Cost-Benefit Analysis and Voluntary Safety Standards for Consumer Products

Leland L. Johnson
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Cost-Benefit Analysis and Voluntary Safety Standards for Consumer Products

Leland L. Johnson

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Foreword

"Safety" is a concept that most of us view uncritically. We tend to treat it as an absolute good. We habitually ask whether a particular act, condition, or product is "safe" or "unsafe," as though it must necessarily be one or the other. It is not easy for us to admit that most things are neither perfectly free of risk of harm, nor are they certain to harm. Because critical values are at stake—our health or even our lives—we do not readily face the fact that safety is almost always a matter of degree.

Because absolute safety cannot usually be purchased at any price, knotty public policy issues are involved in deciding how much money and effort society should invest in order to hold the frequency and severity of accidents at some tolerably low level. These issues are compounded by the fact that the closer one gets toward perfect safety, the larger the additional investment needed to reduce the accident rate by another percentage point. Like it or not, public policymakers must regularly wrestle with hard choices between making such investments in safety and using the same societal assets to pursue other improvements in the quality of life.

Compliance with safety standards, established voluntarily by private groups, affects the safety of a vast range of products, including those used by consumers. This study reports that there are about 58,000 voluntary standards now in force, of which about 2,000 are focused upon consumer products. Although they are established voluntarily, compliance is frequently made mandatory. Some standards are incorporated into government regulations at the federal, state, and local levels. Others substitute directly for government-imposed standards. In other instances, they play a significant role in litigation, as the parties cite compliance or noncompliance as an element in their arguments.

What view of the relative value of social investment in accident prevention is implicit in these voluntary standards? Are they based on any formal analysis of the tradeoff between the dollar costs of
preventive activity and the accident-related costs that are avoided? When such analyses are employed, are they technically sound? How do standard-setters “price” such intangibles as pain, suffering, annoyance, and inconvenience? Is the information necessary to answer such questions now available to private or public decisionmakers?

These are the questions posed by this study. In search of answers, the author has conducted numerous interviews with knowledgeable individuals active in the field. He has also reviewed the files of the largest standard-setting organization, as well as the professional literature in the field. Regrettably, this literature is quite limited, particularly in view of the scale of the dollar costs and other values involved in assuring adequate levels of safety.

Through this and subsequent publications, the Institute for Civil Justice seeks to enlarge and enrich the store of systematic analysis of the safety tradeoff. Although it is a subject more difficult than pleasant, it lies at the heart of many of the most critical social choices before us. Truly humane public policy can be based only upon a clear-eyed view of what is being invested toward what end, and with what sacrifice of competing goals. We believe that such studies as this one help to clarify both means and objectives.

Gustave H. Shubert
Director
The Institute for Civil Justice
Summary

This study urges the more extensive use of cost-benefit analysis in establishing voluntary standards for product safety, even though difficult problems stand in the way. The purpose of such analysis is to find an acceptable balance between the costs that compliance with a standard imposes over time on society, and the benefits that accrue.

Many products cannot be rendered completely risk-free, and some obviously should not be—butcher knives, for example, must be sharp; and any standard will impose costs, if only those entailed in establishing it. The two central questions to be answered are, then: What is an acceptable level of risk, and what is an acceptable level of cost? But a third important question is, How could standards currently in place or under consideration be improved? Many of them are laudable and may lead to impressive reductions in injuries and deaths, but could be rendered even more effective at little additional cost. The opposite is also true: Compliance with some standards may do little to reduce injuries and deaths, but cost society millions or even billions of dollars. Both possibilities suggest the need for cost-benefit analysis.

More than 20,000 voluntary standards are currently in place, about 2000 of which deal with consumer products, and many relate to safety. They fall into three classes: proprietary standards, developed by a firm for its internal use; industrial or professional standards, developed by trade and professional associations for their members; and "consensus" standards, developed under the auspices of organizations that follow clearly delineated procedures to permit a wide range of groups within and outside the industry, including consumer groups, the opportunity to participate in their formulation and approval. Of the three classes, consensus standards receive the most thorough review and command the widest respect and adherence; therefore, they are the primary concern of this study.

Although consensus standards are voluntary in their origins, compliance with them is often made mandatory by government agencies, by incorporation in local building codes, and by reference in govern-
ment contracts. They sometimes obviate the need for government regulation when government agencies regard them as sufficiently strong and industry compliance as adequate. They are important in civil litigation, since evidence on compliance or noncompliance is sometimes introduced in product liability cases to shed light on whether a product was defective or whether the producer exercised due care. And voluntary standards are likely to become still more important in view of the federal government's policy shift toward deregulation of industry, manifested in this instance by sharply reducing the budget of the Consumer Product Safety Commission (CPSC), an action that will weaken its standard-setting and enforcement powers.

The CPSC uses cost-benefit analysis extensively, if crudely, to comply with conditions under Sec. 9(c) of the Consumer Product Safety Act, as it did in establishing the power lawn mower standard that was recently made mandatory. The National Bureau of Standards (NBS) also used cost-benefit analysis in studying the requirement for ground-fault circuit interrupters—safety devices required in some applications by the 1975 National Fire Code to prevent fatal electrical shocks. These studies did not attempt to set a value on life or on pain and suffering, but they are notable for estimating reasonably quantifiable factors such as lost earnings and medical costs for injuries, and the NBS analysis estimated the cost incurred per life saved—a figure that ran to several million dollars for alternative sets of assumptions. The CPSC study left it to the decisionmaker to judge whether the unquantified benefits, especially reductions in pain and suffering, outweighed the estimated excess of costs over benefits; and the NBS study left it to the decisionmaker to judge whether the proposed standard should be left as is, modified, or both. Despite their shortcomings, such studies provide a framework within which the decisionmaker can consider how unquantified factors, such as the value of life and of pain and suffering, variously affect the wisdom of alternative choices.

