Uncertainty Over Adverse Government Action and the Law of Just Compensation

In the course of governing, a legislature or administrative agency frequently intervenes in private economic affairs. That intervention may take the form of an appropriation of private property for public use or of a change in the rules that govern a private activity. The issue of compensating individuals who incur economic losses as a result of such government action is adjudicated in the courts under the Fifth Amendment[1] and under similar provisions of state constitutions,[2] and is debated in the legislatures on grounds of public policy.[3] Although no systematic theoretical foundation underlies these judicial[4] and legislative[5] deliberations, commentators

1. U.S. CONST. amend. V ("nor shall private property be taken for public use, without just compensation"). The economic loss can be the loss of a physical asset as in the case of an expropriation, e.g., Sioux Nation of Indians v. United States, 601 F.2d 1157 (Ct. Cl. 1979) (United States must pay compensation for land it appropriated from Sioux Indians), or it can be a reduction in the profitability of an enterprise, e.g., Goldblatt v. Town of Hempstead, 369 U.S. 590 (1962) (ordinance prohibiting excavation below water table does not constitute compensable taking from owner of quarry). Theoretically, the distinction between the two types of loss is only a matter of degree. Pennsylvania Coal Co. v. Mahon, 260 U.S. 393, 413-14 (1922).

2. Some state constitutions use the phrase "taken or damaged" rather than "taken" in their compensation provisions. E.g., MO. CONST. art. 1, § 26. See generally 2A P. NICHOLS, EMINENT DO-MAIN § 6.44 (rev. 3d ed. 1976). These clauses have been held to expand the range of compensable losses attributable to governmental action. Id. §§ 6.44, .441.

3. E.g., 118 CONG. REC. 24,874-89 (1972) (House debate over bill to indemnify individuals who sustained losses as result of ban on cyclamates); 117 CONG. REC. 40,046-56 (1971) (House debate over indemnification provision of Federal Environmental Pesticide Control Act of 1972, 7 U.S.C. § 136m (1976)).

4. See F. BOSSELMAN, D. CALLIES, & J. BANTA, THE TAKING ISSUE 195 (1973) (most scholars have failed to discern pattern in takings cases since 1920s) [hereinafter cited as F. BOSSELMAN]; Dunham, Griggs v. Allegheny County in Perspective: Thirty Years of Supreme Court Expropriation Law, 1962 SUP. CT. REV. 63, 63 ("crazy-quilt pattern of Supreme Court doctrine on the law of expropriation"); Van Alstyne, Taking or Damaging by Police Power: The Search for Inverse Condemnation Criteria, 44 S. CAL. L. REV. 1, 2-3 (1970) (distinction between valid police power measures and takings without compensation lacks theoretical rationale).

5. See, e.g., 118 CONG. REC. 24,878 (1972) (remarks of Rep. Donohue) (compensation should not be provided to individuals who sustained losses as result of cyclamate ban because government's action was "valid and necessary" and "the Government should not be required to pay damages unless it has committed a wrong"); 118 CONG. REC. 24,877 (1972) (remarks of Rep. Steiger) (compensation should be provided to individuals who suffered losses as result of cyclamate ban because ban was "totally unexpected"); 117 CONG. REC. 40,055 (1971) (remarks of Rep. Poage) (if government destroys property values, by banning dangerous pesticide, it must pay owner); id. at 40,037 (remarks of Rep. Abzug) ("Do we indemnify a bank robber if we catch him and take away his ill-gotten loot? If not, then why should we indemnify a manufacturer when we catch him with his ill-gotten 'loot'?"). In some cases, however, individual congressmen have tried to impose an analytic structure on their deliberations. See, e.g., 118 CONG. REC. 24,880 (1972) (remarks of Rep. Drinan) (addressing general implications of allowing businessmen to rely on government to compensate them for investments in products that cause injury and disease); 117 CONG. REC. 40,046 (1971) (remarks of Rep. Evans) (same). Typically, these attempts have failed to focus the debates.

have identified the elimination of uncertainty over adverse government action as one goal of compensation law.[6] Moreover, in isolated debates, Congressmen have adverted to the elimination of uncertainty as a factor that weighs in favor of compensating individuals who are harmed by government action.[7]

This Note adopts the assumption of Professor Frank Michelman's utilitarian model of just compensation[8] that uncertainty over adverse government action should be considered in the compensation decision. The Note departs from that model, however, in arguing that the analysis of uncertainty requires an assessment of the societal effect of uncertainty, rather than of the direct cost of uncertainty to the uncertain individuals. It also argues that the logic of the model applies to the compensability of government-induced deprivation of jobs as well as to the compensability of such deprivation of traditionally recognized "property" rights.[9] The Note then develops a framework for the analysis of the societal effect of uncertainty in the compensation context.[10] It argues that once attention shifts to the societal effect of uncertainty, the importance of eliminating this uncertainty depends on who is rendered uncertain, and on a variety of circumstances surrounding the uncertainty-creating action.[11] The Note concludes

6. B. ACKERMAN, PRIVATE PROPERTY AND THE CONSTITUTION 44-46, 74 (1977) (Appeal to General Uncertainty); Michelman, *Property, Utility and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law*, 80 HARV. L. REV. 1165, 1214 (1967) (impaired incentives); Williamson, *Administrative Decision Making and Pricing: Externality and Compensation Analysis Applied*, in THE ANALYSIS OF PUBLIC OUTPUT 115, 119-20 (J. Margolis ed. 1970) (uncertainty regarding future redistributions by government is part of Michelman's "demoralization cost").

7. *See, e.g.*, S. REP. NO. 307, 96th Cong., 1st Sess., 31-33 (1979) (deep seabed investments' vulnerability to future Law of the Sea treaty is uncertain, but treaty should provide "grandfather clause," rather than compensation for lost investments); 117 CONG. REC. 40,050-51 (1971) (remarks of Rep. Poage) (uncertainty is concern in issue of compensating owners of banned pesticides).

8. Michelman, *supra* note 6.

9. Because the Fifth Amendment requires just compensation only when "property" is taken, workers have no constitutional right to compensation under current interpretation. Congress, however, has provided compensation to workers who lose their jobs as a result of government action. *See, e.g.*, Regional Rail Reorganization Act of 1973, Pub. L. No. 93-236, §§ 501-505, 87 Stat. 1012-12 (1974) (codified at 45 U.S.C. §§ 771-775 (1976)) (providing protection to employees adversely affected by reorganization of railroads into Consolidated Rail Corporation); Amendment to Act Establishing Redwood National Park, Pub. L. No. 95-250, §§ 102-103, 92 Stat. 166-70 (1978) (codified at 16 U.S.C. §§ 791k-791m (Supp. III 1979)) (providing that employees adversely affected by expansion of Redwoods National Park shall be placed in other jobs); *cf.* Federal Water Pollution Control Act, Pub. L. No. 92-500, § 507(e), 86 Stat. 890 (1972) (codified at 33 U.S.C. § 1267(e) (1976)) (any employee allegedly laid off because of effluent limitation entitled to public hearing by Environmental Protection Agency).

10. This Note does not discuss the institutional structure within which compensation decisions should be made. The analysis could be applied to legislative decisions grounded in the public interest or judicial decisions based on just compensation clauses. The utilitarian basis of the Note is consistent with an accepted role of legislatures. *See, e.g.*, J. BUCHANAN & G. TULLOCK, THE CALCULUS OF CONSENT (1962). In the context of constitutional adjudication, however, utilitarianism might have to be incorporated into the term "just" in the Fifth Amendment before the present analysis could be fully adopted. *See* B. ACKERMAN, *supra* note 6, at 41-42. *But see* note 13 *infra* (philosophical support for model beyond utilitarianism).

11. As the effect of a failure to compensate individuals who are harmed by government action is

by applying the framework to the congressional decision to compensate individuals who own stocks of a pesticide banned by the Environmental Protection Agency.[12]

I. The Uncertainty Effect and the Utilitarian Model of the Compensation Decision

Whenever the government undertakes an action that imposes a loss on an individual or group of individuals, the legislature or agency involved presumably has determined that the direct benefits of the action outweigh the direct costs. Although society is better off if the government undertakes the action, some individuals may be rendered worse off. When this occurs, the issue of compensating the losers arises.

The utilitarian model of compensation[13] provides that individuals who are harmed by government action should be compensated whenever the social cost of providing compensation is less than the social cost of allowing individuals to remain uncompensated.[14] Among the societal effects[15] of failing to compensate individuals who are harmed by government

only one element of the compensation decision, *see* note 15 *infra*, the result of the uncertainty effect analysis can only weigh for or against compensation. It alone cannot solve the compensation problem.

The same framework can be applied to the decision whether to compensate individuals for losses that are generated by private or natural forces. These types of uncertainty commonly differ from uncertainty over government action, because individuals can frequently protect themselves against privately generated or natural losses through private markets. *Cf.* Michelman, *supra* note 6, at 1169 n.5 (limiting compensation analysis to context of government-induced losses); Sax, *Takings and the Police Power*, 74 YALE L.J. 36, 65-66 (1964) (distinguishing between risks of adverse government action and adverse private action in context of compensation). If such protection is not available and if the government must decide whether to act as an insurer, the framework developed in this Note is applicable.

