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Public protection against misperceived risks: Insights from positive political economy

MARK PAULY*

HOWARD KUNREUTHER
University of Pennsylvania

JAMES VAUPEL
Duke University

Abstract

Citizens often misperceive the nature of risks they face and the impacts of alternative actions on those risks. For example, consumers may underestimate the probability of flood in their area, or they may underestimate the beneficial effect of passive restraints on the likelihood of automobile accident fatality. But recommendations that the government should mandate optimal purchases are often ignored by politicians or rejected in favor of direct public compensation.

This paper uses some simple models of public choice to explain why other remedies are used; it explicitly accounts for the fact that the same ignorant consumer whose behavior would have to be constrained are the ones whom the politician must please. In a simple world-of-equals model, such consumer-voters may well favor the alternative devices of implicit mutual insurance and conditional payment. When voters are heterogeneous, the political equilibrium (if one exists) is shown to depend upon the distribution of voters by perceived net benefit of public action and of taxes. Public action may be least feasible exactly when it would do the most good.

1. Introduction

Many citizens often misperceive the nature of the risks they face and the impacts of alternative courses of action on those risks. For example, consumers may underestimate the probability of a flood in their area, or they may underestimate the beneficial effect that a passive restraint would have on the likelihood of an automobile fatality or injury.[1] Traditional welfare economics has often been used to determine the optimal level of protective activity or market insurance coverage and to suggest that the government should bring about achievement of these optimal levels.[2] However, these recommendations, even when they have good empirical foundations, are often ignored or rejected by politicians and bureaucrats. Instead, politi-

* Internationales Institut für Management und Verwaltung, Wissenschaftszentrum Berlin, Platz der Luftbrücke 2, D-1000 Berlin 42 and University of Pennsylvania.

cians may do nothing, or they may favor methods of direct public compensation of the victims of disaster and losses.

Somewhat surprisingly, economists have provided little consideration of why this action (or inaction) occurs; there has been virtually no discussion of the political feasibility of alternative remedies to the problem of consumer ignorance. Colantoni et al. (1974) remark that, when consumers are perfectly informed, proposed constraints on market choice will fail to obtain voter support, but they are silent on what will happen when consumer-voters are misinformed. Hinich (1982) does consider voter choice for the special case in which safety affects health insurance premiums, but he does not treat the general case, nor does he consider alternatives to direct regulation.

In this paper, we therefore use some simple models of public choice to show why the 'first-best' solutions are often rejected, and why other remedies are used. Our explanation does not depend on some hypothesized difference in perception between economist and politician, or between analyst and policy maker. Nor does it depend on some mysterious and interdeterminate aspect of the political process. Instead, we trace out the consequence of the following simple proposition: in a democratic process, achievement of a politician or bureaucrat's goals (including staying in office) depends on pleasing the same consumers whose misperceptions and ignorance are the source of the problem. Consequently, compelling the voters to do things which they (even mistakenly) believe are not in their interest is unlikely to achieve their political support.

We therefore consider several different situations in which consumer misperceptions lead to a market outcome in which aggregate net benefit is not maximized. We then investigate the political feasibility of alternative remedies. The political model we usually use is that of simple majority voting on a single issue. Of course, decisions on public regulation or provision of protective devices are often not made in such a direct manner (or its representative government analogue); often actual decisions originate in and weave through the bureaucratic labyrinth, so that it is difficult to generalize about the reasons for acceptance or rejection. We will therefore consider the impacts of intense minorities (on either side) who can lobby, and we will touch briefly on legislative vote-trading. But our fundamental premise is that in a democracy outcomes do 'tend to' be explained by majority preferences, even under the veil of bureaucracy and political strategizing. Legislation and bureaucratic action will reflect the preferences of the majority. That is, we assume initially that the net gain from adopting the correct course of action and the impact of consumer ignorance are large enough to 'matter'. By this we mean that, if there is some per-person threshold or voting cost δ, then the change in net benefits (positive or negative) exceeds δ in absolute amount. We will then consider also what

happens when some of these magnitudes fall below δ. We assume that decisions are made by majority preferences of those whose net change in utility exceeds δ.

We do not intend to imply that such voter choice models explain *all* political choices about insurance and safety legislation. Specific safety requirements, that were, in fact, enacted and put permanently into effect may well be explained by the interplay of lobbying efforts of various industry trade associations, public interest groups, and bureaucratic ideologues. Our models are directed more at cases where cost-effective safety legislation has failed to emerge, or to become permanent; we offer a number of examples of the political failure of allegedly cost-effective risk management programs that can be better understood using these models.

We begin with a simple model of identical consumer-voters, all of whom underestimate the probability of a loss-producing event, but who monitor the political process perfectly. We show that both cost-effective preventive measures (whether tax financed or legally required) and compulsory conventional market insurance will be unanimously rejected by the political process. It will, however, be possible to find unanimous support for dealing with the risk by a program we call 'implicit mutual insurance'. We inquire whether similar conclusions follow when the population of voters displays several kinds of heterogeneity, and when alternative specifications of the political process are used. Heterogeneity and the political feasibility of cost-effective safety devices are discussed first, followed by a discussion of heterogeneity and cost-effective insurances.