The voluntary standards community, however, makes very little use of cost-benefit analysis. One exception is the set of four safety standards dealing with bathtubs and shower stalls, written by a task group of the American Society for Testing and Materials (ASTM) and approved as ASTM standards (but not yet made mandatory by government agencies). The task group estimated that compliance with these standards for new housing over a 40-year period could involve discounted costs and negative net present values of more than $3 billion. Although this figure is subject to considerable uncertainty, it suggests the large dollar stakes that can be involved.

The reasons why the voluntary standards community does not use
cost-benefit analysis more widely are not hard to find. Foremost are
the formidable problems of estimation, which make it easy to question
the validity of such analysis. Cost-benefit analysis is not a straightforward,
mechanical process that leads to a clearly defined single-point
optimum. It is notoriously difficult, for example, to get any sort of
consensus on an appropriate social discount rate, which is necessary
for estimating present values of costs and benefits. The approaches
used in the economics literature have produced discount rates ranging
all the way from 4½ to 8 or 9 percent, and some government agencies
have employed rates as low as 3 percent or even 0—a total perform-
ance that one commentator describes as "a sorry spectacle."

Several other factors are also difficult to estimate: the effect of a
standard on particular firms and consumer classes; the reduction in
deaths and injuries (a task impeded by poor hazard information);
changes in consumer behavior in response to a standard, thereby af-
flecting benefits; costs that will be imposed on manufacturers and
other sellers; and the value of the reduction in deaths and in pain and
suffering. The last-named is a particularly thorny problem because
some people find it morally troubling to attach cold dollar values to
human life and suffering—even though both individuals and society
make trade-offs every day in deciding how much to spend to prevent
or mitigate accidents.

Finally, the cost of an analysis must be considered. The CPSC spent
over $100,000 for its lawn mower study, a large amount relative to
the budgets of standard-setting organizations.

These problems are not insurmountable, but they make it doubtful
that cost-benefit analysis will play a significant role in voluntary
standard-setting in the foreseeable future. This is a worrisome conclu-
sion in view of the large dollar amounts at stake.

The study recommends several ways to promote the use of cost-
benefit analysis. The first is for the voluntary standards community
to draw on the talents of individuals who are familiar with cost-bene-
fit techniques—such as those having backgrounds in operations re-
search, economics, and economic engineering—and test the value of
the analysis for a few selected standards that are to be written or
modified where the dollar stakes and potential payoffs are likely to be
high. The standard-writing group would integrate the analysis with
engineering and other inputs and, during meetings where standards
are drafted, keep careful minutes that record the difficulties and costs
of doing the analysis and register participants' views of its usefulness.

Second, local, state, and federal agencies that adopt mandatory
standards could follow the example of the CPSC and the NBS, per-
haps using the more extensive data now available and more refined
analytic techniques.
Third, more abundant and more detailed information should be collected nationwide on hazards and on the frequency and causes of accidents. The CPSC gathers some of this information, but much more is needed. Better hazard information will be a valuable input if cost-benefit analysis is widely adopted; even if it is not, the information would still be useful in the development of voluntary standards. Thus, if we are concerned with the broader question of how to assure an appropriate level of safety, we should consider the degree to which better hazard information can substitute for cost-benefit analysis in developing voluntary standards.
Acknowledgments

During this study I benefited from the help of a number of Rand colleagues. In particular, Linda Cohen examined activities of the Consumer Product Safety Commission and assessed the theoretical literature about voluntary standards and resulting levels of safety. Geraldine Walter conducted numerous personal and telephone interviews with members of the insurance industry, trade associations, and manufacturers, and identified many information sources footnoted in this study. Richard Victor made helpful suggestions throughout. Donald MacKay of the Office of Products Standards Policy, U.S. Department of Commerce, and Rand colleagues Frank Camm and Edward Hamilton made numerous useful comments on an earlier draft. Walter V. Cropper of the American Society for Testing and Materials reviewed a portion of an earlier draft and was extraordinarily helpful in making available material from ASTM's files and in suggesting key personal contacts among those involved in developing voluntary standards.

In addition, I received invaluable help from individuals too numerous to name here, from standards-setting organizations, manufacturers and distributors, insurance companies, the academic community, government agencies, and consumer groups. Without their patience and cooperation in answering questions and providing other information, this study could not have been undertaken.
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I. INTRODUCTION

BACKGROUND AND AIMS OF THE STUDY

Voluntary standards for product safety have long been important for society and will become still more important in the future. Their purpose is to afford consumers reasonable protection against death, injury, and pain and suffering. The question is what is "reasonable." Like many other desirable attributes of products and services valued by society, safety is usually obtainable only at a cost, which may be either too low or too high. If the costs of compliance are too low, it would be desirable to raise the costs (such as those imposed on manufacturers) so long as they were exceeded by the value of the reduction in injuries and deaths. If the costs are too high, the product is "too safe," in the sense that the costs of the level of safety achieved exceed the benefits gained. Accurate estimation of the trade-offs between these two elements requires cost-benefit analysis, but the technique has been little used thus far in the formulation of voluntary safety standards because of several difficult problems. Foremost among these are problems of estimation, notably the difficulty of arriving at a consensus on how to take into account deaths and pain and suffering in estimating costs and benefits.

The purpose of this study is to explore the opportunities for expanding the use of cost-benefit analysis, to discuss the problems standing in the way, and to suggest experiments with it that can serve as benchmarks for further application. The study also recommends the collection of better product-hazard information; such information would be a valuable input if cost-benefit analysis is adopted, and if it is not, it could still serve as a partial substitute for such analysis in the formulation of future standards.

More than 20,000 standards are currently in place. Of those, according to a tabulation by the National Bureau of Standards (NBS), over 2000 cover products used around the home, not counting food, drugs, and beverages.\(^1\) These standards fall into three classes: proprietary standards, developed by a firm for its internal use; industrial or professional standards, developed by trade and professional associations for their members; and "consensus" standards, developed

under the auspices of organizations that follow clearly delineated procedures to permit a wide range of groups within and outside the industry, including consumer groups, the opportunity to participate in their formulation and approval. Consensus standards "... are by far the most important since they have had the greatest consideration and review and usually command the widest respect and adherence." For this reason, they are the primary concern in this study.