12. Federal Environmental Pesticide Control Act, 7 U.S.C. §§ 135-136y (1976 & Supp. III 1979).

13. The utilitarian model of compensation was originally developed by Professor Frank Michelman, *see* Michelman *supra* note 6, and later refined by Professor Bruce Ackerman, *see* B. ACKERMAN, *supra* note 6, at 44-49. Professor Michelman argues that this model is not only utilitarian, but that in many cases it is also just, as defined by Professor John Rawls' concept of "justice as fairness." Michelman, *supra* note 6, at 1218-24. This Note takes no position on that point, as it does not attempt to interpret the term "just" under the Fifth Amendment.

14. Michelman, *supra* note 6, at 1215. If the direct net social benefit of a government action is not large enough to outweigh either the social cost of compensation or the social cost of failing to compensate—whichever is lower—then the government should not take the action in the first place. *Id.*

15. Professor Michelman refers to "demoralization costs" as the social cost of failing to compensate individuals who are harmed by government action. Demoralization costs include the ill will of individuals who believe that the cost of government action should not be borne disproportionately by those individuals who incur losses as a direct result of the action. *Id.* at 1214. Professor Ackerman refers to this aspect of demoralization costs as "the cost of citizen disaffection." B. ACKERMAN, *supra* note 6, at 46-48. Michelman's demoralization costs also include the uncertainty that people experience over their own vulnerability to future adverse government action. Michelman, *supra* note 6, at 1214. Professor Ackerman refers to this cost as the "cost of general uncertainty," which includes the social utility loss attributable to uncertainty in the economy regarding government action that will adversely affect some individuals. B. ACKERMAN, *supra* note 6, at 44-45. Professor Ackerman and other commentators have identified additional costs of noncompensable government action. First, there is the risk that government decisions under such a regime will not accurately take account of social costs. *Id.* at 52-53; Berger, *A Policy Analysis of the Taking Problem*, 49 N.Y.U. L. REV. 165, 223 (1974);

action is the creation of uncertainty among those individuals and among others similarly situated.[16] Individual responses to this uncertainty have a variety of effects on the rest of society, both positive and negative. The government can alter those responses by establishing a precedent or policy of fully compensating individuals for losses sustained by a given type of government action.[17] Because the utilitarian model of compensation balances the net social cost of failing to compensate against the net social cost of providing compensation, the societal effect of uncertainty must inform each government decision to establish a precedent or policy of compensating affected individuals.

A. *The Creation of Uncertainty and the Social Cost of Compensation*

The threat of adverse government action renders uncertain an individual's return from either his job[18] or his physical or financial assets. Uncertainty over the prospect of government-imposed losses arises in two ways.[19] First, many instances of government action are foreshadowed by

Dunham, *From Rural Enclosure to Re-enclosure of Urban Land*, 35 N.Y.U. L. REV. 1238, 1253-54 (1960); Sax, *supra* note 11, at 65. Second, if there is a choice of who must bear the cost of the government action, the official responsible for selecting the unfortunate individuals may be susceptible to unfair political or personal pressure from people seeking to avoid the harm. B. ACKERMAN, *supra* note 6, at 52-53; Sax, *supra* note 11, at 64-65.

16. B. ACKERMAN, *supra* note 6, at 48-49, 74 (1977) (Appeal to General Uncertainty); Michelman, *supra* note 6, at 1214 (impaired incentives); Williamson, *supra* note 6, at 119-20 (uncertainty regarding future redistributions by government is part of Michelman's "demoralization cost"). The definition of "uncertainty" used in this Note is different from that used in formal financial analysis. Here, the imposition of uncertainty by the government refers to an increase in the probability that the return from an activity will be lower than that previously expected. In financial terms, this consists of a reduction in the mean and an increase in the variance of the probability distribution of the activity's returns. Reference to the increased "riskiness" of an activity refers to the same phenomenon.

17. Full compensation is defined as the amount of money that would have to be paid to an individual who has sustained a government-imposed loss in order to make him indifferent between his situation before and after sustaining the loss. Michelman, *supra* note 6, at 1214; *see* Downs, *Uncompensated Nonconstruction Costs Which Urban Highways and Urban Renewal Impose Upon Residential Households*, in THE ANALYSIS OF PUBLIC OUTPUT 69, 79-90 (J. Margolis ed. 1970) (basic principle of compensation is to make people whole). In practice, it is likely to be difficult to apply a true full-compensation rule. The value that each individual places on an asset impaired by government action would have to be discerned, and idiosyncratic valuation would have to be honored. In most cases, the measure of compensation would probably be market value. This does not present a fundamental problem for the model as it can be extended to take into account the possibility of paying less than full compensation without disturbing its basic form. *See* Williamson, *supra* note 6, at 124. For simplicity, however, this Note assumes that full compensation is provided.

18. Congress has authorized compensation to workers who lose their jobs as a result of government action. *See* note 9 *supra*. Although the courts have not recognized a worker's loss of earning power as a compensable "taking" under the Fifth Amendment, there is nothing in the logic of the utilitarian model of just compensation that precludes compensation in such a context.

19. Although uncertainty may be a purposeful effect of adverse government action, it may also be incidental. *Cf.* Wolfe, *A Theory of Nonmarket Failure: Framework for Implementation Analysis*, 22 J.L. & ECON. 107, 126-28 (1979) ("derived externalities" of government action). In either case, the decisionmaker should evaluate its effect.

preparatory conduct by the government.[20] During the preparatory stage, the specific nature of the action and the specific subset of society that will bear its cost are unknown. In fact, part of the government's preparation may be the determination of what harm is to be imposed on which individuals. Thus, anyone engaged in an activity that could be harmed by the anticipated action experiences uncertainty over the continued profitability of that activity.[21]

Second, when the government takes an adverse action and fails to compensate those adversely affected, uncertainty arises over future uncompensated losses of a similar nature.[22] A given adverse action may signal future adverse actions of a similiar sort, and a failure to compensate may be perceived as a precedent.[23] As a result, the profitability of jobs or capital thought to be vulnerable to a future noncompensable government action becomes uncertain.[24]

20. For instance, the negotiation of the Law of the Sea Treaty cast a pall of uncertainty over the mining of the deep seabed. Recognizing this phenomenon, Congress considered action that would alleviate uncertainty and would allow the continued development of technology that would facilitate the exploitation of deep seabed resources. S. 493, 96th Cong., 1st Sess., 125 CONG. REC. S1789 (daily ed. Feb. 26, 1979) (providing legal structure for investment, and expressing congressional desire that future treaty leave investments unimpaired); H.R. 2759, 96th Cong., 1st Sess., 125 CONG. REC. H1220 (daily ed. Mar. 8, 1979) (same). An earlier form of these bills provided compensation to individuals whose investments are impaired by the Law of the Sea Treaty, but that provision was omitted in the most recent bill. See S. REP. NO. 307, 96th Cong., 1st Sess. 31 (1979) (expression of congressional intent to avoid impairment of investments sufficient to alleviate uncertainty without compensation).

21. For instance, when an urban renewal project is being considered, a period of investigation and discussion frequently precedes designation of the site to be condemned. Until a location is chosen and the specific nature of the project is announced, individuals with interests in the status quo throughout the area under consideration will be uncertain about whether their interests will be adversely affected. See Downs, supra note 17, at 79-90 ("announcement effect").

22. B. ACKERMAN, supra note 6, at 44 (when individuals observe that property rights have been redistributed, they will become uncertain about future redistributions); Michelman, supra note 6, at 1214 (same); Williamson, supra note 6, at 125 (same). But see Sax, Takings, Private Property, and Public Rights, 81 YALE L.J. 149, 180-81 (1971) (uncertainty regarding adverse government action should be irrelevant to compensation decision because property owners frequently bear risk).

23. The phenomenon of uncertainty emanating from government action that imposes losses on some individuals has also been recognized in the area of tax reform. See, e.g., Feldstein, On the Theory of Tax Reform, 6 J. PUB. ECON. 77, 93 (1976) (changes in tax laws make people uncertain about future stability of tax law, which causes them to engage in precautionary behavior); McIntyre, Transition Rules: Learning to Live with Tax Reform, 4 TAX NOTES, Aug. 30, 1976, at 7, 12 (uncertainty about change is price that must be paid); Note, Setting Effective Dates for Tax Legislation: A Rule of Prospectivity, 84 HARV. L. REV. 436, 439 (1970) (taxpayers must have confidence that they can structure their affairs with assurance that their plans will not be frustrated by subsequent changes in tax laws). But see Graetz, Legal Transitions: The Case of Retroactivity in Income Tax Revision, 126 U. PA. L. REV. 47, 65 (1977) (risk of change in law no different from market risks and should not be policy concern).

