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COALITION BREAKING AND POLICY REFORM

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COALITION BREAKING AND POLICY REFORM

by

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COALITION BREAKING AND POLICY REFORM

1. INTRODUCTION

Most public policy analysts have a clear perspective of economic robustness, but few attempts have been made to articulate a notion of political robustness. In general, economic robustness focuses on designing policies that will, when put into practice, serve the public interest. Operationally, the public interest can and has been defined in numerous ways (Steiner 1969). Similarly; many characterizations of political robustness can also be advanced.

Some policies that are in the public interest harm members of special interest groups. As a result, compensation schemes may be needed to make the pursuit of public interest politically robust. In this context, it is important to distinguish between public-interest-serving policies and compensation schemes. The combination of the two types of policies, public-interest and compensation policies, arise in many well-known circumstances: the mix of agricultural policies, privatization, urban planning and the supply of local public goods, policy reforms of all types, the release and dissemination of technical innovations, and so on.

In all of these instances, public-interest policies cannot be isolated from the more complex mass of government activities, some promoting waste and others promoting efficiency. Economic policies may be divided usefully into two types: (1) those meant to correct market failure, or provide public goods, and which are ostensibly neutral with respect to their distributional effects; and (2) those meant to redistribute wealth from one social group to another and which are ostensibly unconcerned with efficiency. The distinction between public-interest-serving policies and wealth-transfer policies is summarized by the popular metaphor of the economy as a pie—the former expand the size of the pie, and the latter allocate the portions served.[1] Expanding the pie does not guarantee that all portions served will also grow. If social groups must cooperate, and/or some groups have sufficient political influence then the public interest and /or some groups have sufficient political influence, then the public interest and wealth transfers as compensation are politically inseparable.

Treated as a separable activity, compensation may appear as an inefficient, rent-seeking-based policy given that a public good is in place. The existence of compensation is observationally equivalent to distorting wealth transfers resulting from the competition between pressure groups. In the models of Gary S. Becker (1983), A. Downs (1957), A. Krueger (1974), M. Olson (1965), Sam Peltzman (1976), George Stigler (1971), and Gordon Tullock (1967), groups wrestle over the potential wealth offered by an economic system, enjoying subsidies or suffering taxes in proportion to their relative political strengths. The political power of these rent-seeking groups depends on their attributes—such as membership size; abilities to manipulate the news media; and, importantly, their efficiency at overcoming the free rider problem. An important element of these frameworks is that potential wealth is defined by freely operating markets. Politically- coerced transfers between groups necessarily waste some of this wealth. In short, transfers flow to the politically strong at the expense of the society as a whole.

This paper is based on an alternative model where a policy that enhances the public interest may have to be accompanied by a compensation scheme. In a prescriptive sense, a political and economic robust mix of policies that manages special interests whose influence might otherwise obstruct the public interest. Accordingly, a potentially winning group taxes itself in order to mitigate the losses suffered by another group whose political strength lies in its ability to veto a move from the status quo. If threatened with sufficient harm, the latter group's membership would form a blocking coalition that obstructs the implementation of new policies. In effect, the taxed group is in control of policies, including the method of wealth transfer, and the subsidized group merely sets constraints on the feasible choices.

The main result of our analysis is that price-distorting compensation schemes, in contrast to lump-sum transfers, may actually serve the purpose of overcoming this veto more efficiently. This potential occurs through the targeting of members of the losing group who suffer less because they can take advantage of the proposed public-interest policy. The analysis offers an alternative hypothesis to the traditional view of rent seeking; instead of being failures of public choice, price-distorting compensation schemes may be nothing more than the most effective means of securing public-interest policies.

The second section presents the basic model of coalition breaking in order to gain acceptance of a public-interest policy, or a public good. We present the model as a conflict between two groups producers and consumers/taxpayers, over the release of a price-decreasing technical change. The third section presents the choice by consumers/taxpayers of the means of wealth transfer. We consider the continuum of transfer mechanisms which are combinations of two polar cases that do not differentiate between firms with respect to ability to take advantage of the public good. The two polar schemes are: (1) a per-unit-output subsidy, which distorts producer and consumer prices; and (2) a production-neutral payment, which the producer cannot affect by choice of output level. The section demonstrates the conditions under which consumers/taxpayers would prefer price distortion. Section 4 examines the likely case of an imperfect coincidence of consumer and taxpayer interests and considers the frequent use of output restrictions with wealth transfers. In the fifth section, we address the particular case of constant-elasticity supply and demand to illustrate in concrete form the more general analysis of the previous sections. Finally, some concluding remarks are offered.

2. INTEREST GROUP STRUCTURE

Suppose there are two interest groups in society—consumers/taxpayers and producers. Individual Members of these groups behave competitively in the market place, but they may cooperate with other groups members in political choice. Each group is composed of many members; and there is some rule for weighting the votes of individual members to decide each group's position on a policy, as well as whether or not the group will expend effort opposing a particular policy. For pedagogical purposes, we will take the particular public-interest policy to be the release of a technical innovation that will increase production but, by doing so, will also harm enough producers by decreasing output price that the release without compensation will be vetoed.[2]

Producers are endowed with different levels of ability to utilize the new technology, due to firms differing by location, vintage of capital, and endowments of human capital and entrepreneurial talent; and, therefore, some producers will suffer more than others with the innovation release. To formalize the concept of ability to take advantage of the innovation, let a be some index of producer attributes. Define $\pi_0(a)$ as the rent accruing to a-type firms prior to the release of the innovation and $\pi_1(p,a)$ as the rent accruing to those firms under output price, p, and with the release. Assume the profit functions are well-behaved in p and a. Without placing any sign on the derivatives of π_0 and π_1, with respect to a, we define ability to take advantage of the release as

$$\frac{\partial \pi_1(p,a)}{\partial a} > \frac{\partial \pi_0(a)}{\partial a} \text{ for all p.} \tag{1}$$

Intuitively, condition (1) implies that firms of higher level ability gain relatively more, or lose relatively less, from the innovation release. If producers are homogeneous prior to the innovation release, then $\partial \pi_0/\partial a = 0$. Note that, with homogeneous firms prior to release, condition (1) implies that $\pi_1(p,a)$ is a strictly increasing function of ability. Similarly, the gain in output level, y, for a producer due to the innovation release is a positive function of a:

$$\frac{\partial y_1(p,a)}{\partial a} > \frac{\partial y_0(a)}{\partial a} \text{ for all p,} \tag{2}$$

where $\partial \pi_0/\partial p = y_0$ and $\partial \pi_1/\partial p = y_1$. In other words, a producer's ability to profit, or suffer less, from the innovation release is positively correlated with the change in output level.