Voluntary safety standards are important for this study for several reasons.

First, compliance is frequently made mandatory by government agencies. An NBS study found that some 1500 voluntary standards are currently referenced by 36 major state and local building codes and two model building codes. The average code refers to private voluntary standards about 360 times. Still others are made mandatory by reference in government procurement contracts. The National Electric Code provides 95 percent of the electrical safety regulations used in the United States, and the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers (ASME) has been adopted by most states. Standards written by the Society of Automotive Engineers are used by the Federal Aviation Administration and National Highway Safety Administration for establishing mandatory standards. According to one authority, nearly 80 percent of the standards approved by the American National Standards Institute (ANSI) have been made mandatory. An example is ANSI's Specifications for protective headgear for vehicular users, Z90.1-1966. The standard in one form or another has been adopted by 42 states, and the U.S. Air Force this year made it mandatory for all military and civilian personnel operating or riding on two-wheeled motor vehicles to wear helmets meeting the Z90 standard.

Second, compliance with voluntary standards sometimes provides a substitute for government action. For example, the Consumer Product Safety Commission (CPSC) decided not to seek mandatory standards for stove surface temperatures because it deemed satisfactory the

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voluntary standards previously developed by the American Gas Association for gas ranges and by Underwriters Laboratories for electric ranges, and because manufacturers demonstrated full compliance with these standards. It also denied a petition to issue a safety standard for portable gasoline containers because a committee within the American Society for Testing and Materials (ASTM) had already begun development of a voluntary standard for them.  

Third, the federal government is undergoing a policy shift toward deregulation of industry. The use of voluntary standards as a substitute for regulation by the CPSC is therefore likely to become even more important in the future. A Congressional amendment to the Consumer Product Safety Act in 1981 requires that "The Commission shall rely upon voluntary consumer product safety standards rather than promulgate a consumer product safety standard prescribing requirements described in subsection (a) whenever compliance with such voluntary standards would eliminate or adequately reduce the risk of injury addressed and it is likely that there will be substantial compliance with such voluntary standards."

Moreover, the CPSC's budget has been drastically cut—from $47 million in FY 1981 to about $35 million in FY 1982. Under its enabling legislation, the CPSC was given broad authority to (a) operate a nationwide system for reporting and investigating product-related accidents, (b) set mandatory standards for consumer products, (c) require firms to recall defective products, and (d) require firms having reason to believe that their products create hazards to report to the CPSC for appropriate remedial action. These budget cuts will reduce the CPSC's ability to discharge its responsibilities.

Finally, voluntary standards may become increasingly important in product litigation. Evidence about compliance or noncompliance with standards, especially those developed under the consensus process, is sometimes introduced in product liability cases to shed light on whether the product was defective at the time it was designed and manufactured or whether due care was exercised. Although proof of compliance with standards is not regarded as conclusive evidence that the product was free of defect, it can strengthen the defendant's case. Conversely, persuasive evidence advanced by the plaintiff that the defendant failed to comply with relevant standards can compromise the defendant's position. In a search of legal cases, Hoffman and Hoff-

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7Federal Register, September 9, 1980.
8Omnibus Budget Reconciliation Act of 1981, Public Law 97-35, Title XII, Sec. 70b, August 13, 1981.
man uncover many examples of the use of standards in litigation. They conclude that

It is our belief that our review of the authorities has made clear, with an abundance of evidence, that standards are, have been, and will remain a useful tool in products liability litigation. Further, the importance of standards will increase enormously in the future as more standards are adopted to cover more products, and as the courts relax their formerly stringent rules regarding admission of standards into evidence.10

The admissibility of standards into evidence by the courts will be encouraged to the extent that states adopt relevant provisions of the Uniform Product Liability Act. This act was written within the U.S. Department of Commerce as a model code for the states, reflecting the deliberations of the Interagency Task Force on Product Liability.11 The act stipulates that "Evidence of custom in a product seller's industry existing at the time of or prior to manufacture, or of the product seller's compliance or noncompliance with a then existing nongovernmental safety or performance standard, is admissible but is given no special evidentiary weight."12

The concerns that follow have much to say about the "balance" between safety and cost and about "appropriate" levels of the two. Some readers may be troubled by the notions of too much safety or safety purchased at excessive cost. They are not alone: Numerous participants in the formulation of standards find it morally troubling to attach cold dollar values to human life and pain and suffering, and therefore tend to look askance at cost-benefit analysis. Yet both individuals and society at large make decisions every day on trade-offs between the benefits and costs of safety. The automobile driver, for example, may decide not to buckle his seat belt because he judges that the time and discomfort of doing so outweigh the benefits of the reduced probability of injury or death in an accident. Similarly, society has not gone so far as to reduce the nationwide speed limit from 55 mph to 45 mph; the reduction might well reduce the number of inju-

12U.S. Department of Commerce, Uniform Product Liability Act, Washington, D.C., n.d., p. 5. Portions of the act have already been adopted by Connecticut and Idaho. The act is under review by special legislature committees in Washington and Wisconsin and has been introduced (with modification in some cases) in other states as well. For a discussion and legal references, see Victor E. Schwartz, "Administration Directives to Address the Product Liability Remedies That Meet the Problem's Causes," The Forum, Spring 1981, p. 723.
ries and deaths, but evidently is not deemed worth the extra cost in increased travel time and inconvenience. As an extreme example, a standard for kitchen knives could render them so dull that they could not cut fingers—or much of anything else. Here, the costs of safety, including the reduced usefulness of the product, would be too high relative to the value of reduced accidents.

OUTLINE OF THE STUDY

Section II treats several topics as a foundation for the subsequent analysis. These include the institutions and processes of standards development, the motivation of firms to participate in this process, and the methodology and scope of the analysis.

Section III discusses the relationships among costs, benefits, and the optimal level of product safety, and the difficulties of pursuing cost-benefit analysis. Taking into account these difficulties, it discusses two examples of how cost-benefit analysis has been used in the past, particularly by the CPSC.