The converse of the uncertainty problem analyzed in this Note may arise from the incomplete enforcement of regulatory laws. In that context, an activity may be more profitable than it would be if a law were strictly enforced. See, e.g., Dunham, supra note 15, at 1251 (because people's estimates of risk enter into price of land, prices of buildings that are valueless according to housing codes are positive because of chance that municipality will not enforce code).

24. For instance, if a new emission limit is placed on a pollutant, individuals who are engaged in activities that require the emission of that pollutant, or one with similar properties, are likely to

The establishment of a policy or precedent of providing full compensation for specific government-induced losses would eliminate the uncertainty that otherwise would follow the imposition or preparation for the imposition of such losses.[25] Full compensation, however, entails social costs: although the amount of money given to the injured individuals is not a social cost—it is simply a transfer from one sector of society to another—the administration of the compensation program is socially costly.[26] Thus, in deciding whether to provide compensation, the decisionmaker must assess the societal effect of uncertainty regarding similar adverse governmental action in the future.[27]

become uncertain about further effluent limitations. Of course, the nature and scope of the uncertainty depend upon the context in which the initial regulation was promulgated.

25. *See* note 17 *supra* (defining full compensation). When people perceive that government activity foreshadows an adverse government action, or when a legal structure is established that will allow the government to undertake specific actions that would adversely affect some individuals, the promise of full compensation, if and when losses occur, will eliminate the uncertainty effect. Downs, *supra* note 17, at 70, 79 (promise of compensation eliminates uncertainty). Similarly, the precedential value of the provision of compensation can eliminate the uncertainty effect that otherwise would follow the imposition of those losses, and a statement by the court, legislature, or agency articulating the scope of losses considered to be similarly compensable would clarify the compensabilty of similar, but not identical, losses in the future. Once a precedent or policy is established for providing compensation for a given type of government-imposed loss, neither the imposition nor the preparation for imposing such a loss on an individual will generate an uncertainty effect. *See* B. ACKERMAN, *supra* note 6, at 44 (compensation eliminates uncertainty); Michelman, *supra* note 6, at 1214 (compensation eliminates demoralization); Williamson, *supra* note 6, at 120-21 (same).

The ability of the government to use compensation to eliminate the uncertainty that follows an adverse government action is merely asserted by Michelman and Ackerman. At least until a firm compensation policy or set of precedents is in place, it seems reasonable as an empirical matter that the provision of compensation in one instance will not allay all uncertainty that compensation will be provided in similar instances. It is also reasonable to assume, however, that the provision of compensation coupled with a statement of the policy behind the decision to compensate will reduce uncertainty regarding a similar but uncompensated adverse government action in the future. If uncertainty is only partially eliminated by the provision of compensation, the focus of this analysis merely shifts to the societal effect of the expected reduction of uncertainty rather than the elimination of uncertainty. *See* Williamson, *supra* note 6, at 124 (extension of compensation model to allow for possibility of imperfect compensation). For simplicity, this Note assumes that compensation will eliminate uncertainty.

26. The administrative cost includes the cost of distinguishing between the people who should and who should not receive compensation, calculating or bargaining for the amount they should receive, and disbursing the payments. Michelman, *supra* note 6, at 1214 n.99. This cost will be greater than the cost of measuring the social costs required by the compensation model. Whereas the assessments called for by the model are aggregate estimates, those that would have to be made in implementing a full compensation program must be individualized. Because each claim must be scrutinized for accuracy and veracity, the cost of carrying out a compensation program can be substantial.

27. The provision of compensation will also eliminate the other effects of adverse government action. *See* note 15 *supra*. Disaffection will be alleviated because the individuals who bear the brunt of the government action will not believe that the state is operating under a theory of politics different from their own. B. ACKERMAN, *supra* note 6, at 46-48. The risk that the agency responsible for the action will not take into account the full social cost of its action will be alleviated because the agency will have to pay the full social cost of the action. *Id.* at 51; Sax, *supra* note 11, at 65. Some legislators have turned this aspect of compensation into a disadvantage. *See* S. REP. NO. 307, 96th Cong., 1st Sess. 31 (1979) (compensation imposes "additional burden" on government decisionmaker who is considering action that imposes loss on private individuals); 117 CONG. REC. 40,052 (1971) (remarks of Rep. Evans) (same). Finally, compensation will eliminate the risk that improper or corrupt political activity will surround the decision to impose losses on someone, because the incentive for individuals to engage in such activity will be absent. Sax, *supra* note 11, at 65.

B. *The Societal Effect of Uncertainty*

Professor Michelman, in his utilitarian model of compensation, treats uncertainty as a "cost" of failing to compensate an individual who is adversely affected by government action.[28] This treatment stems from his focus on the cost of uncertainty to the uncertain indivdual, rather than on the societal impact of uncertainty.[29] Thus his approach is inconsistent with the goal of basing the compensation decision on a societal cost-benefit calculus. Although uncertainty over adverse government action does represent a cost to the uncertain individual,[30] its effect on society depends on that individual's response. Faced with the uncertain prospect of bearing the cost of a government action, an individual is likely to spend time and money to avoid or to mitigate his anticipated loss.[31] If a risk-reducing course of action is found that is sufficiently inexpensive, he is likely to follow that course of action.[32] That response will affect other people, and may set in motion a chain reaction that has social value unrelated to the individual's cost of uncertainty.[33]

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28. *See* Michelman, *supra* note 6, at 1214. *See also* B. ACKERMAN, *supra* note 6, at 44-45 (treating uncertainty as cost); Williamson, *supra* note 6, at 119-21 (same).

29. *See* Michelman, *supra* note 6, at 1215-18. *See also* B. ACKERMAN, *supra* note 6, at 44 (Appeal to General Uncertainty based on fact that institutional decision that increases uncertainty imposes costs upon all citizens who already find social environment too risky). Ackerman's focus on the individual's cost of uncertainty leads him to adopt an incorrect method of assessing the "cost of uncertainty." He states that as the cost of risk-reducing strategies increases, the appeal to general uncertainty becomes more important. *Id.* at 44-45. Ackerman ignores the possibility that the individual's response to uncertainty can impose on others costs or benefits that are unrelated to the cost he bears in carrying out his response. *But see id.* at 206 n.6 (referring in passing to these effects as "second order").

As Ackerman asserts, the cost of insurance and the cost of reducing participation in the uncertain activity are related to the effect of uncertainty; they are not related, however, in the way he asserts. Viewed from the perspective of the social impact of uncertainty, these costs are significant in that they make different types of responses more or less likely to occur. *See* pp. 1679-82 *infra*. The relationship between response costs and the cost of uncertainty could very well be an inverse relationship. As response costs decline, it becomes more likely that there will be an active response, and that the effect of the uncertainty will spread beyond those initially rendered uncertain. In order to relate these costs to the social cost of uncertainty in any particular instance, it is necessary to predict the chain of effects triggered by the government-induced uncertainty, and to assess the cost of the entire effect.

30. This loss is represented by the subjective probability that the adverse government action will occur, multiplied by the loss that will be imposed by the action, and a factor that represents the degree to which the uncertain individual is risk averse.

31. *Cf.* R. RIEGEL, J. MILLER, & C. WILLIAMS, INSURANCE PRINCIPLES AND PRACTICES: PROPERTY AND LIABILITY 4-6 (6th ed. 1976) (methods of meeting risk).

32. A risk-reducing strategy is sufficiently inexpensive if the amount that is expected to be saved by the strategy, discounted by the probability that the strategy will be successful, is greater than the cost of the strategy.

33. For example, consider a group of merchants in a town near a military base. If uncertainty is created over the closing of the base, either by the closing of another base or by a Defense Department decision to study the possibility of closing military bases, then the merchants' expected income will be reduced and made more risky. They will have incurred a loss as a result of the uncertainty itself. The merchants' response may be to mitigate their potential loss by ceasing to spend any money on capital improvement of their shops. This response would impose on the community the external cost of the shops' dilapidation. Thus, merely by creating uncertainty over the closing of the military base, the

When attention shifts to the societal effects of uncertainty, it becomes clear that uncertainty over such effects must be scrutinized in each situation before a conclusion can be reached about the desirability of the uncertainty. For example, if the uncertain individual can shield himself from the risk of adverse government action without imposing costs on others, the uncertainty may be inconsequential from a societal point of view. Furthermore, from this perspective the uncertainty need not be a social cost. If the uncertain individual's reaction to uncertainty is socially desirable, his cost may lead to society's benefit.

II. A Framework for Assessing the Uncertainty Effect

The uncertainty generated by adverse government action can simply reduce the expected profitability of affected activities, or it can induce those engaged in such activities to take measures to lessen their risk. In either situation, the individual's loss is a social cost; in the latter case, however, the net effect of uncertainty on society is compounded by the social value of the uncertain individual's response. The nature of that response to uncertainty depends on the cost of his bearing the uncertainty and on the relative cost of uncertainty-reducing courses of action.