Finally, we use this public choice perspective to consider the more complex models that might be required if the problems of market and political choice are put in a multi-period context. Such a context permits subjective estimates of probability to change over time, perhaps for reasons of cognitive dissonance recently discussed by Akerlof and Dickens (1982) or perhaps because of biased learning.

2. The basic model

We make the following assumptions:

1. A large number (P) of identical risk averse voter-consumers confronts a risk with true probability θ and true loss X. The risk is identically and independently distributed.
2. Individuals all perceive the probability to be $\phi < \theta$.
3. Individuals do not receive new information on the probability from other sources in the political process.
4. A preventive activity may be available. If it is, it reduces X to Y, $Y <$

X, at a market cost of C. In addition $C < \theta (X - Y)$, so the activity is cost-effective for everyone. However, C is sufficiently above $\phi(X - Y)$ that no one is willing to purchase the activity. (Alternatively, θ could be estimated correctly but $(X - Y)$ underestimated).

5. If taxation is to be used to finance the activity or to finance insurance, all persons will pay equal tax shares.
6. Market insurance is available against the loss at a per unit premium π.
7. Political decisions are feasible only if they would be approved by a majority of voters.
8. There are no spillover effects between persons.
9. Individual misperceptions of probability are 'strongly held', so that individuals do not change their value of ϕ as a result of a political proposal for a mandatory purchase requirement or for public finance. To the extent that the mere proposal to make some activity a subject of public intervention is a way of conveying information, such changes may occur. Different proposals may therefore have different voter responses depending on their susceptibility to this kind of persuasion. Likewise, if voters realize that their information stock is inadequate and that the acquisition and digestion of additional technical information is costly, they may be willing to *delegate* the responsibility and the power for choice to political agents, as under a mandatory purchase requirement (cf. Cornell, Noll and Weingast, 1976.) The issue of the political feasibility of the public provision of information or of delegation is complex, since voter choice depends on voter perception of the kinds of information which politicians or bureaucrats will provide, and on the kinds of choices they will in fact make. We will limit our discussion in this paper therefore to those misperceptions which are 'strongly held', in the sense that subjective probabilities would be little altered by the provision of information; there would then be little demand for the services of information or delegation.

It is easy to see that, in this example, a cost-effective preventive measure will not be voluntarily chosen by any consumer. In addition, if prevention is not possible, risk averse consumers will not be willing to buy the optimal amount of market insurance. Let $EU(I)$ represent the individual's expected utility with I units of insurance. Let π represent the market price per unit of insurance and let W represent wealth. Suppose $\pi = \theta$, so that insurance is actuarially fair. Then the optimal level of coverage will equal X. But when consumers think the probability is ϕ, they choose I to maximize:

$$EU(I) = (1 - \phi)\, U(W - \pi I) + \phi U(W - \pi I - X + I).$$

Market equilibrium requires $\pi \geq \theta$, but then expected utility maximizing I will necessarily be less than X, and can be zero.

One might suppose that public intervention would be able to correct either kind of market failure. However, mandated purchase of the preventive activity (at a cost of C per person) or tax-supported purchase of it (at a cost of $C + t$ per person, where t is the administrative and excess burden cost of taxation) may not be politically feasible. Every consumer will believe that such policies will make him worse off, and therefore will vote against them. By a similar argument, neither compulsory market insurance nor tax subsidized (or tax supported) market insurance will be politically feasible.

There may, however, be some politically feasible alternatives to inaction. We first consider the case of under-purchase of market insurance. Suppose that, instead of compulsory purchase of market insurance, a politician proposes what might be called 'implicit mutual insurance'. This arrangement would require the government to pay $B = X$ to every loser, and to raise the funds with equal taxes levied on all after the occurrence of the disaster. In effect, it would be publicly produced and provided insurance. The individual's wealth would therefore be reduced by $1/P\,(\Sigma X)$, whether he personally suffered a loss or not. The sum of all losses (ΣX) is a random variable, but as the population grows large the average loss approaches ϕX with virtual certainty, by the law of large numbers. Hence, with $B = X$, the individual's utility becomes $U(W - \phi X)$, and this utility is necessarily greater than $EU(I)$. A proposal for implicit mutual insurance would therefore command unanimous support. Even if publicly-provided implicit mutual insurance were less efficient (e.g., in terms of administrative cost), than market insurance, voter-consumers might still favor the public insurance.

It is easy to see why implicit mutual insurance dominates the other programs. It does not require any resources to be sacrificed *before* the losses occur. It makes both the tax paid 'premium' and the benefits proportional to whatever the frequency of loss turns out to be. It is a program whose net benefits to a risk averse person are positive whatever the probability actually is.[3] Persons who think the probability is lower than it really is will underestimate the gross benefit of insurance, but they will also underestimate, in an offsetting way, the tax they expect to pay.