Let $f(a)$ be the proportion of firms of a-level ability over number of producers. Define V as the minimum number of producer votes needed to have the producer group support the innovation release. Under a weighted-vote rule, $w(a)$, define the index, c, such that

$$V = \int_{c}^{\infty} w(a) f(a) da, \tag{3}$$

where the weighting rule could be based on the initial level of output: $w(a) = y_0(a)$. If the c-type producer is just indifferent to voting against the release (i.e., if $\pi_1(p,c) = \pi_0(c) - k$, where c is a cost of lobbying to prevent release), then all firms with ability greater than c will benefit from the innovation's release. Therefore, any generic compensation scheme that affects the producer price or offers a per-producer, price-neutral payment need only make indifferent the c-type producer in order to gain the producer group's acquiescence to the policy.

3. TARGETING PAYMENTS UNDER HETEROGENEOUS ADOPTION

Given that some form of wealth transfer is necessary to gain acquiescence of a supply-enhancing public-interest policy, the question becomes that of determining the least costly means of breaking the potential coalition of products. We narrow our attention to a priori rules that effect the size of the political coalition. We may think of such rules as being announced at the same time as the promised consequences of the technical advance, but prior to the actual dissemination f the advance. For example, this is approximately the situation in the case of agriculture in the United States, where rules of wealth transfer are in place and where aggregate growth of productions anticipated to be supported by a structured and on-going system of R&D and dissemination. Aggregate production is expected to grow due to future innovations and discoveries, the particulars of which are unknown to all but, perhaps, a few.

Of a priori rules, we consider two schemes: (1) a nondistorting payment promised to all producers , and perhaps based on initial output levels; and (2) a distorting per-unit output payment. The key features of these a priori rules is that they are generic in the sense that they do not distinguish directly between producers. Consumers/taxpayers do not target payments to specific producers, either because there exist high transaction costs to the identification of those with superior abilities or because there exist political constraints to transfers based on overtly personal criteria. Nevertheless, while per-unit-output payments do not directly target a group, they do, in effect, tend to concentrate transfers on those who make the greatest relative use of the supply-expanding public-interest policy. The cost to consumer/taxpayers of concentrating transfers on those with the greatest ability is the inefficient level of production brought about by a producer price higher than the market-clearing price.

Specifically, consider the following price-distorting and production-neutral payment schemes. Consumers/taxpayers seek to choose the levels of two generic payments: a production-neutral payment of b dollars per-unit-output on the initial (prerelease) level of a producer's output; and a nonneutral subsidy $(P_T - P_1)$ on the producer's change in output due to the release. The term, P_T, is the targeted producer price and P_1 is the equilibrium, market-clearing price-paid by consumers. In order to assure breaking of the producer coalition, P_T and b are chosen such that the c-level firms are indifferent to the innovation release.

Represent the a-type producer cost of output level y by $e(y,a)$. The instruments, P_T and b, are chosen such that

$$(P_T - P_1)\left[y(P_T,c) - y_0(c)\right] + P_1 y(P_T,c) + b y_0(c) - e(y,c) = \pi_0(c) - k. \qquad (4)$$

Note that the firm makes production decisions based on the target price, P_T. Therefore, the point of indifference of the c-level firm with both the innovation release and the transfer payments may be written

$$\pi(P_T,c)+(b+P_1-P_T)y_0(c)=\pi_0(c)-k. \tag{5}$$

where $\pi(P_T,c)=P_T y(P_T,c)-e(y,c)$—the familiar profit function satisfying Hotelling's lemma: $\partial\pi_c/\partial P_T = y_c(P_T)$.

Consumer/taxpayer welfare gains under the innovation release and the compensation schemes may be measured by the sum of the consumers' marshallian surplus and the total taxpayer outlays, i.e.,

$$CS=\int_{P_1}^{P_0} D(P)dP-\left\{[P_T-P_1][S(P_T)-S_0]+bS_0\right\}, \tag{6}$$

where $S(P_T)=\int_a y(P_T,a)f(a)da$ and $S_0=\int_a y_0(a)da$. Payments may be either nondistorting, in the sense that the consumer and producer prices are equal (i.e., $P_T = P_1$) or distorting (i.e., $P_T > P_1$). The extent to which payments are distorting, or coupled to production decisions, depends on the degree to which consumers/taxpayers rely on the price subsidy to make indifferent the c-type producers to the innovation release [i.e., to satisfy condition (5)]. If $P_T = P_1 + b$, then the payments are entirely of the distorting kind; and, if $P_T = P_1$, then payments are entirely of the nondistorting kind.

The first result relates to the sub-optimality of a completely nondistorting payment scheme.

PROPOSITION 1: If the output of the marginal coalition-breaking firm (the c-type producer), relative to its initial level [$y_c(P)/y_{c0}$], is greater than the average relative output increase [$\bar{y}(P)/\bar{y}_0$] of the industry, then a distorting payment scheme is preferred by consumers/ taxpayers.

The proof of this result is straightforward. Consider the nondistorting case where $P_T = P_1$ and all transfers are accomplished by the nondistorting per-unit-output payment, b, on the initial output. A marginal increase in P_T, and a decrease in b satisfying (5), will increase net consumer/taxpayer gains due to the release-with-compensation policy, if $\partial CS / \partial P_T > 0$. Noting that $P_T = P_1$, a move toward a distorting payment is preferred if

$$\frac{\partial CS}{\partial P_T} = -S(P_T) + S_0 y_c(P_T) / y_{c0} > 0 \tag{7}$$

or if

$$\frac{y_c(P_T)}{y_0(c)} \bullet \frac{\bar{y}_0}{\bar{y}(P_T)} = \rho > 1.$$

This result demonstrates that there are simple and plausible conditions under which one would expect to observe distorting payment policies, even if consumers/taxpayers had complete control over the selection of those policies.