A. The Individual's Cost of Uncertainty

The cost of uncertainty to the individual is the expectational loss generated by the risk that he will sustain damage as a result of a given type of government action.[34] That cost depends upon two factors: the magnitude and the perceived probability of the harm that the individual expects to sustain as a result of the anticipated government action, and the level of the individual's aversion to risk. These factors determine the extent to which the individual is made worse off solely by the onset of the risk that he will incur a government-imposed loss.[35]

Ignoring the risk preference of the uncertain individual, the expectational loss is equal to the magnitude of the anticipated losses multiplied by the perceived probability that those losses will be incurred. To evaluate these factors, the decisionmaker must examine the circumstances that surround the uncertainty-triggering action. An initial adverse government ac-

government has imposed individual costs on the merchants, plus diffuse costs on the community. *See* p. 1680 *infra* (effect of allowing assets to depreciate).

34. *See* R. RIEGEL, J. MILLER, & C. WILLIAMS, *supra* note 31, at 3 (uncertainty is one cost).

35. The more an individual expects to lose when the adverse government action occurs and the higher the probability he places on the action's occurrence, the greater will be the expectational loss he sustains as a result of continuing his participation in a vulnerable activity. Similarly, the more risk averse a person is, the higher will be the cost to him of bearing the uncertainty. *See* W. NICHOLSON, MICROECONOMIC THEORY 73-75 (2d ed. 1979).

tion, or open preparation by the government for such action, sends a message about the future course of government activity.[36] On the basis of that message and its context,[37] individuals form expectations regarding both the probability of their sustaining a loss and the magnitude of that loss.[38]

In all likelihood, the decisionmaker will be able to obtain only general estimates of these values. He must first predict the message that will emerge from the government action in order to identify those who will be rendered uncertain.[39] With this prediction, it is possible for the decisionmaker then to investigate directly the value of the investments that are placed at risk and the subjective probability that the uncertain individuals place on the occurrence of the anticipated loss.[40] These determinations, of course, will be speculative.

Risk aversion adds a second consideration to the calculation of the expectational losses created by uncertainty. The product of the perceived magnitude and probability of harm must be multiplied by a factor that represents the individual's level of aversion to risk.[41] The more risk averse a person is,[42] the higher will be his expectational loss from an uncertainty-triggering government action,[43] and the more he will be willing to spend

36. This is more a characterization than a description of the creation of uncertainty over adverse government action. A mechanism like this is implicit in Ackerman's concept of uncertainty costs, B. ACKERMAN, supra note 6, at 44-45, and Michelman's concept of demoralization costs, Michelman, supra note 6, at 1214. It is also implicit in Congress' concern over creating uncertainty by its actions. See, e.g., 117 CONG. REC. 40,049 (1971) (remarks of Rep. Foley) (14 companies stopped research and development of insecticides because of fear of having future product banned); id. at 40,050-51 (remarks of Rep. Poage) (someone must pay for uncertainty).

37. The message is determined by the nature of the government action or preparation, the context in which the action is taken, and any statement that accompanies the action.

38. See, e.g., 117 CONG. REC. 40,051 (1971) (remarks of Rep. Poage) (discussing level of uncertainty in pesticide industry and recent history of pesticide bans).

39. Both owners of capital and workers can become uncertain regarding government-imposed losses. The loss anticipated by owners of capital is measured by the expected reduction in the income stream generated by their investment. Similarly, the loss feared by workers is measured by the expected reduction in their wages brought about by the anticipated government action. If the anticipated government action will cause workers to lose their jobs, it is necessary to predict the type of jobs into which the displaced workers will transfer in order to assess the magnitude of the loss they will sustain. It is also necessary to take into account the costs of their finding and transferring into a new job.

40. This type of subjective risk assessment is made in the contexts of environmental and occupational regulation. See Slovic, Fischhoff, & Lichtenstein, Rating the Risks, in ENVIRONMENT, April 1979, at 14 (surveying state of art of subjective risk assessment).

41. W. NICHOLSON, supra note 35, at 73-75.

42. The decisionmaker could survey a sample of the individuals rendered uncertain in order to determine their degree of risk aversion.

Direct measurement of risk aversion is likely to be impractical. Two assumptions, however, can be made about the risk aversion of the individuals rendered uncertain. First, it can be assumed that they are risk averse, Friedman & Savage, The Utility Analysis of Choices Involving Risk, 56 J. POL. ECON. 279, 291-92 (1948), and second, it can be assumed that poor individuals are more risk averse than wealthy ones, id. at 300.

43. Because the sole effect of the anticipated government action will be to reduce the profitability of the affected activity, the onset of uncertainty only skews the probability distribution of returns toward the lower tail of the distribution. This reduces the expected value of an activity to both risk averters and risk preferrers. See note 16 supra. The assumption of risk aversion allows the deci-

or forgo in order to alleviate the uncertainty. If no course of action is available that would alleviate uncertainty at a low enough cost, he will remain in the activity and internalize the expectational loss.

B. *The Response to Uncertainty: The Individual's Cost of Risk-Reducing Courses of Action*

An individual participating in an activity whose profitability has become uncertain due to the possibility of future adverse government action can respond in any or all of four ways. First, he can remain in the uncertain activity and internalize the cost of uncertainty. Second, he can sell his interest in the uncertain activity. Third, he can hedge or insure against the anticipated loss by investing in an activity that will become more profitable, or in an insurance policy that will pay out, if the anticipated government action occurs. Finally, he can remain in the uncertain activity, but at the same time take measures to reduce the effect of the anticipated adverse government action. The response or combination of responses that the uncertain individual selects will be the one that achieves the most risk reduction for each dollar he spends or forgoes.[44]

1. *Remaining in the Uncertain Activity*

The simplest course of action that is available to the individual participating in an uncertain activity is to remain in the activity and internalize the loss. The cost to the individual of that response, or nonresponse, is the expectational loss attributable to the uncertainty. The higher the probability that the individual places upon the occurrence of the adverse government action, the more he expects to lose and the more risk averse the individual is, the higher that cost will be.

2. *Sale or Depreciation of the Uncertain Asset*

At the opposite extreme, the individual can sell his interest in the activity. The cost of selling his interest in the uncertain activity depends on the price he can receive. Presumably, buyers and sellers are equally aware of the uncertainty that encumbers the activity. The price of the interest, therefore, can be expected to fall by an amount approximately equal to the expectational loss attributable to the risk of bearing the damage associ-

sionmaker to treat the magnitude of losses discounted by their probability as a lower bound of the expectational loss imposed upon the uncertain individual.

44. Each method of reducing uncertainty entails a marginal cost per "unit" of uncertainty reduced. In theory, each unit of uncertainty would be reduced using the method with the lowest cost for that unit. One method may be used up until the point at which further use of that method would be more expensive than beginning to use another method.

ated with the anticipated government action.[45] The uncertain individual, however, can gain if he sells his interest to someone who is less risk averse, who places a lower probability on the occurrence of adverse government action, or who will lose less than the initial owner if the adverse action occurs.

If the individual is unwilling to accept the loss associated with selling the uncertain asset, he may be able to reduce his losses by allowing the asset to depreciate—in effect, by ceasing to invest in the activity.[46] The individual who pursues that course of action saves maintenance costs, but loses the amount by which his asset's profitability declines as a result of its depreciation. The attractiveness of that course of action depends on the specifics of that tradeoff.

3. *Hedging, Insuring, and Diversifying*

In hedging against the risk of a government-induced loss, the individual remains in the uncertain activity and, at the same time, shifts resources into another activity that will become more profitable if the anticipated government action occurs.[47] To achieve a perfect hedge, enough resources must be shifted into the new activity so that the potential gain in that activity will offset the potential loss in the initial activity.[48] If information about the government action and its possible effects is generally available, however, it will be costly to construct a hedge. Assets that would increase in value as a result of the anticipated government action[49] will increase in price upon the onset of uncertainty. Thus, once uncertainty is imposed upon the owner of an asset, he can alleviate it only at a cost equal to the amount by which the price of the hedging asset rises.[50] On balance, if information about the potential adverse government action is generally available, the hedge does not allow the individual to increase the expected

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45. *Cf.* Downs, *supra* note 17, at 80 (uncertainty about government action reduces marketability of property). As a result, not many people who experience heightened uncertainty about adverse government action would sell their interests in the uncertain activity.

46. *See id.* at 79 (uncertainty over urban renewal or highway construction causes owners of property to neglect making property improvement). Of course, this can be done only if exhaustible assets are involved.

47. *See* R. RIEGEL, J. MILLER, & C. WILLIAMS, *supra* note 31, at 6-8 (describing hedging generally).

48. During the period preceding the ban placed on cyclamates in 1969, several soft drink companies were hedging their investments in diet soft drinks that contained cyclamates by preparing diet soft drinks that did not contain cyclamates. Within a week, the alternative drinks were on the market. Charles Adams, president of Coca Cola, Inc., described his company's preparation of a new diet drink as "taking out insurance." H.R. REP. NO. 1070, 92d Cong., 2d Sess. 17 (1972) (minority views); Letter from Ralph Nader to Representative Emanuel Celler (Mar. 22, 1972), *reprinted in* 118 CONG. REC. 24,881-82 (1972).