This simple story of the basis for support for implicit mutual insurance is, strictly speaking, applicable only to 'new' insurance. Once such a program has been adopted, and losses begin to accumulate, realized average taxes will generally exceed ϕX. Will implicit mutual insurance then continue to command unanimous support? The answer depends on how voters interpret their higher-than-expected tax bills. There are three possibilities:

1. Voters may attribute the higher cost to inefficient management of the insurance program by the current set of politician-bureaucrats. The

result might be a loss of support for current program managers, but a continuation of support for the policy of implicit mutual insurance.
2. Especially if the administrative costs and claims handling procedures of the program are found to be appropriate, voters may respond to information on tax bills by gradually increasing their perceived probabilities. (Over time, these probabilities would be expected to rise to θ.)
3. Voters may conclude that insurance coverage, public or private, is inherently inefficient. In effect, they perceive the loading (rather than the probability) to be unusually high. If there is, in their view, nothing that can be done about that loading, then they may well prefer no insurance (or less insurance) to full coverage at such a high perceived loading. Implicit mutual insurance will then fail to retain political support.

While any of these three actions are possible, the last one appears least likely. It would require that voters misperceive loading or efficiency, rather than probabilities. Not only would there be additional information available on the administrative cost of government-run programs, but also people seem as prone to underestimate the administrative costs of public sector activities as to overestimate them. In any case, the third argument only implies that implicit mutual insurance which comes into existence will eventually lose political support; it is quite consistent with the view that such insurance will be brought into being.

Some aspects of U.S. policies to deal with natural disasters appear to be interpretable as implicit mutual insurance. The experience until 1972 with protecting against flood hazards furnishes an example. Historically, there was virtually no market-provided flood insurance for the following reasons:

> Because of the virtual certainty of the loss, its catastrophic nature and the impossibility of making this line of insurance self-supporting due to the refusal of the public to purchase such insurance at the rates which would have to be charged to pay annual losses, companies generally could not prudently engage in this field of underwriting (Insurance Executives Association, 1952).

There were few land use restrictions imposed on where individuals could build their structures. Hence the flood plains became well developed and there were large losses on occasion from severe floods or hurricanes. The principal source of recovery for all natural disasters was low interest loans and forgiveness grants from the Federal Government. This type of disaster relief is a type of implicit mutual insurance in which each taxpayer implicitly agrees to pay for the losses of his fellow citizens, expecting to be aided himself should he suffer an unexpected loss.

Even after the 1968 National Flood Insurance Program offered heavy subsidies for market insurance, people were still reluctant to purchase it.

By 1972 only 3,000 out of 21,000 eligible communities were participating. Implicit mutual insurance, in the form of federal relief measures, was still the most common form of support.

Another type of implicit mutual insurance can be embodied in a series of linked legislative promises or vote-trading. The Alaska earthquake of 1964 provides a clear example of this type of behavior. Congressmen provided liberal relief to the 49th state which set in motion a whole chain of special disaster bills to aid stricken areas. Eventually new legislation was enacted which incorporated these features into a general disaster relief bill. A California congressman commented after the 1966 floods in his state: 'We don't want any special measures. Just the same treatment that Alaska received.'

These policies (especially the 'linked logrolling' version) can also be interpreted as more traditional logrolling. Some sub groups of the population may well have expected to derive large benefits from these programs, while the costs were diffused over all taxpayers.

However, a general disaster relief program is more difficult to interpret in these terms. Suppose a general relief policy would cover future disasters whose place and time of occurrence is presently unknown, and suppose that policy puts specific limits on the amount and form of relief. Not only would such a program limit special support directly, but also the existence of a prespecified positive but limited amount of relief reduces the net gain to residents of a disaster site from pushing for special relief. With some positive level of relief guaranteed, the net gain from lobbying is limited to any incremental amount of special relief.

A crucial element in the feasibility of implicit mutual insurance is that each individual believes that the *average* loss probability is also ϕ, the same as his own loss probability. If people are identical but believe (contrary to fact) that their own probability is ϕ but the average probability is higher, say at θ, the expected utility under full coverage implicit mutual insurance is not necessarily greater than $EU(I)$, since $U(W - vX)$ is not necessarily greater than $EU(I)$ estimated using the probability ϕ.[4]

It is also possible to develop an idea analogous to implicit mutual insurance that could generate political support for cost-effective preventive measures.[5] The idea is to base payment for the preventive measure on whatever the probability of loss turns out to be. For example, suppose people are provided with safety devices for 'free', but are required to pay K if an accident does occur. K is set so that $K = C/\theta$; the program would be self-supporting in an actuarial sense. The individual's expected utility under such a program would be

$$EU_C = (1 - \phi)\, U(W) + \phi U(W - Y - K).$$

Since $C/\theta < (X - Y)$, it follows that $K < (X - Y)$, so that the net gain is $\phi U'(X - Y - K) > 0$. Even though K is a random payment, an individual would be willing to accept the proposal if he believed that charging K really would cover the cost of the device.

One difficulty with this solution is that, if 'the government' proposes to cover the initial outlay for the device with taxes, the individual who thinks the probability is ϕ would not believe that K charged ϕ times would be sufficient to raise $\$C$ per person, and so would not believe that the program would be self-supporting. There needs to be someone (the cost-benefit analyst, the Institute for Auto Safety, Allstate Insurance?) who is sufficiently confident in the value of the evidence for θ to stand ready to make up any shortfall in revenues generated. It might even be possible to permit the guarantor to earn a positive profit as a reward for this activity. For example, the penalty could be set somewhat above K, but still low enough that consumers will accept the safety device. The guaranteeing organization would be required to provide the safety devices at no cost, but would be allowed to retain all penalty taxes collected. If the guaranteeing organization correctly estimates C and θ, it will earn a positive profit.