Section IV explores the very limited past use of cost-benefit analysis in developing voluntary standards. It describes briefly the information that voluntary standards writers consider, drawing from the sample described in Sec. II. It discusses the one case uncovered in the study where cost-benefit analysis was used in developing safety standards for bathtubs and shower stalls. It explains why use of such analysis has been so limited, and explores possibilities of expanding its use.

Section V addresses a particularly important problem in improving the quality of cost-benefit analysis—that of obtaining better hazard information. It treats the nature and use of CPSC hazard data, the inadequacy of current hazard information, problems posed in seeking additional information from two sources—product liability cases and insurance claims, and the future role of the CPSC.

The concluding Sec. VI touches briefly on trade-offs between devoting resources to cost-benefit analysis and devoting time to other approaches to help ensure the appropriate level of product safety. One promising recourse would be to collect more information on product hazards, which would be a valuable input to cost-benefit analysis if it is adopted, and in any event would be highly useful to organizations that formulate safety standards.
II. PRELIMINARY CONSIDERATIONS

A brief treatment of several topics provides the foundation for subsequent discussion: the institutions and processes of standard-setting; the incentives of private firms to participate in setting standards; the relations among firms' incentives, the consensus process, and safety levels; and the methodology and scope of the subsequent analysis.

THE INSTITUTIONS AND PROCESSES OF STANDARDS-SETTING

The Directory of U.S. Standardization Activities, published by the National Bureau of Standards, lists about 550 groups involved in standards activities, of which more than 400 are private. However, fewer than 20 private entities produce about 85 percent of the privately developed standards.1 Following are some of the most important of these organizations.

The American Society for Testing and Materials

This organization, the "world's largest source of voluntary consensus standards,"2 has about 6,000 standards currently in place. In 1977, ASTM recorded 1,492 standards actions including approval of 225 new standards.3 The approximately 30,000 members of ASTM include individuals and organizations identified as users, producers, marketers, consumers, researchers, government agencies, trade associations, academic institutions, and private research organizations. More than half of the individual members participate in standards-writing through membership in one or more of the approximately 140 ASTM technical committees.

These committees, sometimes numbering 600 or more members, are directed by a chairman, a vice chairman, and other officers. Committees are organized into subcommittees of individuals with expertise or

2Hamilton, op. cit., p. 1339.
interest in specific areas. These subcommittees are in turn divided into smaller task groups, typically with 10 to 20 members, who draft standards and revisions.

ASTM usually does not reimburse individuals for their services. The organizations they are affiliated with—private firms, government agencies, and others—usually donate the time of these individuals and cover their out-of-pocket costs. ASTM provides support for some, however, especially people representing consumer interests. For example, it has provided funds to allow participation by representatives of the National Consumers League, among other organizations, on several ASTM committees.4

The standards-writing and approval process is guided by four major principles: balance, voluntarism, consensus, and due process.

ASTM committees and subcommittees that develop specifications for commercial use are required to be "balanced." Voting interests in the committee or subcommittee are grouped as producer, consumer/user, or general interest. The number of producer voting interests may not exceed the total number of general and consumer/user voting interests. Moreover, the chairman cannot be a producer.

The work of the committees, subcommittees, and task groups is pursued on a voluntary basis. Membership in the Society is a matter of free choice, not appointment or election.

ASTM defines a consensus standard as a

... standard produced by a body selected, organized, and conducted in accordance with the procedural standards of due process. In standards development practices, a consensus is achieved when substantial agreement is reached by concerned interests according to the judgment of a duly appointed review authority.5

After a task group prepares a draft document, it is reviewed by the subcommittee. Only if it is approved by two-thirds of those returning ballots (and a minimum of 60 percent of the voting interest must re-

4The experience of the National Consumers League in working with ASTM is recounted in NCL's Report on Consumer Representation and Voluntary Standards Setting, for 1978, 1979, and 1980 respectively. NCL has participated in the deliberations of Committee C-18 on Thermal and Cryogenic Insulating Materials, Committee D-13 on Textiles, Committee E-4 on Medical and Surgical Materials and Devices, and Committee D-2 on Petroleum Products and Lubricants.

5Committees and subcommittees must be balanced in cases where they deal with "materials, products, systems, or services that are offered for sale or provided for a fee." Of the 138 ASTM technical committees in existence in mid-1980, 92 were required to be balanced in accordance with this criterion. (Cropper, op. cit.)

6ASTM, The Voluntary Standards System of the United States of America, Philadelphia, Pa., 1975, p. 7. This discussion of procedures of ASTM and of other leading standards-setting groups draws heavily from this publication.
turn the ballots) does it proceed to the main committee ballot. There at least 90 percent of those returning ballots (again including a minimum of 60 percent of voting interests) must approve the draft. Subsequently, it goes to a Society ballot, where each ASTM member is entitled to vote. At least 90 percent of those who vote must vote affirmatively in order for the standard to pass.?

All negative ballots must be treated in accordance with strict procedures. Explanations by voters casting negative ballots must be acted upon either at a meeting of the subcommittee or by letter ballot of the subcommittee. If these "negatives" are considered persuasive, the draft standard is modified accordingly; if they are not persuasive or are considered irrelevant, they are dropped. Members who agree with a negative may submit a minority report for consideration during the main committee meeting at which the negative is acted upon. Further procedures are required for processing negative votes on main committee ballots when they move to Society ballot, and for processing negative votes on Society ballots when the draft standard finally goes to ASTM's Committee on Standards for final approval.

The National Fire Protection Association

The NFPA has established over 250 standards relating to fire safety and fire protection; they were developed and reviewed by 150 technical committees. NFPA's total membership runs to about 33,000, including industry representatives, state and local government representatives (such as fire marshals), educational institutions, architects, engineers, professional associations, and insurance companies. In procedures similar to those of ASTM, the NFPA Standards Council evaluates requests to the NFPA for preparing or revising a standard. If the initial evaluation is favorable, a committee prepares the standard, with a two-thirds majority vote required for approval. The draft standard goes through several more levels of distribution for comment prior to final approval.