49. This assumes that they are generally available on the market.

50. The increase in the variance of an asset can be hedged away, but the decline in its expected value cannot. *See* note 16 *supra* (definition of uncertainty for purposes of this Note).

value of his investments, but it does allow him to reduce his risk.[51] Hedging can increase the value of the uncertain individual's investment, however, if the individual has generally unavailable information about, or advantageous access to, hedging assets. For example, that possibility occurs if a manufacturer prepares to shift to an alternative product when its primary product is in danger of being banned from the market.

The purchase of an insurance policy that will reimburse the policyholder for all losses that are brought about by an anticipated government action is a course of action equivalent to a hedge. If this type of insurance is available, its cost will equal the actuarial value of the expected loss. Like a hedge without an information or access advantage, insurance only limits the expected loss to the decline in an activity's expected value that the risk of the adverse government action causes.[52] It does not change the expected value. Insurance, moreover, is unlikely to be available for a loss that is the result of an anticipated government action.[53]

A related risk-reducing strategy is to diversify: to acquire interests in several assets so that, if the anticipated government action is taken, only a small portion of the individual's total portfolio is impaired.[54] To do this, however, the individual may have to reduce his exposure in the uncertain activity. Therefore, if the investment in that activity is indivisible, diversification may be impossible.

An individual can hedge against the risk of adverse government action only if he can accurately predict the nature of the action and identify an activity that would benefit by the action. Diversification is feasible so long as it is possible to identify an activity that will be unaffected by the government action. The size of the initial uncertain investment relative to the individual's portfolio, and its divisibility, also determine the viability of either hedging or diversifying. It must be possible to shift enough resources into other activities so that when the government action is taken,

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51. *See* note 48 *supra* (example of hedge against cyclamate ban using information and access advantages).

52. *See* note 50 *supra* (only increase in variance of asset, not decline in expected value, can be hedged away).

53. *But see* R. RIEGEL, J. MILLER, & C. WILLIAMS, *supra* note 31, at 82 (Lloyds Associations willing to write exceptional contracts); N.Y. Times, Jan. 5, 1980, at 2, col. 1 (Lloyds of London insured NBC-TV for risk that United States would not participate in 1980 Olympics). An insurable risk typically exhibits the following characteristics: (1) it must represent the possibility of a real loss, and there should be no incentive for the insured to increase the possibility of a loss; (2) the loss must be important; (3) the cause, time, place, and amount of loss must be accurately ascertainable; (4) the cost of the insurance must not be too high; (5) a large number of individuals must experience the risk; and (6) the magnitude and probability of the loss must be objectively calculable by the insurer. R. RIEGEL, J. MILLER, & C. WILLIAMS, *supra* note 31, at 16-17. The risk of adverse government action, depending on the context, is likely to fail to meet the third, fourth, fifth, and possibly the sixth conditions.

54. *See* J. VAN HORNE, FINANCIAL MANAGEMENT AND POLICY 50 (4th ed. 1977) (investor can reduce riskiness of portfolio by investing in securities whose returns are not perfectly correlated).

the loss that is sustained is either insignificant in relation to the entire portfolio or offset by a simultaneous gain in the other assets. If a hedge can be constructed, or a portfolio diversified, the cost to the uncertain individual depends on the profitability of the assets that are acquired, on the return forgone if the individual divests himself of the initial risky asset, and on the transaction costs of constructing the new portfolio.[55]

4. Safeguarding

To institute a safeguard against the adverse effect of government action the uncertain individual must predict the nature of the anticipated action and alter the activity at risk so that it will remain profitable even if the government takes the action.[56] The viability of the safeguard depends on the availability of a risk-reducing strategy for that activity.[57] If a strategy exists, its cost to the uncertain individual depends on the cost of the safeguard itself and on the probability that it will be successful. The probable success of the safeguard, in turn, depends on an accurate prediction of the adverse government action, an important determinant of the attractiveness of this alternative.

C. The Societal Effect of Uncertainty

Whether the threat of government action renders jobs or capital uncertain, the individuals affected will undertake the most cost-effective risk-reducing strategy available.[58] Each of the responses to uncertainty pro-

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55. *Cf.* R. RIEGEL, J. MILLER, & C. WILLIAMS, *supra* note 31, at 10-11 (putting money into fund as self-insurance may entail accepting lower returns).

56. *See* R. MEHR & E. COMMACK, PRINCIPLES OF INSURANCE 28 (7th ed. 1980) (prevention of loss as means of risk reduction); R. RIEGEL, J. MILLER, & C. WILLIAMS, *supra* note 31, at 5 (same); Ehrich & Becker, *Market Insurance, Self-Insurance and Self-Protection*, 80 J. POL. ECON. 623, 637-38 (1972) (analyzing self-protection as it interacts with market insurance and self-insurance). For instance, if it is feared that the government might tighten a pollution emission standard, a firm whose production process barely allows it to meet the current standard might respond by investigating ways to reduce its emissions. If it is successful, it can remain profitable when the standard is changed. An argument that has been made frequently during congressional debates over compensation is that firms should engage in this type of activity. *See, e.g.,* 117 CONG. REC. 40,046 (1971) (remarks of Rep. Evans) (manufacturers should continue to test product while product is on market); 118 CONG. REC. 24,885 (1972) (remarks of Rep. Boland) (indemnification of cyclamate manufacturers would encourage industry to reduce research).

57. In many situations, there are no safeguards against an adverse government action. For instance, if the anticipated action is the closing of a military base, there will be very little the community around the base can do to protect its interests.

58. *See* R. RIEGEL, J. MILLER, & C. WILLIAMS, *supra* note 31, at 9 (individual will retain risk when that is cheapest alternative). If no risk-reducing strategy is more economical than internalizing the expectational loss, then none will be undertaken.

One congressman argued that a firm that faces the risk of adverse government action will pass on the cost of the risk to consumers by raising the price of its product. 117 CONG. REC. 4050 (1971) (remarks of Rep. Poage) (favoring indemnification of owners' banned pesticides; uncertainty regarding pesticide bans "will add substantially to the cost").

This argument is not unambiguously valid. The heightened risk of adverse government action is not

duces a societal effect that may or may not be socially desirable. The decisionmaker can predict individuals' responses to a given instance of government-induced uncertainty, and can assess the social desirability of those responses, based on estimates of the relative cost to the uncertain individuals of alternative responses. That assessment should be one component of the decision whether to promise, or to set a precedent for, the provision of compensation for a class of government-induced losses. If the net effect of uncertainty in the class of cases under consideration is socially desirable, the uncertainty effect would not justify the provision of compensation. On the other hand, if the net effect of uncertainty is socially costly, that cost must be weighed[59] against the social cost of providing compensation in the class of cases under consideration.[60]

1. *Retaining the Uncertain Asset*

If an owner of capital retains an asset that is subject to the risk of

equivalent to an increase in the variable cost of a product, which could be partially passed on to the consumer. Rather, it is similar to an increase in the rate of a profits or a property tax. This type of cost can be directly passed on through increased prices only under limited circumstances. *See* R. MUSGRAVE & P. MUSGRAVE, PUBLIC FINANCE IN THEORY AND PRACTICE 396-407, 412-21 (1973) (incidence of corporate profits and property taxes); Harberger, *The Incidence of the Corporation Income Tax*, 70 J. POL. ECON. 215 (1962) (path-breaking analysis of incidence of corporate profits tax). In the short run, a profit-maximizing firm in a perfectly competitive market cannot pass on this type of cost increase by raising its prices. R. MUSGRAVE & P. MUSGRAVE, *supra*, at 397, 414. The same is true of a profit-maximizing monopolist. *Id.* at 401.

Cost increases of this type can be passed on through higher prices in two situations. First, they can be passed on under an oligopolistic market structure. This occurs if all firms in the market either collude or treat the cost increase as a signal to raise prices simultaneously. *Id.* at 403-04. Second, this type of cost can be passed on by a monopolist that has not fully exploited its market power. In response to the cost increase, the restrained monopolist may exploit unused market power. *Id.* at 403. In addition, if a firm's labor force is weak and the firm has monopsony power, it may be able to pass on some of its increased costs to its workers. *Id.* at 406.

In the long run, however, the consumer will bear a portion of the cost increase. As property in the uncertain sector depreciates, it will not be fully replaced. New investment in the sector will decline, and capital will shift out of the uncertain sector and into the rest of the economy. The reason for the shift is that the expected return from capital in the uncertain sector will have fallen. *See* note 16 *supra* (defining uncertainty). The shift of capital will continue until the net rate of expected return in the uncertain sector equals that in the rest of the economy. As capital shifts from the uncertain sector into the rest of the economy, the relative output of the uncertain sector will decrease. Assuming that demand remains constant, this will cause an increase in the relative prices of goods produced in the uncertain sector. R. MUSGRAVE & P. MUSGRAVE, *supra*, at 398-400, 414-15.

59. *See* note 15 *supra* (discussing other types of costs).