A practical problem arises when θ is very low. Then the conditional tax will be very large. For example, an airbag tax could amount to over $25,000 if we use the probability of an accident with an injury as an estimate of θ. There are some ways to soften this blow. For one thing, the conditional charge could be payable over time, so that the obligation can be spread out. It would also be possible to think of covering the conditional charge with insurance, though the insurance premium would, of course, equal C.

Note that this method avoids the 'safer than the average risk' problem. Each person will *think* that his safety device is subsidized, and that is is being paid off by the other higher risk individuals. But *ex post* all will pay the same (expected) share.

If people correctly perceive θ but underestimate the size of the loss, the analysis of insurance is similar to that above. People would perhaps buy some insurance (if they estimate the loss to be greater than zero), but would not purchase full coverage even at an actuarially fair premium. In contrast, there would be unanimous support for implicit mutual insurance that promised to pay the full amount of any loss, whatever it turned out to be.

In the case of safety devices, underestimation of $(X-Y)$ could also lead to failure to adopt a cost-effective safety device. Using the random payment method here would require a determination of the size of the difference in loss the device made. As a practical matter, it may be difficult to establish what the loss would have been had the device not been installed.

3. Heterogeneity and safety devices

In this section we modify the previous models to consider several kinds of heterogeneity in the population of consumer-voters and the impact of heterogeneity on the political feasibility of government intervention when safety devices are cost-effective. (The next section will consider heterogeneity and the purchase of market insurance.) The major types of heterogeneity with regard to safety devices are:

1. Different degrees of misperception of θ.
2. Different (objective) levels of θ.
3. Different tax shares.
4. Different degrees of attention to political gains (thresholds).
5. Different (subjective) costs to using safety devices.

If there are no spillover benefits, then there is an essential indeterminacy in these cases. Some persons (e.g., those who do not own a motorcycle) will be asked to vote on matters (motorcycle helmets) that are of no concern to them. How should they be expected to vote (if they pay enough attention to do so)? We will assume that there is some spillover benefit from the use of the safety device by any person who engages in the dangerous activity. An unhelmeted motorcyclist hit by a flying stone may become an unguided missile, or other persons may simply experience disutility from observing the (uninsured) suffering of an accident victim.[6] However, the individual's estimate of spillover benefit is still multiplied by his subjective and possibly incorrect estimate of the probability of an accident. We will also consider the possibility that if the expected spillover per capita is sufficiently small, no political influence is exerted by those not directly affected.

In the no-intervention equilibrium, people could be classified into one of three groups:

Current observers (O): for example, people who never drive a motorcycle, who have no lawn to mow, or own a house on a ridge free from the danger of a flood.
Current voluntary users (V): if any, who would use the safety device in the absence of intervention.
Current abstainers (A): who presently find purchasing the device to be utility-reducing.

There are the three kinds of policies from which a political choice must be made. There is the *requirement* strategy, in which use of the safety device is required by law and the requirement is effectively enforced. [Permitting people to violate the requirement in return for some payment or fine (in

cash or in kind) before or after the event of detection, is another possible strategy, but we will not consider it here.] A second approach is *public provision*, in which the safety device is fully paid for by public funds raised, we will assume, from a proportional wealth tax. The third option is the *status quo*, with no alteration in the market equilibrium use of the safety device.

In this section, we assume as before that at least some individuals i mistakenly believe that ϕ_i is less than θ_i. We want to determine which of the three options is politically dominant. Because people will have different preferences, we need to state the rule by which political choice is made. We investigate two possibilities: one is *binary choice majority rule* in which the winning option is the one with majority support among those whose net gain or less is more than some threshold δ. The second is a *threshold* model, in which the winning option is the one with majority support among those whose net gain or loss is more than some threshold δ.

3.1 *Homogeneous groups*

We first suppose that the value of ϕ and C (the total cost of compliance, monetary C_M and nonmonetary C_N) are the same within each group. Wealth levels are permitted to vary. Of course, for the O's, $\phi^O = \theta^O = \theta$. We will assume that for the V's, $\phi^V = \theta^V$. For the A's, we assume as before that $\phi^A < \theta^A = \theta^V$. We now describe the voting calculus of each type of person in each circumstance. In order to simplify the exposition, we will describe the net gain in terms of its expected value rather than its expected utility.

3.1.1 *Requirement strategy*

The spillover benefit from each person who uses the safety device and who has the damage from an accident reduced is assumed to be $\$N$. The expected spillover benefit per capita from use of the device by all A's is therefore $(\theta N)A/P$ which we will denote by S. (Note that expected spillover benefit is therefore a linear function of the fraction of A's in the population.) Under a requirement strategy, the perceived gain to either an O or a V would therefore be S. Finally, a type-A person gains $\phi(X - Y + NA/P)$, where $\phi(X - Y)$ is the expected direct gain and $\phi NA/P$ is an abstainer's subjective estimate ($\hat{S}$) of the spillover benefit. He also would have to pay C, the cost of the safety device.