Testing Laboratories

These organizations, the best known of which is Underwriters Laboratories, Inc. (UL), write some standards of their own and also maintain membership in ASTM, the NFPA, and other organizations.

?-The 90 percent affirmative" rule, combined with the "60 percent rule," guarantees a majority decision (64 percent), thus preventing recalcitrant objects to blocking an action that is desirable to the majority.
UL standards are based on its laboratory experience and its industry advisory council deliberations. An initial draft proposed by UL engineers takes into account applied requirements, field experience, survey of existing standards, and compatibility with existing standards. After it is discussed by industry advisory groups or conferences, reviews and comments are provided by appropriate UL engineering councils and clients, government agencies, and other groups. After revision and resubmission for comments, it is published as a consensus UL standard.

While its best-known standards and tests are for electrical products, UL also develops standards in such areas as fire and burglary protection, chemical hazards, and the safety performance of refrigeration, air-conditioning, and heating equipment.

Professional and Technical Societies

The most notable among these are the Society of Automotive Engineers with 27,000 members, the American Society of Mechanical Engineers with 55,000 members, and the Institute of Electrical and Electronics Engineers with 137,000 members. These organizations usually write standards in committees consisting of both members and nonmembers, in accordance with consensus procedures. They also participate through membership in the numerous committees maintained by ASTM, NFPA, and other organizations.

Trade Associations

These include such well-known organizations as the National Electrical Manufacturers Association, the American Petroleum Institute, the Aerospace Industries Association of America, the Electronic Industries Association, and the Association of Home Appliance Manufacturers. Because the membership of these organizations is generally limited to producers (except for the Aerospace Industries Association, which is made up of users), the standards they write are usually classed as industry standards. Like other organizations, they also help develop consensus standards through the committees of ASTM, NFPA, and other organizations.

The American National Standards Institute (ANSI)

ANSI is a federation of the nation's leading professional and technical societies, trade associations, labor organizations, consumer groups,
retailers, and manufacturers involved in developing voluntary standards. Although ANSI itself does not develop standards, it acts as a clearinghouse, coordinating approval of standards submitted to it by others in accordance with carefully defined procedures that require a period of public review and comment. After the originating group acts upon the comments, ANSI’s Board of Standards Review determines whether a national consensus exists.9

In some cases submissions come from trade associations that have developed industry-wide standards and want the greater credibility and encouragement of ANSI’s endorsement as consensus standards. In other cases, ANSI appoints a special committee representing all relevant interests and coordinated by a secretariat (typically a trade association or some other group directly interested in that particular standard). After developing the standard, the committee submits it to ANSI for approval.

The Consumer Product Safety Commission

CPSC staff members attend meetings of committees, subcommittees, and task groups. They serve in only a nonvoting, advisory capacity, however, because the CPSC does not want the activities of its staff members to be construed as CPSC endorsement of decisions made by others. Moreover, conflicts of interest can arise, along with problems posed by CPSC participation in actions later found to be anticompetitive.8

The CPSC also has an "offero" process for developing mandatory standards. The CPSC is required by Sec. 7 of the Consumer Product Safety Act to "include an invitation for any person, including any state or federal agency (other than the Commission), . . . (A) to submit to the Commission an existing standard as the proposed Consumer Product Safety Standard or (B) to offer to develop the proposed Consumer Product Safety Standard." The CPSC is permitted to contribute to the offeror’s cost as per an agreement negotiated with the offeror. Section 7 permits the CPSC to draw on a far broader range of expertise and experience than its own resources provide, while reducing its probable cost of developing the standard. The CPSC identifies prod-

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9The total number of American National Standards rose from over 3,000 in 1968 to over 10,000 in 1979. ANSI, 1980 Progress Report, p. 9.
8A more detailed discussion of the role of government employees in the voluntary standards process, and the advantages and potential drawbacks of their participation, is provided by Hamilton, op. cit., pp. 1467-1472. CPSC staff participation and the products they are concerned with are described in the annual reports of the CPSC. See, for example, its Annual Report, Fiscal Year 1980, Part 2, pp. 43-44.
ucts that pose serious hazards, according to its system of accident reporting described in Sec. V. It then announces the need for a mandatory standard and solicits aid from voluntary standards organizations, trade associations, and other groups.

A variety of organizations have offered to develop standards for the CPSC under this process. Consumers Union developed a power lawn mower standard; a trade association—The Consumer Safety Glazing Committee—developed a standard for architectural glass; the National Consumers League assisted in a proposed standard for Christmas tree lights; the NCL and ASTM developed a proposed standard for matchbooks; and UL proposed a mandatory standard for television receivers.10

The offeror process has not worked smoothly, however. For example, only after long delay did the CPSC respond to ASTM's proposed matchbook standard. After a number of adverse comments, the CPSC substantially modified it. The final standard differed only in minor respects from a draft ASTM voluntary standard that had been completed before the CPSC decided to develop its own.

WHY PRIVATE FIRMS PARTICIPATE IN ESTABLISHING SAFETY STANDARDS

It is easy enough to appreciate private firms' desire to cooperate in developing many standards of the sort discussed above. Standards of interchangeability and classification, for example, clearly benefit both firms and society at large.11 The particular rules adopted are less important than the fact that everyone follows the same rules.

But it is less clear why private firms are concerned with the formation of safety standards. A particular consumer may not care how other consumers choose among products on the basis of their safety as long as his own choices are not unduly restricted. Likewise, a particular firm may not be much affected by the product safety practices of other firms, as long as it is free to set its own proprietary standards.

Presumably, private firms have an interest in producing what-

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10A particularly well-documented account of the UL experience is provided by S. David Hoffman and Dennis O. Duda, A History of the Development of the Proposed Federal Mandatory Safety Standard for Television Receivers: A Voluntary Effort. Underwriters Laboratory, Inc., Northbrook, Ill., 1980. The CPSC did not adopt the proposed mandatory standard, however, because evidence provided by UL indicated that existing voluntary standards were adequate to ensure reasonable levels of safety.

