What Make a Regulator Excellent When Faced with Extreme Events?

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Introduction

Regulators have a challenge balancing equity and efficiency when determining what type of regulations they may want to propose and then enforce. A policy is considered ***efficient*** if the well-being of society is improved over the status quo. ***Equity*** is concerned with distributional issues that may require weighting certain groups demanding special treatment higher than others.

Risk and uncertainty associated with a particular problem pose additional challenges for regulators. How do they evaluate the likelihood and consequences of specific events occurring when evaluating the costs and benefits of specific regulations? What time horizon (T) should they utilize given a tendency to be myopic in ones thinking and concerns with their own status in the next few years (i.e. the NIMTOF---Not in My Term Of Office problem)? What is the appropriate social discount rate for taking into account elements of society affected by a particular policy such as the impact on future generations?

In this short paper I will focus on ways that the regulator who strives for excellence can appropriately use insurance coupled with other policy tools to address efficiency and equity concerns associated with events that have low probability of occurrence but if they happen the outcomes are likely to be severe. The next section proposes a framework for linking intuitive (short-run) thinking with more deliberative (long-term) thinking to reduce future losses from extreme events. Section 3 discusses guiding principles of insurance that the regulator should consider when developing public-sector strategies I then suggest how well-designed regulations can be utilized in conjunction with private insurance to reduce future losses from technological accidents and natural disasters.

A Framework for Understanding Regulators Behavior re Extreme Events

A large body of cognitive psychology and behavioural decision research conducted during the past 30 years has revealed that individuals and organizations often make decisions by combining ***intuitive*** thinking with ***deliberative*** thinking. These are two ways of collecting and processing information based on a large body of research in psychology and behavioural economics that have been given the respective labels System 1 and System 2.

In his thought provoking book *Thinking, Fast and Slow* Nobel Laureate Daniel Kahneman has characterized the differences between these two modes of thinking. *Intuitive Thinking* (System 1) operates automatically and quickly, with little or no effort and no voluntary control. It is often guided by emotional reactions or simple rules of thumb that have been acquired by personal experience with events and their

consequences. *Deliberative Thinking* (System 2) allocates attention to effortful and intentional mental activities where individuals undertake trade-offs implicit in benefit-cost analysis, recognize relevant interdependencies and connectedness as well as the need for coordination in coping with extreme events.

Combining these two modes of processing information generally results in reasonably good choices when decision makers regulators have considerable past experience as a basis for their actions. When determining what steps to take in dealing with low probability-high consequence (LP-HC) events, individuals often exhibit systematic biases that are guided by rules of thumb requiring much less time and effort than a more deliberative analysis of the cost-benefit trade-offs.

For extreme events, such as natural disasters or technological accidents regulators often follow their intuitions rather than undertaking systematic analyses that characterize deliberative thinking. They may also be overly concerned with equity issues that conflict with efficiency considerations in determining what strategies to follow. With respect to insurance, regulators will often restrict premiums that insurers can charge to those residing in high-risk areas because of short-run political pressure that characterize intuitive thinking. An excellent regulator needs to be aware of these biases and try to overcome them through the design of policies that reflect long-term considerations.[1]

Guiding Principles for insurance

The following two guiding principles should enable insurance to play a significant role in the management and financing of extreme events.

***Principle 1—Premiums Should Reflect Risk*:** Insurance premiums should be based on risk to provide signals as to the hazards individuals they face and to engage in cost-effective mitigation measures to reduce their vulnerability to catastrophes.

Principle 1 provides a clear signal of the expected damage to firms subject to technological accidents and to those currently residing in areas subject to natural disasters. Insurers will also have an economic incentive to reduce premiums to firms and residents who invest in cost-effective loss- reduction mitigation measures. If Principle 1 is applied in hazard-prone areas where premiums are currently subsidized, some residents will be faced with large price increases. This concern leads to the second guiding principle.

***Principle 2—Dealing with Equity and Affordability Issues*:** Any special treatment given to residents currently residing in hazard-prone areas (e.g., low income homeowners) should come from general public funding and not through insurance premium subsidies. *Note:* It is important to note that Principle 2 applies only to those individuals who currently reside in hazard-prone areas. Those who decide to locate in the area in the

[1] For more details on the role that regulators can play in addressing insurance issues see Kunreuther, Pauly and McMorrow (2014).

future would be charged premiums that reflect the risk. Otherwise they would be encouraged to move into hazard-prone areas.