If we assume that the sum of the direct plus spillover benefit to type A persons is still less than the cost C that they would have to pay, then the feasibility of the requirements strategy will depend on the fraction of A's in the population. In the majority rule model, all of the O's and V's will vote in favor of a requirement, and all of the A's will vote against; the

proposal to require the safety device will fail (compared to the *status quo*) if $A > O + V$. For a given level of N, the proposal will be more likely to fail when the number of persons making mistaken choices is greater: that is, public corrective action is likely to be least feasible when the aggregate welfare gain from that correction would be greatest.

The assumption that the net gain from mandatory purchases is always negative for abstainers is most plausible when externalities are small. In contrast, if the externalities per person are large, and the misperception of probabilities is not too severe, then some curiously different results are possible. As noted above, the level of expected spillover (for an abstainer or for others) is an increasing function of A/P. Suppose therefore that the perceived net welfare change for any A is negative until A/P reaches some level greater than 1/2 but less than unity. Now consider the consequences for political outcomes of increasing A/P from a low level. External benefits to other persons will cause mandatory purchase requirements to be adopted as long as A/P is less than 1/2. When A/P reaches one half, such requirements will cease to be politically feasible. But now let the fraction increase still further. At some point, the perceived external benefits to any A from adoption may become so large that a proposal will again command political support, now unanimous. More generally then, when externalities are large enough to matter, it is quite possible that mandatory safety devices will be politically feasible when the fraction of non-users of the device is either very small or very large, but not in between.

If there is a threshold cost to expressing political preferences, things are less precise. Given N, the larger is A the larger is S, so the gain to O's and V's from requiring the device is more likely to exceed their threshold on voting costs. But, if the loss to the A's is also large enough to exceed the threshold, the O's and V's may well be outvoted or outlobbied. If the net loss to each A falls below the threshold, however, then the requirements strategy may be politically feasible. Even a safety device that has a *negative* net benefit might then be politically feasible, since the O's and V's care only about the spillover benefits. That is, not only may cost-effective preventive measures fail under majority rule, but inefficient measures may succeed if they generate externalities.

3.2.1 *Public goods strategy*

The gain to an O from adoption of the public goods strategy to provide the safety device via taxation is $S - t(W_i^O)$ where $t(W_i^O)$ is person i's tax, a function of his wealth. His gain may still be positive compared to the *status quo*. However, it is necessarily lower than under the requirements strategy since each O must pay something in taxes to get the external benefit, whereas under the requirements strategy each observer got it for nothing. The net gain to a V from supporting the public goods proposal (compared to the *status quo*) is

$$g^V = S + C - tW_i^V$$

if nonmonetary costs are zero. The amount is surely positive if the person's wealth is less than $\overline{W}$, the mean wealth in the population, even if there are no observers.

For an A, the net gain under public provision is:

$$g^A = \phi(X - Y) + \hat{S} - tW_i^A$$

since he has to pay a tax of tW_i^A.

We now compare the public goods strategy with the *status quo*. The public goods proposal is favored over the *status quo* by those O's with wealth less than that W at which $t(W) = S$, by those V's with wealth less than that W at which $t(W) = S + C$, and by those A's with wealth less than that W at which $t(W) = \hat{S} + \phi(X - Y)$.

When all three options are possible, it is difficult to derive simple propositions. We can say that when there are many A's, the distribution of income or wealth is not skewed, and externalities are small, the outcome is likely to be the *status quo*, whereas if there are many V's and (especially) O's, or high externalities, and the income distribution is not skewed, the outcome is likely to be requirements. Finally, if the number of O's is not a large majority of the population, and if the distribution of income is highly skewed, then the public goods strategy will tend to emerge. It is also possible for cycles to occur, so that there is no majority rule winner.[7] In general, it is quite possible for cost-effective safety devices to be politically infeasible.

3.2 *Heterogeneous groups*

Now let us assume that ϕ and C are not uniform within groups. For example, either ϕ may be different, or C_N, the nonmonetary part of C, may vary across individuals. As a result, there will be a distribution of the net direct benefit β, or $[\phi(X - Y) - (C_M + C_N)]$ across individuals. Call this $f(\beta)$. Of course, for the O's the net direct benefit is zero, so for this group there is a mass point of *overall* net benefit (private and external) at $\$S$. All other persons receive a net benefit which will have the same distribution as β_i. With β_i varying, it is quite possible that, for some of the A's, the value of β_i is negative even if $\phi = \theta$.

3.2.1 *Requirement strategy*

If the β_i vary, there is nevertheless little difference in the analysis of the requirement strategy under majority voting. Requirements probably make all of the A's worse off, but there is a gain of S for all members of O and

V. The threshold model can have different results since there can be varying numbers of abstainers who make their presence felt. If S is relatively low, but there are some A's who have high values of nonmonetary cost, then it is possible that the requirements strategy is dominated by the *status quo* even if the A's are in the minority. (This is the case of motorcycle helmets.) The reason is that some of the A's with very high nonmonetary cost find it worthwhile to oppose the safety device, while the other A's do not care nor do the V's and O's.