Proposition 1 relies on heterogeneous producers, where the marginal defector from the blocking coalition increases supply by a greater percentage than the industry average. The relative level of the marginal defecter's output increase to the industry's average is a measure of the degree to which consumers/taxpayers can optimally target payments via nonneutral transfers. More generally, if there is a mix of price distorting and nondistorting payments, then the optimal level of price distortion is a function of these relative rats of output increases due to the innovation release and payment scheme.

PROPOSITION 2. If both price-distorting and nondistorting payment mechanisms are optimal, then the rate of price distortion, measured by ($(1 - P_1 / P_T)$), is proportional to the rate of increase in the c-type firm's output relative to the industry's average:

$$(1 - P_1 / P_T) = \varepsilon^{-1}\left[\frac{y_c(P_T)}{y_{c0}} \bullet \frac{\bar{y}_0}{\bar{y}(P_T)} - 1\right] = \varepsilon^{-1}(\rho - 1), \tag{8}$$

where ε is the aggregate supply elasticity.

The result is simply the first-order condition for maximizing the consumer/taxpayer welfare given by (6). The optimal degree of price distortion is an increasing function of the rate of output increase of the marginal defector, and is a decreasing function of the aggregate supply elasticity. The measure of relative output increase due to the innovation release (ρ) is an indicator of how easily one can target payments to defecting producers via a per-unit-output payment. The supply elasticity indicates the degree to which resources will be misallocated due to the nonneutral payments. The optimal level of price distortion, therefore, is a function of both the heterogeneous ability to take advantage of the innovation release, *and* the inefficiency caused by the coupling of payments. This implies that, in those industries where producers are fairly homogeneous in their adoption of new technologies, one would be less likely to observe nonneutral, "inefficient" payments.

One particularly noteworthy result is that the optimal degree of price distortion is not directly dependent on the degree of technical change: it is the heterogeneity of the technology's adoption that is important, not the size of the supply increase. The absolute degree of the potential supply shift will determine whether or not consumers/taxpayers seek to break the producer coalition—a small supply that may generate insufficient marshallian surplus to justify the implementation costs of any transfer payment scheme. The absolute degree of the supply shift will also affect the total amount of compensation that must be offered the marginal defector.

Of course, condition (8) presumes an interior solution, but a corner solution (i.e., $P_T = P_1 + b$) to the consumer/taxpayer problem is possible. The conditions under which the consumers/taxpayers would rely solely on distorting payments would depend on the specific functional forms of the producers' supplies and the demand function. Nevertheless, if producers are sufficiently heterogeneous, in the sense that the c-type firm's output increase is great relative to the industry average, then no nondistorting transfers are made. The broadest condition is, that if

$$\left(1 - P_1 / P_T\right) < \varepsilon^{-1}(\rho - 1) \qquad \text{for all } P_T, \tag{9}$$

then a corner solution is optimal, P_T is chosen such that $\pi(P_T,c) = \pi_0(c) - k$, and no nondistorting payments are made. A sufficient condition is given by the following proposition:

PROPOSITION 3: If the percentage difference between the marginal defecter's output increase and the industry's average is greater than the supply elasticity at all levels of P_T that satisfy (5), then consumers/taxpayers prefer the exclusive use of distorting payments to assure coalition breaking.

The foregoing result is simply a stronger version of condition (4), where the left-hand side of the inequality has been replaced by unity.

4. Noncoincidental Consumer and Taxpayer Interests, and Output Constraints

A number of additional aspects to the above analysis naturally emerge. First, consumer and taxpayer interests may not perfectly coincide; and second, output restricting policies are often implemented in tandem with transfer or compensation policies in U. S. agriculture. Consumer and taxpayer interests may be imperfectly aligned because of the existence of progressive income tax rates while the share of expenditure devoted to the good in question may be decreasing in income. In addition, there may exist inefficiencies associated with taxation itself, making a dollar transferred to producers more costly from taxation relative to increasing the price of the good. Placing differential weights on consumers' marshallian surplus and taxpayers' outlays will alter the optimal combination of price-distorting and non-price-distorting payments. Furthermore with a greater weight on taxpayers' expenditures, output restrictions may serve the purpose of transferring surplus gains from consumers to producers.

Suppose consumer and taxpayer welfare measures receive weights λ and $(1-\lambda)$ in the selection of the optimal transfer mechanism that breaks the producer coalition. There exists an additional instrument at consumers'/taxpayers' disposal: an output restriction that reduces both firm output and rent by some proportion $(1 - r)$. That is, for some producer price P_T, consumer price P_1, per-unit-initial output payment b, and ability a, a firm producers $ry(P_T,a)$ and earns rent of $r[\pi(P_T,a) + (b + P_1 - P_T)y_0(a)]$. For example, suppose each firm is endowed with one unit of land of homogeneous quality, and the per-acre cost function is independent of quality. In this setting, the government requires $(1 - r)$ units of land to be "diverted."

The consumers taxpayers wish to maximize the weighted sum of the marshallian surplus gain and tax outlays,

$$CS = \lambda \int_{P_1}^{P_0} D(P)dP - (1-\lambda)\left[(P_T - P_1)r\left(S(P_T) - S_0\right) + rbS_0\right] \tag{10}$$

subject to the market equilibrium

$$rS(P_T) = \int_a ry(P_T,a)f(a)da = D(P_1), \tag{11}$$

and to a coalition-breaking condition. To break the coalition, the c-type firm must be indifferent to the innovation release and the compensation scheme, i.e.,

$$r\left[\pi(P_T,c) + (b + P_1 - P_T)y_0(c)\right] = \pi_0(c) - k. \tag{12}$$

Maximizing (10) subject to (11) and (12) yields the first-order condition for an interior solution:

$$-D\frac{\partial P}{\partial P_T} - (1-\lambda)r\left[(P_T - P_1)\frac{\partial S}{\partial P_T} + S(P_T)\left(1 - \frac{\partial P}{\partial P_T}\right) - S_0 y_c(P_T)/y_{c0}\right] = 0. \tag{13}$$

Noting that $rS = D$ and $\partial P/\partial P_T = (\varepsilon/\eta)(P_1/P_T)$, this condition may be written in terms of the optimal rate of price distortion, viz.,

$$1 - P_1/P_T = \frac{\omega + (\rho - 1)\eta/\varepsilon}{\eta + \omega}; \tag{14}$$

where ω is a strictly decreasing function of λ, i.e., $\omega(\lambda) = (1 - 2\lambda)(1 - \lambda)$, and $\omega(0) = 1$, $\omega(1/2) = 0$. One can easily verify that, as the weighting of consumer and taxpayer interest converges to equality at $\lambda := 1/2$, the optimal price distortion becomes that given by (8).