11A humorous account of the need for such standards, and the difficulties involved when a large organization (e.g., the United States Government) insists on different standards of its own, is contained in American National Standards Institute, The Strange Case of the Seven-Sided Post Hole, New York (undated brochure).
ever level of overall safety they choose, either above or below the industry average. Under some conditions, firms would be better off relying solely on their own internally developed standards; but this is also risky. If they set low standards, they might risk losing sales and facing an inordinate number of product liability suits. If they set high standards, they might either gain or lose sales depending on consumers’ willingness to pay higher prices for safer products. In either case, safety would be only one of many elements contributing to their profits in the competitive marketplace. Indeed, exploiting the freedom to differentiate their own products from those of competing firms, some companies might benefit from the industry’s not promulgating voluntary safety standards. As Hemenway observes, "the trade associations in drugs and cosmetics, for example, might be committing suicide should they attempt to promote minimum industrywide quality standards, which could diminish the product differentiation advantages of established firms."

Firms have three reasons relevant to this study for cooperating in developing safety standards. It gives them an opportunity, first, to respond to problems posed by poor safety information in the hands of consumers; second, to forestall adverse regulatory action; and third, to defend themselves against product liability suits.

Response to Consumers

Firms may desire to cooperate in setting minimum standards if consumers can assess the average safety level of a class of products, though not the safety characteristics of individual products. That is, consumers have a subjective probability distribution of the cost of accidents for a class of products (e.g., automobiles, bicycles, knives), a subjective distribution that changes as the safety record of the class changes. If the safety practices of some firms deteriorate, the entire industry may suffer, including firms that continue to manufacture safe products. As Hemenway observes, "one motive for sellers to create industrywide quality standards is their belief that the shoddy products of a few firms reflect badly on the entire industry, [and] that a few rotten apples spoil the barrel."

This rationale for standards development is backed by substantial

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evidence. A study of the history of the Association of Home Appliance Manufacturers (AHAM) notes that the Association has viewed sound standards-setting as one way to increase industry sales. Moreover, the many examples of product adulteration earlier in the century support the notion that buyers have difficulty judging quality prior to purchasing certain products. Cases in point include the deterioration of sole leather due to use of tanning extract, glucose, and Epsom salts; and the progressive adulteration of mayonnaise with gum arabic.

Of course, the use of standards is only one of several ways to cope with such problems. Brand-name reputations for safe, reliable service, acquired through advertising and other marketing techniques, provide an important means to the consumer of identifying differences among products within an industry.

Forestalling Regulatory Action

Firms may seek to forestall the setting of mandatory standards by a government agency. Concerns about product safety in the 1960s and the establishment of the CPSC in 1973 triggered greater concern about consumer products within the voluntary standards-setting community. ANSI's Consumer Council, formed in 1967, reflected widely held views that consumer interests should be further expanded. ASTM's Committee F-15, discussed below, was formed in 1972 in direct response to increasing concerns about consumer product safety.

Firms have two reasons to cooperate with the CPSC in setting voluntary safety standards. First, the Commission has the discretion to forgo setting mandatory standards if it considers that voluntary standards are strong enough and that industry compliance is adequate. Firms have reason to develop at least tolerably adequate standards, in the eyes of the Commission, and to avoid egregious cases of noncompliance that would trigger unfavorable Commission action. As Harter notes:

> Those affected by the standard may feel strongly that their views and insights are legitimate and the information they possess is better than that available to the agency but that the agency will not pay


--See Hemenway, op. cit., pp. 50-51, and his references to histories of product development.
attention when developing a mandatory regulation. Thus, for them, participation is the key, and they feel the consensus process affords better participation than the government’s rulemaking process. The industry may also be concerned that if the government writes the standard it will not keep pace with changing technology and it will permit the standard to become obsolete whereas if it remains voluntary it can be updated by those affected.\footnote{Philip J. Harper, Regulatory Use of Standards: The Implications for Standards Writers, National Bureau of Standards, Washington, D.C., November 1979, pp. 47-48. See also Calvin J. Collier, "Voluntary Standards in Transition," American National Standards Institute, New York, March 25, 1981, p. D. As a leading example of the problems noted by Harper, OSHA adopted over 120 voluntary standards as mandatory soon after its creation, which created two problems. First, many of the standards were subsequently revised, but OSHA did not incorporate the revisions in the mandatory versions. Thus, in cases of conflict the out-of-date rules applied. Second, many standards called for measures that would be deemed quite inappropriate by the voluntary standards-setters if enforced on a mandatory basis.}

Second, the Commission has discretion to adopt mandatory standards based on voluntary ones. By developing voluntary standards with well-documented technical support, the industry can help to assure that subsequent mandatory standards will be palatable. However, unlike the Occupational Safety and Health Administration, the CPSC has not chosen to adopt existing voluntary standards without revision. Instead, under the offeror process discussed above, it has adopted only a few mandatory standards.\footnote{Since 1978 the Commission has issued seven mandatory standards covering sharp edges, sharp points, and small parts in toys; lawn mowers, unstable refuse bins, citizen band radio antennas, and unvented gas space heaters. See "Consumer Product Agency is Battling for Its Independence and Its Life," National Journal, June 27, 1981, p. 116; and the Annual Reports of the CPSC, especially 1982, Part 2, pp. 18-21.}

However, the presence of the CPSC is surely not the only factor that explains the willingness of firms to participate in standards-writing. Although interest in consumer product safety accelerated during the late 1960s, standards groups had previously been concerned with consumer products. According to ANSI, "projects aimed at developing consumer products standards were initiated as early as 1928. Many institute-approved standards dealing with safety, performance, and testing of consumer goods resulted, along with many others that affect or are related to consumer products."\footnote{"ANSI and the Consumer," October 1976, p. 10 (brochure).}

Protection Against Product Liability Suits

Demonstration that the defendant has complied with sound safety standards (especially consensus standards, which have more credibility than industry or proprietary standards) may provide evidence that
the defendant is conforming to the state of the art, which may in turn help show that the product was not defective. Thus, firms have a stake in participating in standards development to help ensure that the results reflect their interests, and at the same time are credible enough to encourage courts to admit evidence of defendants' compliance.