3.2.2 *Public goods strategy*

The distribution of positive and negative net benefits under the public goods strategy depends on the *joint* distribution of β_i and W. All O's and V's presumably still have a distribution of incremental net benefit from the public goods strategy that depends only on the distribution of the tax base $f(W)$, as in the homogeneous group case. But for the A's, the crucial question is the correlation of wealth and β. If, for example, W and β are negatively correlated (say, because W and nonmonetary cost are directly related), then it is possible that *none* of the A's will be in favor of public provision. In contrast, if the income elasticity of β is positive, and if the wealth of the A's is below $\overline{W}$, then virtually all of the A's may favor public provision.

The crucial income elasticities, given a uniform $(X - Y)$, are the income elasticities of ϕ and of nonmonetary costs; together these determine the income elasticity of β. The thrill of wind in your hair may be a normal good, but so may be the accuracy of risk perception, so the *a priori* relationship between the perceived benefit of motorcycle helmet wearing and income is unclear.

To the extent that there is pure 'taste' variation in β, not related to wealth, then the fraction of A's in favor will depend on the distribution of W, the mean value of β, *and* the form of the distribution of tastes.

Some simple formalized examples may help to illustrate these possibilities. Assume that all persons would benefit from a safety device whose cost is $\$C$ for everyone, and that there are no nonmonetary costs or externalities. Assume that ϕ varies directly and perfectly with wealth according to the function $\phi = \phi(W)$, up to that level of W at which $\phi(W) = \theta$. Finally, assume that all persons have the same perception of $(X - Y)$, and all persons are users of the product in which the safety device might be installed.

We could represent $\phi(W)\,(X - Y)$ by a curve such as Q in Figure 1. We could represent the taxes of any person under a proportional wealth tax by a straight line T. If $\overline{W}$ is mean wealth, the person's tax at that level must equal C, the market price. Before any public intervention, persons with wealth levels greater than W_0 will be in the set of V of voluntary users, and

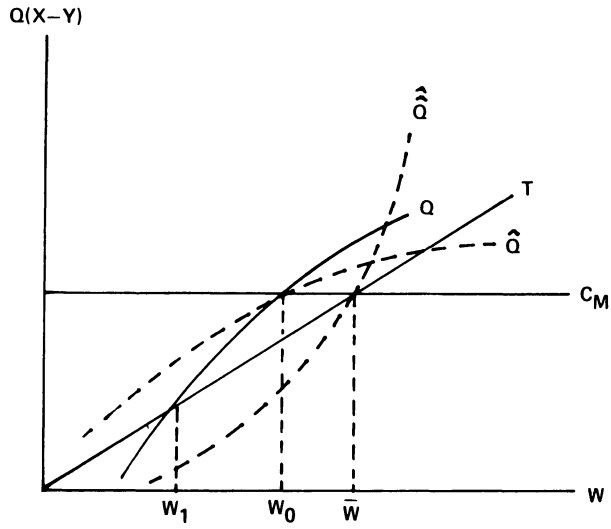

Figure 1.

persons with lower wealth will be abstainers. Now suppose tax finance is proposed. Compared to the *status quo*, this proposal will be favored by voluntary users with wealth from W_0 to $\bar{W}$. Voluntary users with wealth in excess of $\bar{W}$ will oppose the proposal since it provides less net benefit than purchasing at the market price C_M. Abstainers with wealth between W_1 and W_0 will also favor the proposal. Thus, in this general formulation, the project will be supported by the middle group, but opposed by the poor and the wealthy.

If the curve of net benefit has a shape like $\hat{Q}$, then we can say that the tax system 'tracks' the perceived net benefits, and all abstainers plus voluntary users will favor the project, even with the same initial number of V's and A's. Conversely, if the curve is as $\hat{\hat{Q}}$, there will be no abstainers or voluntary users who favor the public goods strategy.

4. Heterogeneity and insurance

Now we suppose that no safety device is available, but insurance against some risk would be cost-effective. We showed earlier that, in such a case, implicit mutual insurance would be politically feasible if the population were homogeneous with respect both to facts and (possibly mistaken) beliefs. How is this conclusion modified when people are not identical?

There can be several sources of heterogeneity with regard to perceived risk, actual risk, tax shares, and thresholds. As already noted, if people believe there are differences in risk, even if risks are actually similar, then

implicit mutual insurance can fail to command support. What is important here is not that people have different estimates ϕ_i, but rather that they *think* that the risks vary across the population. This is because one's expected tax cost for implicit mutual insurance, given some tax shares, depends on one's estimate of the average value of risk $\bar{\phi}$. If people have different ϕ_i's but think that everyone else is about the same kind of risk as they are, implicit mutual insurance can still command unanimous support. But if some people believe that the average risk $\bar{\phi}$ is above their own risk, and if that variation is not taken into account in the tax system, then implicit mutual insurance may fail to command support. In the limit, implicit mutual insurance will be no different from market insurance, as far as the individual's beliefs are concerned. Of course, if $\bar{\phi}$ exceeds ϕ_i, but does not do so to too great an extent, then people may well still prefer implicit mutual insurance to the no insurance, no intervention alternative.