If supply and demand are represented by constant elasticity curves, and the relative output increase measure ρ is constant over the relevant range of P_T, some direct comparisons between rates of distortion may be made as the weight on taxpayers increases relative to that on consumers. Specifically, as the relative weight on taxpayers increases, $\omega(\lambda)$ decreases and the optimal rate of distortion fails.

Even if taxpayers were given all the weight n the choice of compensation scheme (i.e., if λ or, equivalently, $\omega = 1$), price-distorting payments may still be optimal. Consider the case where no distorting payments are made ($P_T = P_1$). A move to distorting payments will increase consumer/taxpayer gains if

$$\rho - 1 > \omega \frac{\varepsilon}{-\eta}. \tag{15}$$

Accordingly,

PROPOSITION 4: As the weight on taxpayers increases, the minimum relative output gain differential between the c-type firm and the industry average that rationalizes a distorting scheme also increases.

The intuition underlying proposition 4 is that some tax outlays are being recouped by consumers in the form of increased production. As the consumer benefits of these tax outlays are discounted (i.e., as ω grows), the relative cost of distorting policy increases. Nevertheless, even with complete weight on taxpayer interests, a sufficiently low supply elasticity relative to the demand elasticity would preserve the optimality of targeting compensation via some degree of price distortion.

Given an optimal selection of the rate of price distortion, which depends only on λ, η, ε, and ρ, the conditions under which a positive output restriction ($r < 1$) enhances consumer/taxpayer interests may be determined. From a point of no output restriction, consumers/taxpayers will gain from a decrease in r, if $\partial CS/\partial r > 0$. Defining $R_c = P_T y_c(P_T)$, output restrictions improve consumer/taxpayer interests if

$$1-\rho(1-\varepsilon\pi_c / R_c) \le 0. \tag{16}$$

Hence,

PROPOSITION 5: Placing some degree of restriction on output improves consumer/taxpayer welfare for large increases in the c-type firm's output relative to the industry's average, for small elasticities of supply, and for small ratios of rent to revenues for the c-type firm.

5. A PARTICULAR CASE: CONSTANT ELASTICITY SUPPLY AND DEMAND

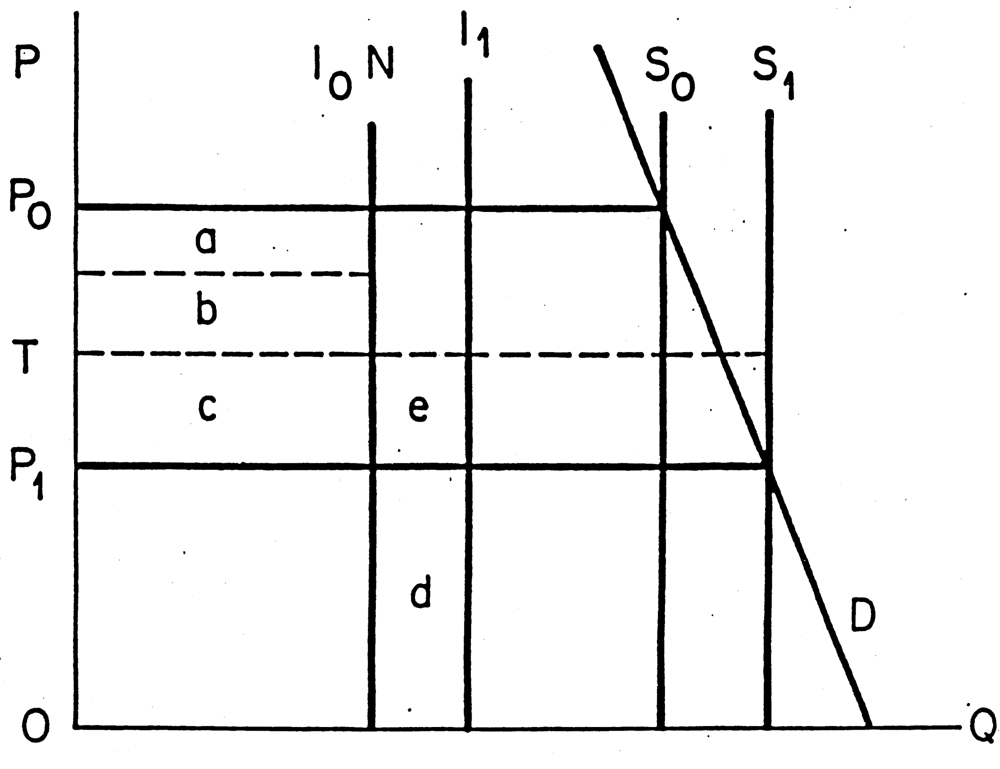
To draw out implications from the above theoretical results, we explore specific cases in this section. We do this in two parts. First, a graphical example is presented of the case of perfectly-inelastic supply. This case reveals the important factors determining output-based payments. Second, we turn to constant elasticity supply and demands and two types of producers, innovators and noninnovators. For this case, the explicit algebra determining price distortions that achieve effective coalition breaking is presented.

THE CASE OF PERFECTLY INELASTIC SUPPLY

Consider the example illustrated in Figure 1. This is an extreme case of two types of producers, innovators and noninnovators, who must be unanimous in opposition in order to obstruct the dissemination of a technical advance. Initially, their individual supply curves are identical, perfectly inelastic, and given by the curves labeled I_0 and N. Aggregate supply is

FIGURE 1

THE OPTIMALITY TO CONSUMERS
OF COALITION-BREAKING PER-UNIT OUTPUT PAYMENTS
UNDER PERFECTLY INELASTIC SUPPLY



Note: $S_1 = I_1 + N$, $I_0 = N$

given by $S_0 = I_0 + N$; demand, by D; and initial equilibrium price, by P_0. Now, if the technical advance is implemented, innovators would have the new supply curve of I_1; the new aggregate supply would be $S_1 - I_1 + N$; and the new equilibrium price would be P_1. Both types of producers would lose rents given by area $a + b + c$ due to the fall in equilibrium price. Innovators, however, would gain by area d due to expanded production. Here, area a is defined to equal area d. The potential net loss to innovators is, therefore, area $b + c$, which must be the least per-producer payment promised in order to prevent obstruction of the technical advance. The total consumer transfer to producers of $2(b + c)$ would leave the innovator just as well off as without the advance. The noninnovator would be a net loser of area a—the output-expanding benefit to the innovator.