All in all, though, concerns about product liability probably provide only weak motivation for firms to participate in standards-setting. The link between firms' experience in product liability suits and the development of standards is at best tenuous. It is true that the increase in safety-related activities by standards groups during the 1970s coincided with an upsurge in product liability suits. On the other hand, both of these trends may have been reactions to increased general concerns and awareness during that period about consumer product safety, with no causal connection. Response to poorly informed consumers seems to be a more persuasive explanation for long-term involvement.

FIRMS' INCENTIVES, THE Consensus PROCESS, AND THE LEVEL OF SAFETY

Although a primary incentive for participating in standards activity is to respond to poorly informed consumers and a secondary one is to respond to potentially adverse regulatory actions, these incentives do not necessarily lead to the appropriate selection and design of standards, as described in Sec. III. Some firms in a particular industry may be reluctant to help write standards to which they are expected to conform because they regard the costs as excessively high. These firms may feel that, given the nature of their products and market conditions, they are better off opting for weak standards or none. This situation was reflected in the assertion by the National Commission on Product Safety that "safety itself has been a secondary consideration in the usual process of developing voluntary standards. The need for a consensus commonly waters down a proposed standard until it is little more than an affirmation of the status quo."

Other firms, especially those that may have a comparative advantage in producing safe products through their past experience or use of proprietary technology, may opt for high standards—perhaps excessively high if costs to society exceed the benefits. These firms may

\[\text{Footnotes:}\]
\[\text{20 For a description and analysis of product liability experience, see the Interagency Task Force Report on Product Liability, op. cit.}\]
nevertheless be better off, because of the reduced competition, if all
firms are expected to comply.22

Of course, producers are not the only interests represented in the
consensus process. Consumer groups, representatives of government
agencies and the academic community, distributors, and others par-
ticipate in deliberations at various levels of standards-writing and
approval. If the consensus process worked perfectly, i.e., if all conceiv-
able interests were fairly represented in deliberations and in polling,
then by definition the outcome would be deemed socially appropriate.
Yet the consensus process cannot be expected to operate perfectly. The
sheer fact that participation is voluntary makes it difficult or impos-
sible to represent all interests fairly. Moreover, participants vary
widely in the knowledge they have about a particular standard they
are involved in developing. As in a political democracy, the rules for
representation and approval procedures have evolved over decades
toward greater fairness while reflecting compromise among many
conflicting objectives.23

Given the interests of producers to develop standards that may or
may not strike an appropriate balance between costs and benefits, and
many other interests represented with varying levels of knowledge
and expertise, the standards that are finally approved could encour-
ge either excessive or weak levels of safety. Thus, the purpose of this
study is to explore the opportunities and problems of using cost-bene-
fit analysis to develop standards that will encourage socially appropri-
ate outcomes.

22Theoretical analyses concluding that under certain circumstances firms may opt
for excessively high standards are contained in L. G. Thomas, "The Economics of Pro-
ducer Developed Safety Standards," Faculty Working Paper 657, College of Commerce
and Business Administration, University of Illinois, Urbana-Champaign, March 20,
1969; and Hayne E. Leland, "Quacks, Lemois, and Licensing: A Theory of Minimum
which the safety level may be set too high can recur when firms that produce safety
devices or other goods stand to benefit from stringent standards. For example, some
have alleged that the standard for the level of illumination in school classrooms is
higher than necessary, and that those who profit from the standard are the lighting
companies that participated in the standard-setting process. See Ralph Nader and Peter
Mayer, "The Case for Reforming Our Standards-Setting System," New Engineer, Janu-
ary 1978, p. 29.

23For a highly detailed account of many alleged imperfections in the consensus pro-
cess, see the Federal Trade Commission, Standards and Certification, Proposed Rule
and Staff Report, Washington, D.C., December 1978. After attending several ASTM
committee meetings as an observer, Hamilton concludes that "judgmental rather than
scientific classification of interests, lack of qualified representatives of some important
interests, uneven attendance, and the importance of working groups that lack balance
—are undoubtedly present to some degree in all 'balanced' committees." (Op. cit., p.
1355.)
METHODOLOGY AND SCOPE OF THE SUBSEQUENT ANALYSIS

This study is based on investigation of a small sample of consensus standards relating to consumer products. We take the definition of consumer products from in Sec. 8(a) of the Consumer Product Safety Act:24

Any article or component part thereof, produced or distributed (i) for sale to a consumer for use in or around a permanent or temporary household or residence, a school, in recreation, or otherwise, or (ii) for the personal use, consumption, or enjoyment of a consumer in or around a permanent or temporary household or residence, a school, in recreation or otherwise.

The work focuses especially on ASTM, the largest organization that produces consensus standards. Within ASTM, the study involved perusing the files of Committee F-15 from the time the Committee was formed in 1972. This Committee was selected for in-depth analysis because it was established specifically to write safety standards for consumer products, in response to the concerns expressed by the National Commission on Product Safety and others, and because its files are unusually detailed and complete. These files include the activities of the following task groups:

F-15.02—Cigarette lighters
F-15.03—Bathtubs and shower stalls
F-15.04—High chairs
F-15.05—Play yards
F-15.06—Nonpowder guns
F-15.07—Arm-held baby carriers
F-15.08—Carriages and strollers
F-15.09—Shopping carts
F-15.10—Flammable-liquid containers

The study also includes examination of the files, dating from 1979, of Committee F-08 on sports equipment and facilities and Committee D-13 on textiles. The files of subcommittees of particular concern include F-08.14 (skiing) and F-08.50 (headgear).