Let us now consider somewhat more formally a model in which both objective and perceived risks vary across the population. Suppose that there is some risk which is greater than zero for only part of the population. For example, homes located on hilltops have a zero probability of flood damage (ruling out Biblical deluges as uninsurable). Persons who own such houses could therefore be called *observers*. Other persons, let us assume, own houses all at equal objective risk θ, but some of them have $\phi_i = \theta$ while others have $\phi_i < \theta$. The first group would become *voluntary* purchasers of market insurance, whereas the second group would be *abstainers*. If tax shares are not uniform, and if intervention is limited to market insurance, then public intervention can take either of two forms: mandatory purchases of market insurance or tax financed market insurance.

The major conceptual difference between these two options is in the distribution of the cost of the insurance, and the analysis is therefore similar to that in the previous section. When there is a majority of A's and heterogeneous beliefs, then neither form of insurance will be feasible. When the O's and V's are in the majority, some form of insurance will probably be chosen, but the particular form depends on the distribution of taxes and perceived net benefits. The less skewed the distribution of wealth, given that there are many O's and V's, the more likely it is that mandated coverage will dominate both tax-financed relief and no action.

In addition to the two market insurance options, there can also be two forms of implicit mutual insurance. Either such insurance can be financed with a wealth tax, or affected parties can be required to bear equal shares of the total loss. If affected people do believe that their loss probability is the same as that of other affected parties, then the equal shares option will still command unanimous support (compared to inaction). In contrast, wealth tax finance may fail to generate support, even for implicit mutual

insurance, if wealth varies or if there are many observers on whom the tax would be levied. The opposition would come from affected parties with above-average wealth and/or from observers who object to paying a tax for something from which they get little benefit. Political feasibility of implicit mutual insurance requires an ability to tailor tax payments to risk. If only conventional tax instruments are available, implicit mutual insurance may not be feasible.

Implicit mutual insurance can therefore be made infeasible if beliefs about probabilities become more heterogeneous but tax shares cannot be adjusted. The alternative that would be chosen could then either be no government action or mandated market insurance.

The history of the flood insurance program may be consistent with these theories. As noted above, up until the last decade the dominant form of political activity in the case of floods or other disasters was a tax-financed insurance implicit in federal disaster relief programs, as embodied in the disaster relief bill. In 1972, however, tropical storm Agnes caused unusually large damages (and therefore unusually large federal relief expenditures) in the eastern part of the U.S. There may have been a rise in the perceived ϕ associated with large disasters, and perhaps a perception that some areas of the country were more flood prone than others. The result would be an increase in the proportion of observers. Because disaster relief did not provide complete coverage, the increase in perceived ϕ also swelled the ranks of voluntary purchasers, especially among those with higher wealth (see Kunreuther et al., 1978). It is plausible that the combination of increased numbers of O's and higher wealth V's plus an increase in perceived heterogeneity was responsible for the Flood Disaster Protection Act of 1973. Its principal provisions were that no federal financial assistance (in the form of loans from federally insured lenders) would be available to any new purchaser of a home in a flood-prone community unless the community participated in the program and the homeowner purchased the insurance. At the same time, the interest rate subsidy under the disaster relief program was greatly reduced. In effect, a partial mandatory insurance purchase program was substituted for a tax-financed insurance program after Agnes converted many people into observers or voluntary purchasers.

5. Multi-period models: Cognitive dissonance, biased learning, and delegation

The preceding models were all developed in a simple framework in which market choices and political choices were made for the same time period. Akerlof and Dickens (1982) have recently discussed a model in which people's attitudes toward a particular risk change over time. They hypothesize

that a person's subjective estimate of the loss probability of a risk he has chosen to accept may decline over time, once the risk has indeed been accepted. They attribute this possibility to the psychological phenomenon of 'cognitive dissonance', in which people *choose* to alter their beliefs about risks they have accepted. An alternative notion which would give the same result is that of biased learning, in which failure to observe a loss (even if the subjective probability is low) induces the great majority of people to reduce their subjective probability estimates. Whatever the motivation, the welfare outcome is the same: a Pareto gain is possible if people are compelled to use the safety device, but market equilibrium will not involve such compulsion. Akerlof and Dickens therefore conclude that 'safety legislation causes a Pareto superior result'.

Akerlof and Dickens develop their model in the context of worker choice among risky jobs. Since their welfare conclusions do not depend on why probabilities decline over time for workers in the risky job, we will present a simplified version of the model that does not explicitly incorporate cognitive dissonance. There is assumed to be a safe job which pays wage w_s, and a risky job which initially carries an accident risk of q, and a per-accident cost of c_a. In the first of two period, no safety equipment is available. In the second period, preventive equipment will be available at a cost of c_s, and it is cost-effective: $c_s < qc_a$. The critical assumption is that, although all workers have this information at the beginning of the first period, those who choose the risky occupation reduce their subjective probability to q' less than q by the beginning of the second period. Suppose that c_s is greater than $q'c_a$. Then the worker will not choose the safety equipment in the second period. Viewed from the beginning of the first period, making this choice reduces the worker's second period real income by $(qc_a - c_s)$. To compensate the worker for this prospect (ignoring discounting), first period income must be higher by the same amount. That is, first period wages must be $w_s + qc_a + qc_a - c_s$. Because the cost of a marginal worker in period 2 must be $w_s + c_s$, period 2 payments per worker will be $w_s + c_s$, whether the old period 1 workers use the safety equipment or not.