Consider now the use of a "target" price that, when announced prior to the implementation of the technical advance, would guarantee to innovators that they would remain as well off as without the advance. This level of this producer price, T, is such that area b equals area e. Area e can be interpreted as benefits which the technical advance enables the innovator to gain in response to the target price. With the coupled policy, the innovator loses area $a + b + c$ due to the price fall, gains area d due to the technical advance, and gains area $c + e$ due to the support price. The noninnovator, however, gains only area c from the support price, implying a net loss of area $a + b$ with the coupled policy. Under the coupled policy, consumers need only transfer the amount of $2c + b$ to producers in order to gain the benefits of technical advance. A coupled policy, in this case of perfectly inelastic supply curves, benefits consumers by the amount b relative to the decoupled policy.

This example clearly demonstrates that coupled transfer schemes distinguish those who would lose less under output-expanding changes in production. Coupled transfer schemes are better targeted at those who are the most easily divided from the obstructing coalition. The case of inelastic supply curves and the similarity of innovators and noninnovators are the special features of this example that make apparent the superiority of a per-unit transfer policy. As the proportion of innovators grows large, the relative consumer gain from using per-unit rather than per-firm payments declines. At the extreme, where all identical firms would adopt the technology, the total amount of transfers is the same under both types of policies; and under perfectly inelastic supply curves the consumer would be indifferent between either scheme.

When supply is perfectly inelastic, no distortionary consequences result from a support price policy being coupled to the level of production. In essence, the policy is decoupled from production decisions because production is divorced from all price considerations. And, in this sense, there is no cost of distinguishing innovators and noninnovators with a coupled policy. As the supply curves move from being perfectly inelastic to having some price responsiveness, the cost of the transfer grows. This example illustrates clearly that there are two elements crucial to determining for consumers the best means of transferring benefits to producers—the relative proportion of innovators to noninnovators and the responsiveness of supply to coupled policies.

THE CASE OF CONSTANT ELASTICITY SUPPLY AND DEMAND

Consider that there are only two types of producers—innovators who would make use of a future technical advance and noninnovators who would not. Let the proportion of innovators be given by λ and the proportion of *noninnovators* be given by $(1 - \lambda)$, Let the initial profit and supply functions of both types of producers be given by the Cobb-Douglas constant-elasticity production model

$$\pi(P) = \frac{1}{1+\alpha}\left(\frac{1}{C}\right)^{\alpha} P^{1+\alpha}, \tag{17}$$

where

$$\frac{\partial \pi(P)}{\partial P} = y(P) = \left(\frac{1}{C}P\right)^{\alpha}. \tag{18}$$

To be specific, consider a technological advance that shifts innovators' supplies at every price by the proportion $1/\theta$. An innovator's supply curve, after the technical advance, is given by

$$y = \frac{1}{\theta}\left(\frac{1}{C}P\right)^{\alpha}. \tag{19}$$

Total supply after the innovation is adopted, S_1 is the sum of innovator and noninnovator supplies, viz.,

$$S_1(P) = \lambda \frac{1}{\theta}\left(\frac{1}{C}P\right)^{\alpha} + (1-\lambda)\left(\frac{1}{C}P\right)^{\alpha}. \tag{20}$$

Take the constant-elasticity curve given by $D(P) = bP^{-\beta}$. Therefore, equilibrium price, P_1, is given by

$$S_1 = \frac{\lambda}{\theta}\left(\frac{P_1}{c}\right)^{\alpha} + (1-\lambda)\left(\frac{P_1}{c}\right)^{\alpha} = bP_1^{-\beta} \tag{21}$$

implying

$$P_1 = P_0\left(\frac{\theta}{Z}\right)^{1/(\alpha+\beta)}, \tag{22}$$

where P_0 is the equilibrium price without the dissemination of the advance and $Z = \lambda + (1 - \lambda)\theta \leq 1$. The term, Z, may be given an intuitive meaning by noting that the percentage gain in an innovator's yield over the average yield of all producers can be expressed as

$$\frac{1}{\theta}\left(\frac{P_1}{c}\right)^{\alpha}(S_1 - 1)^{-1} = \frac{1}{Z} - 1. \tag{23}$$

The term, Z, is a measure of how well one can distinguish innovators from all other producers through production levels. As Z falls, an innovator's production level grows relative to the average production in the industry. Once the advance is adopted, an innovator profit is given by

$$\pi_1 = \frac{1}{\theta}\left(\frac{\theta}{Z}\right)^{(1+\alpha)/(\alpha+\beta)} \pi_0. \tag{24}$$

Without loss of generality, take the cost of lobbying in order to obstruct the dissemination of the technical information to be proportional to initial profits, viz., $l\pi_0$. The consumers/taxpayers will find it necessary to compensate at least the innovator if his profits fall below that which he could obtain by obstructing the change. Define this level of compensation as B_d, where $B_d = \pi_0 - l\pi_0 - \pi_1(P_1) \geq 0$ and thus

$$B_d = \pi_0\left[(1-l) - \frac{1}{\theta}\left(\frac{\theta}{Z}\right)^{(1+\alpha)/(\alpha+\beta}\right] \geq 0. \tag{25}$$

This implies that, in order for transfers to serve the public interest, the level of technical change and the number of innovators must be such that

$$Z(1-l) \geq \left(\frac{\theta}{Z}\right)^{(1-\beta)/(\alpha+\beta)}. \tag{26}$$

The intuition behind expression (26) is that, for a transfer scheme to be necessary, the residual demand facing the innovators must be sufficiently inelastic such that the price effect of the technical change is greater than the cost savings. For a given level of the advance, θ, as the proportion of innovators increases, the more inelastic is the residual demand facing that group, the more depressed price will become and the more necessary will compensation become to avoid obstruction.

