political Economy of Rent-Seeking", Economic Journal, 1987, 685-699.