If, however, the use of safety equipment in period 2 could have been made compulsory, the period 1 wages could fall to $w_s + qc_a$, and therefore there would be a lower competitive price for the product over the two periods. From this, Akerlof and Dickens conclude that there is a welfare gain from safety legislation, since consumers are made better off and workers (from their perspective at the beginning of period 1) are not made worse off.

If one accepts this conclusion, the relevant positive question is, as before, whether the theoretically Pareto superior governmental action is politically feasible. The answer is that it may well not be, depending on the

assumptions made about the enforcement of political contracts. If political 'recontracting' is possible, the Pareto superior outcome may be as politically infeasible as it is economically infeasible.

At the beginning of period 1, consumers would favor safety legislation, because they prefer lower prices, while workers would be indifferent since they achieve the same utility regardless. So one would expect the legislation to be passed. But at the beginning of period 2, workers already in the industry would prefer cash to safety equipment, and would favor repealing or postponing the safety requirements in order to get a higher net money income. (For public relations reasons, they might profess to favor both more cash and the safety requirements, so as to put the onus for changing the law on employers.) Consumers and new workers would not gain from compulsory safety legislation, although new workers would adopt the safety devices voluntarily. Since old workers favor repeal and all others are indifferent, there would be no obvious impediment to political recontracting. Akerlof and Dickens state that binding first-period private contracts to use the new equipment may be futile because of the possibility of private recontracting at the beginning of the second period. Precommitment contracts in the political market may be equally futile, unless one suggests some greater impediments to political recontracting. In any case, the more numerous the workers affected by the safety legislation (in the majority rule model) and the larger their utility reduction from using the safety device (in the lobbying model), the less likely it is that there will be politically feasible safety legislation that actually takes place.

There are some candidates for the role of impediments to the political process. The sheer inertia and high transactions costs in the political process (compared to the market) may prevent de facto repeal. Manufacturers of safety equipment would lobby against postponement, as might insurers. Finally, if there are some externalities (even if quite small ones) for consumers and new workers, they may move from indifference to opposition to repeal. The difference between political recontracting and market recontracting is that the latter involves only two parties, whereas the former permits the involvement of slightly interested bystanders. The sluggishness of the political mechanism's response to voter preferences may be the major reason why efficiency is increased.

6. Conclusion

The analysis of consumer misperceptions, to be useful, needs to be linked to the analysis of political feasibility. We have identified some situations in which a politically feasible solution is probably impossible. These include

1. Circumstances in which abstainers are in the majority.
2. Circumstances in which some abstainers would suffer large subjective costs from the use of the device.

There are other circumstances in which it may be feasible to change the *status quo*, including

1. When the number of abstainers and their subjective cost is small.
2. Where the tax system 'tracks' subjective cost and the median tax is below the mean tax.

Finally, there are some (perhaps most) cases in which political feasibility cannot be known *a priori*, but depends on the actual distributions of costs, benefits, and possibly taxes.

There are two important implications for research and policy which follow from this view.

1. Paradoxically, and regrettably, those situations in which misinformation produces the largest welfare loss may be exactly those situations in which political correction is least feasible. Especially if externalities are not large, the political feasibility of corrective action will decline as the fraction of the population making inefficient choices rises. (This conclusion does not necessarily hold if externalities are important.) The analyst needs to have an appreciation of these limitations if his analysis is to be useful and his frustration level kept down.
2. Sometimes there are examples of 'second-best' improvements which do fit the political constraints, as in the cases of implicit mutual insurance and conditional tax financing. It may be preferable for analysts to concentrate on these feasible second-best solutions rather than on infeasible first-best proposals. Such solutions may involve tax finance with tax shares different from those present in conventional tax instruments.

NOTES

1. There is a growing literature in economics and psychology which has investigated systematic biases in perceptions. See Tversky and Kahneman (1974), Slovic et al. (1980), and Einhorn and Hogarth (1981).
2. See, for example, Colantoni, Davis and Swaminuthan (1976).
3. Another argument for this kind of insurance is that it may involve lower administrative costs than the use of the market apparatus.
4. There is some evidence that people sometimes think this way. Studies indicate that a great majority of motorists think that they are better than the average driver. Similar studies have not been done for types of risks that are typically uninsured.

5. For a discussion of a similar idea, but not in a public choice context, see Vaupel and Cook (1978).
6. The situation is more complex if the potential victim already has access to public or private (via insurance) compensation. While the higher taxes on insurance premiums for observers is a kind of externality, the likelihood of market puchase of safety devices or private insurance is affected by the presence of compensation.
7. Suppose a community has three equal sized groups:
   a) V's with wealth below $\overline{W}$
   b) O's with wealth above $\overline{W}$ and above that wealth at which $tW = S$
   c) A's with wealth below $\overline{W}$ but above that wealth at which $tW + \phi(X - Y) + \hat{S}$. Then the rankings of the *status quo* (T), requirements (R), and public goods (P), shown below will generate a cycle:

V	O	A
P	R	T
R	T	P
T	P	R

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