Under a decoupled policy, announced prior to discovering innovators, based on lump-sum, per-producer payments, the minimum total amount of wealth transfer, B_d, is given by expression (26). Gross consumer benefits of the technical advance with the decoupled policy CS_d, is represented by the area under the demand curve between prices P_0 and P_1, i.e.,

$$CS_d = \frac{bP_0^{1-\beta}}{1-\beta}\left[1-\left(\frac{\theta}{Z}\right)^{(1-\beta)/(\alpha+\beta)}\right]. \tag{27}$$

Net consumer gains from the advancement are represented by $R_d = CS_d - B_d$.

Now consider the other polar case, where price-distorting, coupled policy is a "targeted" price, T, guaranteed to all producers, that will make the innovator just indifferent to obstructing the change:

$$\pi_1(T) = \frac{1}{1+\alpha}\frac{1}{\theta}\frac{T^{1+\alpha}}{c^{\alpha}} = \pi_0(1-l), \tag{28}$$

implying

$$T = P_0[\theta(1-l)]^{1/(1+\alpha)}. \tag{29}$$

The coupled policy will induce a greater level of production from all firms, implying a new equilibrium price, P_t, given by

$$bP_t^{-B} = S_t = \left(\frac{T}{c}\right)^{\alpha}\frac{Z}{\theta}, \tag{30}$$

$$P_t = P_0\left[[\theta(1-l)]^{\alpha/(1+\alpha)}\frac{Z}{\theta}\right]^{-1/\beta} \tag{31}$$

The total transfers to producers under the per-unit payment scheme are given by

$$B_c = (T - P_t)S_t, \tag{32}$$

which, after some algebraic manipulation, may be represented as

$$B_c = \frac{P_0^{1+\alpha}}{c^{\alpha}}\left\{(1-l)Z - \left[[\theta(1-l)]^{\alpha/(1+\alpha)} \bullet \frac{Z}{\theta}\right]^{-(1-\beta)/\beta}\right\}. \tag{33}$$

Gross consumer benefits from the coupled policy, CS_c, is given by the area under the demand curve between P_0 and P_t, viz.,

$$CS_c = \frac{bP_0^{1-\beta}}{1-\beta}\left\{1 - \left[[\theta(1-l)]^{\alpha/(1+\alpha} \bullet \frac{Z}{\theta}\right]^{-(1-\beta)/\beta}\right\}. \tag{34}$$

Net consumer/taxpayer benefits from the coupled policy are given by $R_c = CS_c - B_c$.

We may now characterize the condition under which consumers/taxpayers would prefer strictly coupled to strictly decoupled policies.

PROPOSITION 6: For the constant-elasticity supply-and-demand case it is sufficient that the percentage gain in an innovator's level of production over the industry average is greater than the supply elasticity for consumers/taxpayers to prefer a coupled transfer of an additional marginal amount to producers. That is, if $1/Z-1 > \alpha$, the consumers would prefer to give an additional dollar to innovators through coupled rather than decoupled means.

PROOF: For familiarity here, let the total number of producers be arbitrarily represented by N. The total amount at the margin that the consumer expends on the coupled program could be distributed evenly across all producers in the decoupled, per-producer payment scheme. If the per-producer amount transferred to innovators by this decoupled means $(\partial TS_l/\partial T)$ (N^{-1})) is less than the per-producer transfer to innovators by the target price $(\partial \pi_1/\partial T)$, then the decoupled policy is clearly inferior because the consumers can accomplish at least the same transfer to innovators by the coupled means and also gain some value due to the additional consumption.

The increase in consumer/taxpayer expenditures for an increase in the support price is given by

$$\frac{\partial TS_t}{\partial T} = (1+\alpha)\left(\frac{T}{c}\right)^{\alpha} \bullet \frac{Z}{\theta} \bullet N. \tag{35}$$

This increase in expenditures can be directly transferred through a decoupled program and increase each innovator's welfare by $\partial TS_t / \partial T = (1+\alpha)(T/c)^{\alpha} Z\theta^{-1}$. The associated increase in each innovator's profit with the coupled policy is given by $\partial \pi_t / \partial T = (T/c)^{\alpha}\theta^{-1}$. From the immediately preceding paragraph, the decoupled policy is clearly inferior if

$$\frac{\partial TS_t}{\partial T} \bullet \frac{1}{N} < \frac{\partial \pi_1}{\partial T}, \tag{36}$$

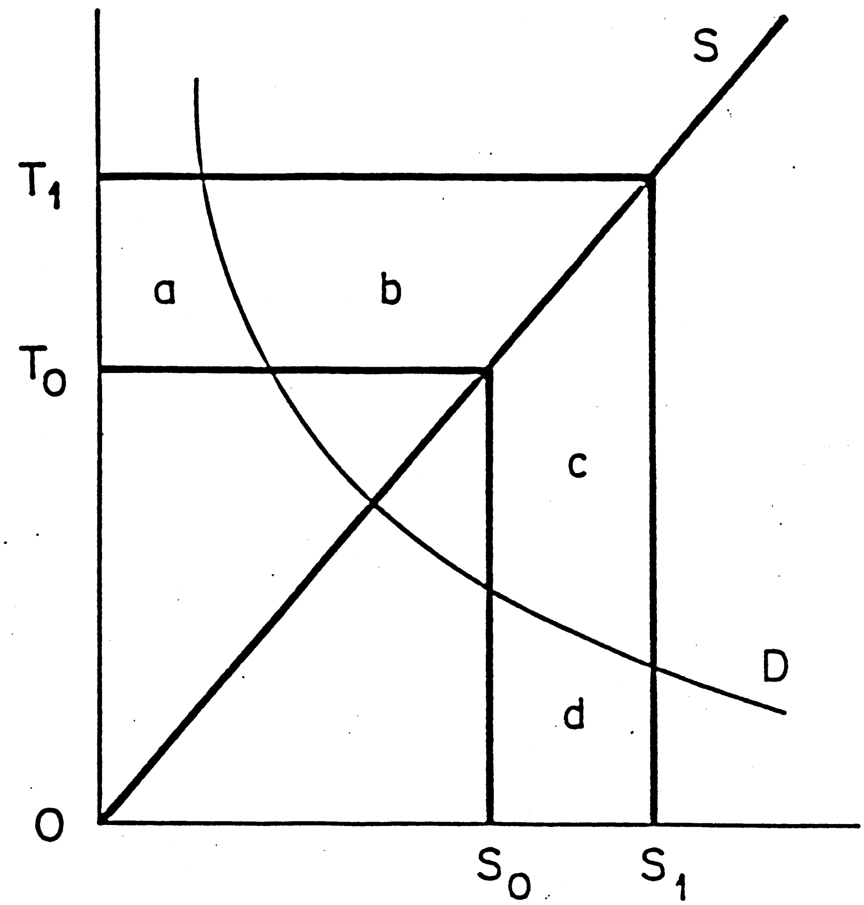
or if $1/(1+\alpha) > Z$, or $1/Z - 1 > \alpha$.