60. Any of these reactions will entail costs to the uncertain individual, which will affect the allocation of resources to the uncertain sector. To the extent that the uncertain sector becomes less profitable, less capital will be attracted to that sector. As a result, output will fall and prices will rise. *See* note 58 *supra*.

The social desirability of this uncertainty-generated reallocation depends on the optimality of the allocation prior to the onset of uncertainty. If that allocation was optimal, then the injection of uncertainty that is exogenous to the market is socially costly. If the ex ante allocation of resources was suboptimally high, however, the effect of the uncertainty is to move the allocation of resources toward optimality. Because of the problem of the "second best," it cannot be concluded from this fact alone that the reallocation is beneficial. The decisionmaker will have to analyze empirically a particular reallocation in order to conclude anything about its social desirability.

adverse government action and internalizes the uncertainty, then the own-
er's expectational loss is a social cost. The same is true of a worker: if a
worker fears losing his job, but chooses to remain in the job and internal-
ize the risk of losing it, his expectational loss is a social cost of the govern-
ment-generated uncertainty. The more specific his skills are to the set of
jobs rendered uncertain, the higher will be his cost of uncertainty. The
total social cost of uncertainty in each situation is equal to the aggregate
of individual expectational losses.[61]

2. *Sale or Depreciation of the Uncertain Asset*

If the owner sells the asset, society will bear a cost equal to the differ-
ence between the asset's value prior to the onset of uncertainty and its
value in the hands of the buyer.[62] All other things being equal, the greater
this cost, the more the uncertainty effect militates in favor of providing
compensation. The buyer's conduct under uncertainty, however, must also
be considered. If, for example, a buyer of the asset has an advantage in
instituting safeguards against or in hedging against the risk of government
action, the resulting social cost may be lower.[63]

Alternatively, the owner of an asset, when faced with uncertainty, may
allow the asset to deteriorate. The social desirability of the deterioration
depends on the initial allocation of resources. If that allocation was opti-
mal, the injection of uncertainty—a factor exogenous to the market—is
socially costly. Conversely, if the ex ante allocation of the uncertain asset
was suboptimally high, the uncertainty moves the allocation of resources
toward optimality.[64]

Externalities generated by the asset's deterioration are also social costs
of uncertainty.[65] The externalities may be safety or aesthetic hazards for
which the owner is not liable, or they may be product-quality problems of
which consumers are unaware. These costs will continue until the owner
of the deteriorating asset goes out of business or until the uncertainty that
triggered the deterioration subsides. If these costs are expected to be high,

61. Moreover, when the individual cannot alleviate his uncertainty over adverse government ac-
tion, it is possible that he will externalize his apprehension by acts of aggression. *See* Williamson,
supra note 6, at 119 (aggression is possible response to demoralization brought about by adverse
government action). If an aggressive response is expected, the social cost of that response must also be
taken into account.
62. Society will also incur the transactions cost of the sale.
63. *Cf.* Sax, *supra* note 22, at 183-84 (one way to accommodate conflicting uses of property is to
impose costs of conflict on party who is expected to sell property interest to third party who can
develop best solution to conflict).
64. This, however, will not necessarily be an improvement. *See* note 60 *supra* (theory of second
best).
65. *See, e.g.,* Downs, *supra* note 17, at 80 (deterioration in quality of life in area facing uncer-
tainty regarding urban renewal or highway construction).

the uncertainty effect favors the establishment of a precedent or policy of providing compensation to those who incur losses as a result of such action.

For a worker whose job is vulnerable to adverse government action, changing jobs is analogous to the sale of an asset. Assuming that the ex ante allocation of labor is optimal, the social cost of the worker's transfer is equal to the loss in productivity caused by his moving into a job for which he is less well-suited and by a less qualified worker taking his old job. The amount of productivity lost depends on the relative skill levels of the jobs and the relative qualifications of the workers.[66] If the ex ante allocation of labor in the uncertain sector is suboptimal, the social desirability of the reallocation must be analyzed directly.[67]

The situation of a job being rendered uncertain due to government action differs from that of a physical or financial asset being rendered uncertain in two respects. First, because no worker is likely to be able to hedge or to safeguard against the adverse effect of government action, a transfer of "proprietorship" cannot significantly alter the societal effect of uncertainty.[68] Second, workers do not have the option of cutting their potential losses by allowing their uncertain assets to depreciate. Jobs are even more indivisible than most physical assets. Thus the worker cannot fine tune the resource reallocation in the way the owner of certain types of capital can.[69]

3. Hedging or Insuring Against the Anticipated Loss

If the owner of an asset hedges against the risk of adverse government action, there will be a reallocation of resources toward investments that would benefit from the anticipated action. As always, the social desirability of that effect depends upon the ex ante allocation of resources. If the reallocation of resources is not particularly costly and if the transaction

66. To the extent that the workers are paid for skills that are specific to the uncertain sector, they will have to accept lower pay when they transfer to jobs outside that sector. Some of the human capital that they had built up in their old jobs therefore will be lost. The workers will transfer into jobs that are likely to be lower paying but more secure than their initial jobs, and the skills that they applied in their previous jobs will be underutilized. With a labor supply less abundant in the uncertain activity, the wage rate will rise. This in turn, will cause a reduction of output in the uncertain activity.

67. *See* note 60 *supra* (discussing societal effect of reallocation of resources).

68. It is possible that the worker who takes over the job will be less risk averse than the original worker. If so, the societal cost of uncertainty will be somewhat lower. There seems to be no way to predict, however, whether the new worker will be less risk averse than the original worker or whether the uncertain job is simply the best job he can find.

69. Theoretically, the worker can spend less time, money, or both developing the skills needed for the risky job. It seems doubtful, however, that many jobs require such independent acquisition of skills on the part of the worker.

costs of hedging are low, the societal effect will be insignificant.[70] On the other hand, if resources flow into assets of low social value, the effect will be socially costly. For example, if the uncertain individuals take out insurance policies to protect themselves from adverse government action, the shift of resources produces only the elimination of uncertainty—security gained at the expense of other goods.[71] Thus, the uncertainty effect will weigh in favor of establishing a policy or precedent of providing compensation to the individuals adversely affected only if the response to uncertainty is expected to entail a socially costly reallocation of resources.

Although compensation may be denied to owners of capital on the ground that they can hedge or diversify without significant allocative costs, the same is not true with respect to workers. Their investments at risk are the knowledge and skills they apply in their jobs. These assets represent an overwhelming proportion of their "portfolio" and are indivisible.[72] Thus, even if workers and their employers anticipate the same adverse government action, the uncertainty effect may favor more strongly a precedent or policy of compensating workers for a given type of adverse governmental action, than a similar precedent or policy of compensating owners of capital.

4. Safeguarding Against the Anticipated Loss

If the owner of capital institutes safeguards against the anticipated adverse government action, the ultimate societal effect of uncertainty de-

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70. For example, in response to uncertainty regarding the cyclamate ban, soft-drink companies invested in developing alternative diet soft drinks. *See* note 48 *supra*. Although difficult to determine empirically, it would appear that this hedge was not socially costly. It may, in fact, have been socially beneficial.

71. *Cf.* B. ACKERMAN, *supra* note 6, at 44 (adaptive behavior occurs at expense of forgoing positive utility).

In principle, workers may be able to reach an agreement with their employer under which the employer guarantees them a minimum number of hours of work, liberal severance pay, or some other form of job protection in exchange for a lower wage rate. In effect, they could buy insurance from their employer. The amount the workers would have to give up would equal the actuarial value of the risk of their losing their jobs multiplied by a factor that would represent a degree of risk aversion lying between their own and their employer's aversion to risk.

In practice, however, it is not clear that such risk transfers will occur. The transaction costs of working out individual contracts that conform to each employee's risk and risk preference would be high. Therefore, such an arrangement would occur only in firms or industries having an organized labor force. Even in these industries, it is not certain that a satisfactory risk transfer could be agreed upon. If the workers differ in their risk or preferences for risk, it is unclear how well a union that represents the entire group of workers will be able to satisfy its constituents. *See* D. BOK & J. DUNLOP, LABOR AND THE AMERICAN COMMUNITY 112-16 (1970) (accommodation of minority interests); *cf.* M. OLSON, THE LOGIC OF COLLECTIVE ACTION 90 (1971) (collective bargaining involves coercion). In addition, the cost of satisfactory job security may be so high that workers are unable adequately to protect themselves. They may have to internalize at least part of the uncertainty of adverse government action.

72. A worker, conceivably, can seek training in another field while remaining at his job as a means of diversifying his "portfolio", but this is likely to be impracticable.

pends on the nature of the safeguard and the cost of its implementation. This course of action will frequently be socially desirable. The nature of the safeguard response is to convert an activity from a form in which it conflicts with another activity,[73] thereby possibly requiring government intervention,[74] into a form in which it does not. Thus, if successful, the safeguard promotes the public interest.[75]

The circumstances that give rise to this response are limited in two respects. A socially beneficial safeguard can be expected only if the uncertain individual is able, at a sufficiently low cost, to alter his activity to eliminate its adverse effect on other activities.[76] In addition, the safeguard will be socially desirable only if the uncertain individual can eliminate the conflict more cheaply than the government can by direct regulation.[77] If a

73. *See* Sax, *supra* note 22, at 154 (analyzing inextricability of relationships among property rights).