Two Examples of Insurance Coupled with Regulations

Example 1: Coupling Insurance with Third-Party Inspections to Reduce Environmental Risk[2]

The passage of Section 112r of the Clean Air Act Amendments of 1990 requires firms to have adopted a risk management plan (RMP) to reduce the release of hazardous chemicals. Firms are often reluctant to adopt an RMP because they are costly and they feel that the chances of severe chemical accidents are so small that it is below their threshold of concern, a form of intuitive rather than deliberative thinking. Small companies have an additional reason not to consider undertaking RMPs: they know that if there is a major accident they will become insolvent and it is not cost-effective for them to invest in preventive measures. Firms were also aware that there relative few inspectors available by the agency, in this case the Environmental Protection Agency (EPA), required to enforce the regulation.

The combination of third party inspections in conjunction with private insurance with premiums reflecting risk *(Principle 1)* is a powerful combination of two market mechanisms that can convince many firms of the advantages of implementing RMPs to make their plants safer and encourage the remaining ones to comply with the regulation to avoid being caught and fined. The intuition behind using third parties and insurance to support regulations can be stated in the following way. One of the biggest concerns of a regulatory agency is that it doesn't have enough resources to audit all firms in the industry. Low-risk firms, who the EPA has no need to audit, cannot credibly distinguish themselves from the high-risk ones without some type of inspection. By delegating part of the inspection process to the private sector through insurance companies and third parties, the RA provides a channel though which the low-risk firms can speak for themselves.

There is a short-term incentive for the low-risk firm to get inspected because it will receive a lower premium by showing that it is likely to have a lower claims. Firms choosing not to be inspected by third parties are more likely to be a high-risk rather than a low-risk one. Therefore this mechanism not only substantially reduces the number of firms the EPA has to inspect but it also makes their audits more efficient. It is important for the regulatory agency to be able to charge an appropriate penalty if a firm is not in compliance. For example, if the US EPA imposes the maximum allowable fine it can impose of $27,500 per day should it discover that a firm does not have an RMP, then this may be an added incentive for industrial facilities to undertake a third party inspection voluntarily.

[2] For more details see Kunreuther, Kang and Schmeidler (2003) and Kunreuther, Metzenbaum and Schmeidler (2006)

Example 2: Coupling Insurance with Regulations to Encourage Mitigation[3]

When a firm posts a bond as a form of financial responsibility to obtain a construction permit, the bond is a form of insurance to ensure that if there are unexpected damage the public sector is not liable for covering the losses. When a bank requires a property owner to purchase insurance as a condition for issuing a mortgage it is protecting its investment should there be damage to the property and the owner is unable to cover the costs of damage. In the United States flood insurance is provided under the National Flood Insurance Program (NFIP) to reduce the costs of federal disaster relief. To date premiums have been highly subsidized for many homeowners so this government program has incurred severe debts given severe flood-related losses from Hurricanes Katrina and Sandy.

Most homeowners did not purchase flood insurance voluntarily when the NFIP began marketing policies in 1968 so that regulations were passed requiring residents with federally insured mortgages to have a policy. Empirical data has revealed that many homeowners still do not have flood coverage. Many of those required to purchase a policy as a condition for a mortgage cancel it several years later if they have not had a claim because they perceive insurance to be a poor investment. Furthermore property owners have not invested in loss reduction measures because of the upfront costs. Rather than focusing on the long-term benefits of the mitigation measure based on the life of the property there is a tendency to focus on only the potential returns over next few years. This is one of the reasons that the investment costs of the measure exceed the perceived expected benefits. To remedy this situation the Wharton Risk Center has proposed how the government can play a central role in enforcing these regulations:

- Required multi-year insurance (3-5 year policies) tied to the property with risk-based premiums (Principle 1). This reduce the chances that homeowners will cancel their insurance in the next several years if they have not suffered losses where they make and receive claims on their policy.
- Long-term mitigation loans tied to the property to spread the upfront costs over the life of the mortgage. If the mitigation measure is cost-effective the risk-based insurance premium reduction will be less than the annual loan cost, making the mitigation measure financially attractive
- Means-tested vouchers to address affordability issues based on well-specified criteria to address Principle 2. As a condition for a voucher the property owner will be required to invest in a mitigation measure via a long-term loan. The voucher will cover both a portion of the insurance cost and the loan cost so that the package is affordable. Empirical data reveal that a voucher covering part of the insurance premium and the loan cost would be financially more attractive to both the property owner and the federal government than a voucher program that covered only the premium. The mitigation measure is likely to reduce the cost of risk-based insurance significantly because of lower claim payments by the NFIP.

[3] More details on this proposal can be found in Michel-Kerjan and Kunreuther (2013) and Kousky and Kunreuther (2014)

This proposal for risk-based premiums and means-tested vouchers are part of the *Biggert-Waters Flood Insurance Reform Act* that reauthorized the NFIP for five years in July 2012. This Act was modified in March 2014 as *The Homeowner Flood Insurance Affordability Act of 2014* that delayed the implementation of risk-based premiums until issues of affordability of the NFIP were addressed. The National Research Council is currently undertaking this study.

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