In the case of a perfectly inelastic demand curve, the condition, $1/Z - 1 > \alpha$, is both sufficient and necessary for consumer preference of a coupled program transfer of an additional dollar to innovators. The intuition of the proposition can be illustrated in Figure 2. Consider the additional transfer of $T_1S_1 - T_0S_0$ dollars to all producers, which is area $a + b + c + d$ in Figure 2. This could be done in two ways: through a $[T_1S_1 - T_0S_0]/N$ transfer to each innovator (as well as to each noninnovator) under a decoupled, per-firm payment scheme or through an increase in the target price from T_0 to T_1. The target price increase would imply a total profit increase of area $a + b$ for all producers taken together and a profit increase of $\pi_1(T_1) - \pi_1(T_0)$ for each innovator. The condition, $1/Z-1 > \alpha$, is simply that which assures for a small increase from T_0 to T_1,

$$\frac{1}{N}\left[T_1S_1 - T_0S_0\right] < \pi_1(T_1) - \pi_1(T_0). \tag{37}$$

FIGURE 2

CONSUMER GAINS FROM PER-UNIT-OUTPUT PAYMENTS



If expression (37) holds, the consumer under coupled policies can accomplish a greater transfer to innovators and at the same time gain from an increase in consumption—area *d*—that would otherwise be foregone with a lump-sum transfer. Under a perfectly inelastic demand curve, however, area *d* disappears and the consumers/taxpayers lose by area $a + b + c + d$ under either transfer scheme. The criterion for choosing a target price over a lump-sum payment would not involve any consumption gains but collapse to a question of targeting to innovators the greatest proportion of the additional dollar expended. It is the possibility of the additional consumption of area *d* that makes the condition, $1/Z - 1 > \alpha$, sufficient but not necessary; while an increase in the support price might transfer less to the innovator than a direct per-producer payment, it could still increase total consumption as well.

As it turns out, the condition, $1/Z - 1 > \alpha$ is sufficient for the superiority to consumers/taxpayers of coupled policies.

> *PROPOSITION 7:In the constant-elasticity supply-and-demand case, if a transfer policy is necessary to overcome obstruction [i.e., the condition in expression (26) holds] and the percentage gain in an innovator's level of production over the industry average is greater than the supply elasticity, then the coupled policy is optimal for consumers/taxpayers for all elasticities of supply and demand meeting these conditions.*

PROOF: Define $\rho = Z(1 - l) \cdot (\theta/Z)^{-(1-\beta)/(\alpha+\beta)}$ from expression (26) such that if a transfer is necessary to accomplish the technical advance, then $\rho > 1$. The ratio of an innovator's production to average production is greater than the supply elasticity implies that $1/(1 + \alpha) > Z$. After some algebraic manipulations, the superiority to consumers of coupled over decoupled payments, $R_c > R_d$, implies

$$\rho > \frac{1/(1+\alpha) - Z\phi}{1/(1+\alpha) - Z}, \tag{38}$$

where

$$\phi = \frac{1-\beta\rho^{\frac{-\alpha(1-\beta)}{\beta(1+\alpha)}}}{1-\beta}. \tag{39}$$

If $\rho > 1$, then $\phi > 1$, and the right-hand side of expression (9) is certainly less than unity.

The expression (38) presents the necessary condition for the superiority of coupled relative to decoupled policies for breaking producer coalitions. We can re-express this condition as

$$\frac{1}{1+\alpha} - Z \bullet \left[\frac{\rho-\phi}{\rho-1}\right] \geq 0 \tag{40}$$