74. *See id.* at 175 (describing legislative and administrative resolution of conflicts among property uses).

75. The creation of uncertainty over an unfavorable government resolution of a conflict between an individual's activity and the public interest is equivalent to increasing the prospective cost of the inputs that give rise to the conflict. For instance, if a plant uses a process that risks injury to workers, and the government generates uncertainty regarding the possibility of stricter safety regulation, the cost of the process effectively will rise. If substitutes are readily available for the inputs responsible for the conflict, they will be put into use when the government orders that the activity cease operation. If no such substitutes exist, the individual who bears the cost of uncertainty will have an incentive to begin searching for a resolution to the conflict between his activity and the public interest. *Cf.* C. SCHULTZE, THE PUBLIC USE OF PRIVATE INTEREST (1977) (analyzing use of economic incentives to achieve public goals). Thus, by effectively raising the prospective cost of an input that conflicts with the public interest, the government can stimulate a private search for a mutual accommodation between a private activity and the public interest. This scenario comports with the accepted view among economists that research and development efforts tend to follow increases in the cost of factor inputs. *See* R. NELSON, M. PECK, & E. KALACHEK, TECHNOLOGY, ECONOMIC GROWTH, AND PUBLIC POLICY 31-34 (1967) (factor prices influence innovative activity); Binswanger, *Induced Technological Change: Evolution of Thought,* in INDUCED INNOVATION: TECHNOLOGY, INSTITUTIONS, AND DEVELOPMENT 13, 23 (H. Binswanger & V. Ruttan eds. 1978) (same); *cf.* Schmoakler, *Economic Sources of Inventive Activity,* 22 J. ECON. HIST. 1 (1962) (society can influence technological advances through market mechanism).

76. The case of a firm doing research and development on pollution control in response to an anticipated tightening of emission standards illustrates this type of socially desirable response to uncertainty. Initially, the firm's operation conflicted with the public interest by polluting the air to a degree that would be unacceptable in the long run. If successful in finding a way to reduce its emissions at a sufficiently low cost, the firm could remain in business and the community could breathe cleaner air. Without the firm's efforts, the government would have to choose either the firm or the cleaner air, but not both.

77. This argument tracks one of the arguments for the strict liability of product manufacturers: because manufacturers are in the best position to avoid, or to pay others to avoid, injuries arising out of the use of their products, they should bear the cost of those injuries. Calabresi & Hirschoff, *Toward a Test for Strict Liability in Torts,* 81 YALE L.J. 1055, 1060 (1972). In the context of uncertainty over adverse government action, the uncertain individual is often in the best position to smooth the transition that the government action brings about. This minimizes the social costs of the transition. *See* Sax, *supra* note 22, at 177-86 (when one activity interferes with another activity, cost of conflict should be imposed on party most easily able to innovate in order to accommodate both activities).

This solution seems to be the theoretical basis of one of Ralph Nader's arguments against indemnification of those who incurred losses as a result of the cyclamate ban. *See* Letter from Ralph Nader to Representative Emanuel Celler, *supra* note 48 ("The government must rely on businessmen for their

class of individuals responds to uncertainty in this way, the uncertain individuals' cost will lead to society's gain. Although other considerations inform the compensation decision,[78] the uncertainty effect weighs against the establishment of a precedent or policy of compensating individuals who are harmed by such action if a socially cost-beneficial safeguard response is available.

Unfortunately, the safeguard response is unlikely to be available to many individuals adversely affected by government action. Workers do not have control over the activities in which they are employed. They are dependent upon their employer's ability to institute safeguards against adverse government action. In addition, small businesses may be unable to institute safeguards, even if the safeguards would be cost-beneficial to larger firms. This may be due to economies of scale in the safeguard technology.[79] Or, it may be due to the ability of larger firms to reap more benefit from a safeguard than a smaller firm could reap.[80] Thus, even if a socially desirable safeguard response is possible, the uncertainty effect supports establishing a precedent or policy of providing compensation to those individuals who cannot implement the safeguard.[81]

III. The Federal Environmental Pesticide Control Act: An Application of the Framework

The value of the uncertainty effect analysis can be illustrated by examining the Federal Environmental Pesticide Control Act (FEPCA).[82] The FEPCA establishes a legal framework for regulating the development, manufacture, and use of pesticides. A key feature of the Act is the provi-

part in assuring the safety of their products . . . . There is, given the limited scope of any Federal agency, no way to completely assure the public health unless the private sector assumes a prudent responsibility itself.")

It is possible that the imposition of the risk of certain government actions will result in overinvestment in precautionary activity. If this is the case, a solution may be to promise or to establish a precedent for the provision of partial compensation. *See* note 17 *supra* (discussing imperfect compensation).

78. *See* notes 11 & 15 *supra.*

79. *See, e.g.,* F. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 411-23 (2d ed. 1980) (exploring possibility that economies of scale exist in research and development); Kamien & Schwartz, *Market Structure and Innovation,* 13 J. ECON. LITERATURE 1, 8-11 (1975) (economies of scale in research and development up to modest size).

80. *See, e.g.,* R. Nelson & S. Winter, The Schumpeterian Trade-Off Revisited 5-8 (Apr. 1979) (unpublished paper of ISPS, Yale University) (larger firms can reap more benefit from research and development than smaller firms).

81. *Cf.* 15 U.S.C. § 636(b)(5)-(7) (1976 & Supp. III 1979) (providing loans to small businesses that incur costs as result of capital expenditures undertaken to comply with federal or state laws or as result of closing of military installation or reduction in federal support). Although Congress was not explicitly concerned with uncertainty over adverse government action in enacting the Small Business Act, the effect of providing loans is to reduce this uncertainty. *Cf.* note 17 *supra* (discussing imperfect compensation).

82. 7 U.S.C. §§ 136-136y (1976 & Supp. III 1979).

sion that grants compensation to all individuals who produce or own a pesticide that is taken off the market.

A. *The Federal Environmental Pesticide Control Act*

The FEPCA provides that all producers of pesticides must register their products with the Environmental Protection Agency (EPA).[83] In registering, the manufacturer must submit to the EPA data on the environmental effect of the pesticide.[84] The EPA may register a pesticide only after it determines that the use of the substance has no unreasonable adverse environmental effect.[85] If the EPA subsequently finds that a pesticide causes "unreasonable adverse effects on the environment," it may cancel the pesticide's registration, and thus ban it from the market.[86]

Under the FEPCA, any person who owns a banned pesticide may receive an indemnity payment equal to the cost of the pesticide.[87] There is no provision, however, for compensating workers who lose their jobs as a result of pesticide bans; no such provision was even considered by Congress. The provision of indemnification was a major point of contention in both the House of Representatives and the Senate.[88] For the most part, however, the debates over indemnification were unfocused and lacked an analytic structure. Although participants in the debates alluded to the uncertainty caused by the cancellation of registrations,[89] the implications of the uncertainty were not addressed fully.

B. *Application of the Uncertainty Effect Analysis*

The proposed framework provides a structure for an examination of the FEPCA's indemnification provision. Uncertainty can arise as a result of the FEPCA in two ways: first, the enactment of the FEPCA established the possibility that a pesticide could be banned from the market; and second, as more pesticides are banned, the fear that others might be banned increases. The activities that are rendered uncertain by the government's threat to ban a pesticide are the use, sale, production, and research and development of pesticides. Farmers and manufacturers of pesticides along

83. *Id.* § 136a.
84. *Id.* § 136a(c)(2).
85. *Id.* § 136a(c)(5).
86. *Id.* § 136d(b).
87. *Id.* § 136m. The only limitation upon who may be indemnified is the exclusion of a person who "(i) had knowledge of facts which, in themselves, would have shown that such pesticide did not meet [the registration requirements], and (ii) continued thereafter to produce such pesticide without giving timely notice of such facts to the Administrator [of the EPA]." *Id.* § 136m(a).
88. *See* 118 CONG. REC. 33,922-24 (1972) (Senate debate over conference committee bill; Senate bill had no indemnity provision); 117 CONG. REC. 40,046-56 (1971) (House floor debate).
89. 117 CONG. REC. 40,050-51 (1971) (remarks of Rep. Poage) (uncertainty will add to cost of pesticides); *id.* at 40,051 (remarks of Rep. Poage) ("[S]omeone must pay for uncertainty . . . .")

with the employees of each are the primary groups most likely to be involved in those activities.[90] The effect of uncertainty on each group must be analyzed separately.