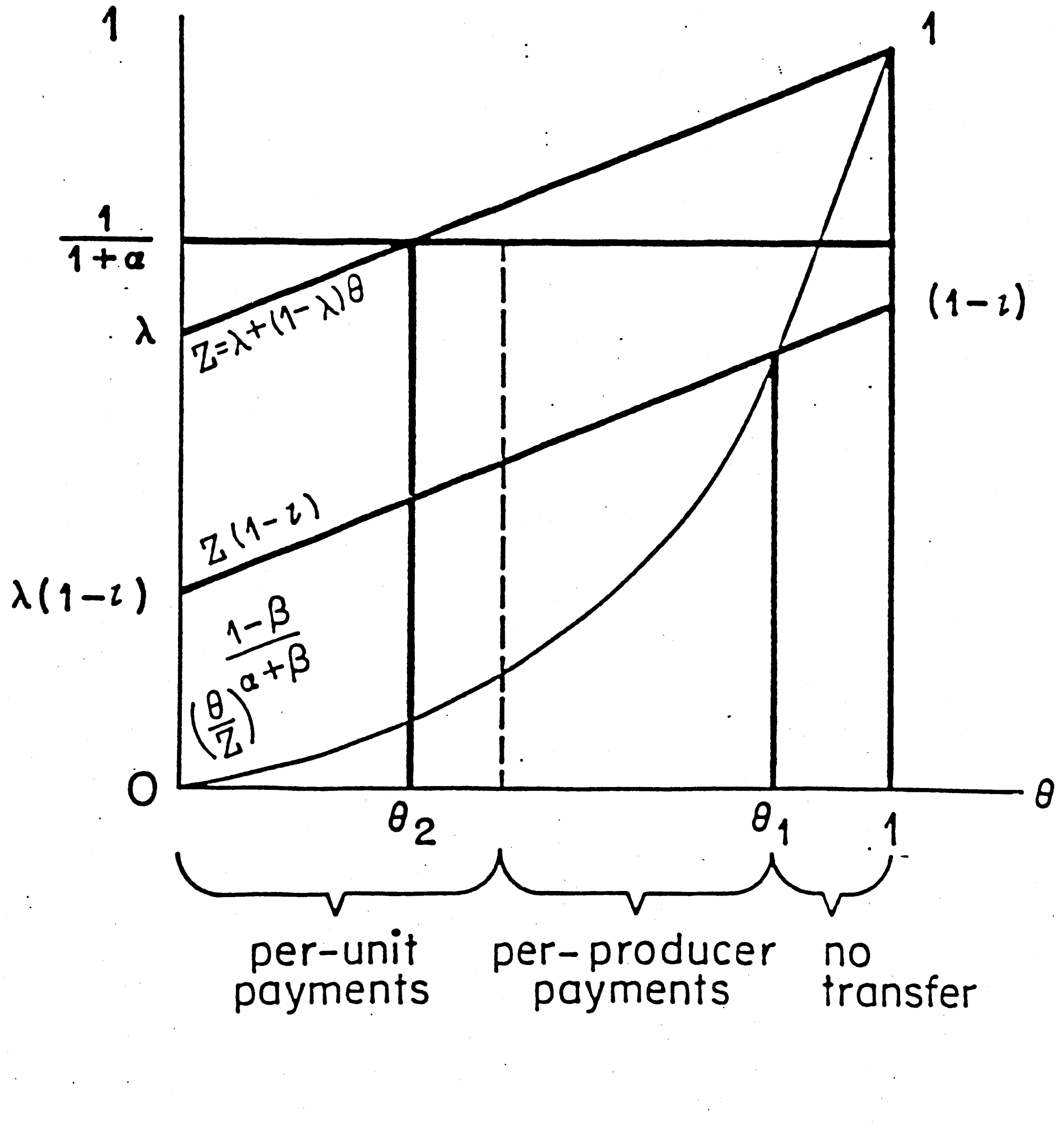
where $\phi \geq 1$ for all $0 \leq \beta \leq 1$ and $\rho \leq 1$. Note that, if $\beta = 0$, then $\phi = 1$ and the conditions in Proposition 7 are both necessary and sufficient for $R_c > R_d$. As β grows positive, the term $(\rho - \phi)(\rho - 1)$ decreases below unity, implying a tradeoff between $Z - \lambda + (1 - \lambda)\theta$ and the demand elasticity in assuring that the benefits are greater from a coupled transfer relative to a decoupled one. (One may also note that $\phi \leq \rho$ for all $\rho \geq 1$.)

The choice of public policies can be characterized by Figure 3. The necessity of a transfer scheme is given by the inequality condition of expression (26). Let θ_1 be such that the equality in expression (26) strictly holds. For levels of θ above θ_1, producers are unwilling to form the coalition to obstruct the technical change, and a policy would include only a public good.[3] Where $\theta \leq \theta_1$, some transfer mechanism is necessary to break a producer coalition against the change. Note that, as $l \rightarrow 0, \theta_1 \rightarrow 1$ and as $l \rightarrow 1, \theta_1 \rightarrow 0$. Note also that, as demand becomes more elastic, that is, as β increases toward unity, θ_1 decreases (because the derivative of the right-hand side of expression (26) is positive).

The choice between policies is indicated by the inequality given by expression (40). Let θ_2 be such that $1/(1+\alpha) = Z = \lambda + (1-\lambda)\theta_2$. For $\theta < \theta_2$, and for some θ sufficiently near

FIGURE 3

OPTIMAL TRANSFER SCHEME
FOR LEVELS OF TECHNICAL ADVANCE



θ_2, a per-unit-output payment scheme is better for consumers/taxpayers. For θ sufficiently greater than θ_2, the per-firm scheme is superior.

As α (the elasticity of supply) decreases, the critical value θ_2 increases toward unity; and, indeed, ϕ approaches unit also, implying that the "fuzzy" region above θ_2, where coupled policies are superior, vanishes. Note that for sufficiently high values of the proportion of innovators, λ, relative to the supply elasticity, $\lambda > 1/(1 + \alpha)$, no level of supply increase due to the technical change will result in a per-unit payment being superior to a per-firm transfer.

6. Conclusion

This paper has demonstrated that the particular means of compensation may serve a purpose beyond that of simply transferring wealth. Analyzing wealth transfers in isolation does not reveal the motivating and underlying political-economic relationships that exist between social groups. Taxes and subsidies are a part of a larger portfolio of policies, all of which have some effect on the distribution of welfare. In the complete set of policies, wealth transfers may serve a remunerative function. In fact, recipients as a group may actually be losers when one accounts for implementation of the larger portfolio.

Nonneutral, price-distorting payments may provide a less expensive means of preempting coalitions that would otherwise obstruct the entire portfolio. In the model presented here, an output subsidy distorting consumer and producer prices is useful to consumers/taxpayers because it effectively differentiates between decentralized producers; thus, it counters the political opposition to, say, a supply-enhancing policy by dividing and conquering. This is in contrast to other models of political competition between groups that suggest that the transfer mechanism would tend to be the most efficient, in the sense of minimizing deadweight loss, because all groups could share in an efficiency gain (e.g., Becker 1983, Gardner 1987). Our analysis allows a governing group, consumers/taxpayers, to overcome the problem of imperfect information (about the degree of ability to take advantage of the innovation) through its choice of the compensation scheme.

The framework is particularly relevant to the current debate over reform of agricultural policies. Many economists approach this topic assuming that wealth transfers are the inefficient outcomes of chaotic rent seeking. Their recommendations to achieve reform are based on the belief that wasteful subsidies are the rewards of raw political power, or the consequence of consumer ignorance, and that a knowledgeable public would be concerned with gaining efficiency, if not with eliminating transfers altogether. Our framework, on the other hand, explains how a seemingly inefficient policy that appears to harm consumers could be, in fact, a rational component of a larger portfolio of policies ultimately benefiting consumers at the expense of producers.

FOOTNOTES

[1]Following a model addressed elsewhere by Gordon C. Rausser, the former policies are referred to as political economic resource transactions (PERTs) and the latter as political economic seeking transfers (PESTs).

[2]It should be emphasized that other public-interest policies, such as investment in transportation systems or public utilities, could replace "technical innovation." Moreover, the roles of consumers and producers could be reversed.

[3]This result presumes, of course, that the consumer benefits outweigh all costs associated with providing and distributing the public good. For further details, see Rausser and Foster [1991].

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