1. *The Expectational Loss*

The expectational loss imposed on farmers by the threat of an uncompensated cancellation of a pesticide's registration is a function of three factors: the farmers' average inventory of a given pesticide, the probability that farmers place on the EPA's cancellation of the pesticide's registration, and the extent to which farmers are risk averse. Because farmers typically buy a full season's stock of a pesticide at one time, their average inventory is large.[91] The exact figure could be ascertained by surveying a sample of farmers.[92] The probability that farmers place on the EPA's banning a pesticide is probably based on past experience as well as on any publicity regarding the EPA's current consideration of such action.[93] A crude estimate of this figure could be determined by extrapolating from the recent history of pesticide bans.[94] Finally, it can be assumed that all farmers are risk averse, and that small farmers are more risk averse than operators of large farms.[95] A congressman considering the FEPCA indemnification provision could therefore ascertain, with a fair degree of specificity, the expectational loss that is imposed upon farmers by the possibility of a pesticide's deregistration.[96]

The expectational loss imposed on pesticide manufacturers will also be substantial. They stand to lose not only their inventory, but also their investment in the development, production, and marketing of the pesticide.[97] Because the magnitude of their potential loss is high, the expecta-

90. Dealers in pesticides will also be involved, but their response will add nothing to this illustration and thus will not be discussed.

91. *See* 117 CONG. REC. 40,049 (1971) (remarks of Rep. Goodling).

92. During the debate on the House bill, one congressman estimated that a large farm would have between $50,000 and $100,000 worth of pesticide in its warehouse. *Id.* at 40,047 (remarks of Rep. Teague). Another hypothesized that a farm worth a few thousand dollars could have $1,000 invested in pesticides. *Id.* at 40,051 (remarks of Rep. Poage).

93. Participants in the House debate seem to have agreed that uncertainty would be determined by the history of pesticide bans. *See, e.g., id.* at 40,048 (remarks of Rep. Foley) (little likelihood that cancellations will be numerous); *id.* at 40,050-51 (remarks of Rep. Poage) (uncertainty will be low because pesticides would not be banned frequently).

94. The publicity, severity, and suddenness of pesticide bans should also be taken into account in estimating the subjective probability that such bans will occur in the future.

95. *See* notes 42-43 *supra* (discussing assumptions that people, in general, are risk averse and that risk aversion is inversely correlated with wealth).

96. He should take into account, however, the likelihood that expectational losses probably increase immediately following the cancellation of a pesticide's registration.

97. This figure was estimated to be between $4 and $12 million at the time the FEPCA was being debated. *See* 117 CONG. REC. 40,049 (1971).

tional loss of manufacturers will be great.[98]

The expectational loss imposed on farm employees and employees of pesticide manufacturers depends on the effect a pesticide ban will have on employment. If the ban increases the probability that workers will lose their jobs, the expectational loss depends on the availability and attractiveness of alternative jobs. The more specialized or geographically isolated the workers are, the higher their expectational losses will be.

2. The Response to Uncertainty and Its Social Desirability

Farmers. For farmers, only the following responses to uncertainty are likely to be viable: first, they can continue farming as before and internalize the risk that they will lose the investment in their pesticide inventory; second, they can buy pesticides as they need them;[99] third, they can buy several different types of pesticides, with the hope that not all of them will be taken off the market;[100] or fourth, they can sell their farms to people who can better bear the risk of pesticide bans.

Although the farmers' response or combination of responses cannot be determined precisely, the first three possibilities probably will be more prevalent. The alternative of selling their farms would be unattractive to most farmers, because the price that they could receive is unlikely to be significantly above the value they place on their farms with the added uncertainty. A buyer is not likely to value the threat of a pesticide ban any lower than the initial owner, nor is he likely to have an advantage over the current farmers in hedging or safeguarding against a pesticide ban.[101]

Thus, it appears that farmers will internalize the uncertainty, will avoid stocking pesticides, or will use several different types of pesticide. The first two responses are socially costly. Internalization represents a direct social utility loss; maintaining small inventories represents extra transaction and transportation costs as well as inefficient inventory management. The third response, diversification, may represent a decline in farming efficiency. If it turns out that none of the pesticides are taken off the market, farms will be inefficient to the extent that some less effective pesticides were used. On the other hand, if a pesticide is taken off the market, the fact that farmers have not relied on it exclusively may reduce

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98. *Cf. id.* at 40,049 (1971) (remarks of Rep. Kyl) (14 companies had already stopped researching new pesticides because of fear that new product would be taken off market).

99. This is a form of safeguarding against the risk that a pesticide will be banned.

100. This is a way to diversify the investment in pesticides.

101. *See* p. 1679 *supra* (seller of uncertain asset can gain only if buyers are less risk averse, place lower probability on occurrence of adverse government action, or can hedge or institute safeguards against adverse action more cheaply).

the disruption caused by the ban.[102] The uncertainty effect, on balance, probably weighs in favor of a policy of compensating farmers for any pesticide bans. Such a policy would eliminate the socially costly effects of farmers' bearing the risk of losing the value of their pesticide inventories.

Manufacturers. Manufacturers have wider opportunities and more effective ways to safeguard and to hedge against losses due to an EPA ban. By continuing to research the environmental effects of a pesticide after it has been registered, they can anticipate any problems that will come to the attention of the EPA and can make the alterations necessary to keep their product environmentally sound and on the market.[103] If no alteration can correct a problem, they can at least cut their losses by reducing production until the EPA decides whether to ban the product.[104] Alternatively, manufacturers can hedge by developing and marketing pesticides in groups of substitutable products. If one pesticide is banned, the value of its substitutes, now relieved of competition, will rise.[105]

The overall effect of uncertainty on the pesticide manufacturing industry will be to increase postregistration research and development and to spread research and development investment over a larger number of products. The first of these effects is socially beneficial. The manufacturer can probably discover the environmental effects of its products more cheaply than can any other party. By forcing him to bear the risk that a pesticide will be banned, the government can create an incentive for him to continue testing products while they are on the market.

The social desirability of diversification of research and development projects is more open to question. The issue is whether it is better to invest more money in each of a few research projects, or less money in each of many projects. Although the answer depends on the nature of the area of research, it is likely that research and development works best

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102. Also, to the extent that farmers' demand for a diversified set of pesticides leads to a reduction in the use of a pesticide that ultimately is banned, society will incur a benefit.

103. This was the primary argument against providing compensation to manufacturers. *See, e.g.,* 118 CONG. REC. 33,924 (1972) (remarks of Sen. Hart) (indemnity payments reduce incentives of chemical industry to police itself); 117 CONG. REC. 40,046 (1971) (remarks of Rep. Evans) (manufacturers will lose incentive to test once product is on market).

104. Another means of safeguarding might be to stop the development of new, socially desirable pesticides. Several congressmen urged that this would be the response of the pesticide industry. *See, e.g.,* 117 CONG. REC. 40,049 (1971) (remarks of Rep. Kyl); *id.* at 40,053 (remarks of Rep. Abernethy). One congressman reported that 14 companies had already ceased developing new insecticides. *Id.* at 40,049 (remarks of Rep. Kyl). Although this response is possible, it is unlikely to predominate for two reasons. First, the development of new pesticides serves as a hedge against the risk that those on the market will be condemned. Second, at a certain point, if enough manufacturers stop developing new pesticides, the prospective profits of a company that does develop such products will be so large that the retreat will end.

105. If a pesticide manufacturer finds both of these strategies too expensive compared to the expected gain, it is likely to be acquired by another manufacturer that can either implement the strategies more cheaply or gain more from the strategies once implemented. *See* TAN 63 *supra* (discussing sale of asset to buyer more capable of hedging or safeguarding).

when "bets are spread" over several research projects.[106] Thus, the uncertainty effect weighs against the compensation of pesticide manufacturers for their losses when their product is banned.

Workers. If uncertainty about a pesticide ban is expected to render jobs uncertain, it is likely that workers will have no choice but to remain in their jobs and internalize the expectational loss. No other risk-reducing strategy is likely to be available. Thus, the social cost of their uncertainty is the sum of their expectational losses. The size of that cost depends largely on the number of workers affected and the alternative jobs available to them. The more jobs placed at risk and the less satisfactory the alternative jobs are, the more heavily the uncertainty effect will weigh in favor of compensation.

Conclusion

The government typically assumes the role of regulating the extent to which one party's actions incidentally affect the interests of other parties. When it is the government that acts, however, it must regulate the incidental effects on society of its own actions. One incidental effect of a government action, or preparation for action, that imposes losses on a subset of society is the creation of uncertainty over such losses. This effect can be alleviated by compensating, or by promising to compensate, individuals who sustain losses as a result of the government action. The societal impact of uncertainty varies depending on the circumstances surrounding its creation and on particular characteristics of the individuals who are rendered uncertain. Uncertainty may impose costs that are concentrated on an identifiable class of individuals, or it may impose diffuse costs upon society as a whole. Alternatively, uncertainty can be socially beneficial in situations in which it induces individuals to undertake actions that promote the public interest. Although the uncertainty effect concerns only part of the compensation decision, it weighs in favor of providing compensation to individuals who are harmed by government action only if responses to the action are more costly to society than the provision of compensation. If the uncertainty effect is socially beneficial, it militates against the provision of compensation.

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106. *See* Nelson & Winter, *In Search of a Useful Theory of Innovation*, 6 RESEARCH POL'Y 36, 47, 49 (1977).