The information in these files has been crosschecked and supplemented by personal and telephone interviews with individuals in-

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24Some of the major exclusions are tobacco and tobacco products, motor vehicles and equipment, aircraft, boats, drugs, medical devices, cosmetics, and food.
In addition, the following committees operating under ANSI auspices were included for brief investigation:

- B-71—Outdoor power equipment
- Z-90—Head protection
- Z-21—Gas-burning appliances
- Z-86—Underwater safety

Interviews were conducted with members of each committee or its central contact person on the secretariat, or both.

The work of these particular ASTM and ANSI committees covers both juvenile and adult products, and products used both within and outside of the home.

Additional interviews were conducted with about a dozen individuals who are actively involved in a more general way with voluntary standards: members of the ASTM staff, of decisionmaking groups within ANSI (such as the Board of Standards Review), and of the Consumer Product Safety Commission, the U.S. Department of Commerce, and the Federal Trade Commission. Given the limited sample size in this study, their experience provided particularly valuable support for the presumption that some of the conclusions reported here can be validly applied to other standards-setting activities for consumer products and, to a lesser degree, to industrial products as well.

Moreover, interviews focusing on loss prevention and underwriting practices were conducted with a large number of individuals in the insurance industry. These organizations included the Liberty Mutual Insurance Company, Northbrook Excess and Surplus Insurance Company, the Kemper Group, CNA, the Alliance of American Insurers, the American Insurance Association, and the Insurance Services Office.
III. THE PURPOSE AND NATURE OF COST-BENEFIT ANALYSIS

The objective of cost-benefit analysis is to provide guidance for allocating scarce resources among alternative uses in a way that will maximize their value to society. As applied to safety in particular, the objective of such analysis is to benefit society by reducing deaths and injuries as much as possible given the available resources—in other words, to provide a basis for allocating dollars in directions where they will do the most good.

To explore the opportunities and the problems posed by cost-benefit analysis, we shall concentrate on:

- Costs, benefits, and the optimal level of product safety,
- The difficulties of pursuing cost-benefit analysis, and
- Past examples of how this analysis has been used, particularly by the CPSC.

COSTS, BENEFITS, AND THE OPTIMAL LEVEL OF PRODUCT SAFETY

We define the optimal level of safety as that at which, for a given product sale, the sum of expected accident costs and accident prevention costs is minimized. The cost of an accident is measured by its costs (including litigation and insurance administrative costs) multiplied by the probability of its occurring. Preventive costs include those imposed on both the buyer and seller. For the seller, they include the costs of designing and manufacturing safer products. For the buyer, they include the time, inconvenience, and attention required to avoid accidents.

Whether promulgation of a safety standard for a given product encourages too little or too much safety depends on whether the benefits—measured by the reduced accident costs and lesser caution required of the user—outweigh the additional preventive costs imposed on the producer. If the benefits fall short of costs, then compliance would

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1This definition is consistent with that given by John Brown in his analysis of the effect of alternative liability rules on achieving the socially optimal level of safety. See his "Toward an Economic Theory of Liability," *Journal of Legal Studies*, June 1973. Minimization of the sum of preventive costs and accident costs is emphasized also in Interagency Task Force on Product Liability, op. cit., p. VII-7, as the appropriate goal in designing economically efficient rules for assigning liability.
encourage too much safety. Conversely, if benefits exceed costs, compliance would reduce the sum of accident and preventive costs, although it still might not encourage the appropriate level of safety. The standard should then be strengthened or weakened to the point where the added benefits of modifying it just equal the additional costs.

This situation is illustrated in Fig. 3.1, which measures the strength of the standard (the horizontal axis) in terms of total costs and benefits (the vertical axis). The costs and benefits are all those incurred during the period when the standard is expected to be in effect. Curve TC, the total cost of complying with the standard, increases with the strength of the standard, reflecting both the progressive difficulty of meeting higher standards and the possibility that compliance would compromise the usefulness of the product. Curve TB, the flow of total benefits, also increases with the strength of the standard, but tapers off as additional benefits slow down at higher levels of safety. The optimal strength of the standard is reached at point d (where the slopes of curves TC and TB are equal) with total cost at c and total benefits at b, and where net benefits of compliance are maximized. Were the standard strengthened to point e in Fig. 3.1, total costs would exceed total benefits, and compliance with the standard would encourage more than enough safety. Moreover, Fig. 3.1 shows that it is not enough for a standard's total benefits to exceed total costs. A standard whose strength is to the left of d would be too weak; one to the right of d would be too strong.

This analysis is based on the assumption that adoption of the standard in Fig. 3.1 does not affect the costs and benefits of simultaneously adopting other standards with respect to the product in question; that is, the wide variety of standards that could be adopted with respect to the product are not mutually exclusive. When they are mutually exclusive, however, thereby requiring that only one must be selected from a range of options, then the standard that shows the greatest net benefits should be chosen.

DIFFICULTIES OF PURSUING COST-BENEFIT ANALYSIS

The theoretical construct in Fig. 3.1 is not meant to imply that cost-benefit analysis is a straightforward mechanical process leading to a clearly defined single-point optimum. On the contrary, it is complicated by numerous problems, including estimation of

- The social discount rate,
Fig. 3.1—The optimal safety level of a standard

- The effects of the standard on particular firms and consumer classes,
- The likely reduction in deaths and injuries,
- The value of the reduction in deaths and in pain and suffering,
- Other costs of deaths and injuries,
- Changes in consumer behavior, and
- Manufacturing and other seller costs.

Succeeding sections explain how, despite these problems, under some circumstances cost-benefit analysis would be useful to standards writers and to government agencies that adopt voluntary standards as mandatory.

Choosing the Social Discount Rate

It is not enough simply to aggregate the flow of costs and benefits over time and compare their magnitudes as was done in Fig. 3.1. We
must take into account the significance of the timing of these flows as well. Other things being equal, a standard that requires large investments in early years and yields benefits in later years is less attractive than one whose benefits occur early, with costs spread into later years. This preference arises for several reasons, as Burkhead and Miner explain:

Given a positive rate of return on investment in general, the resources used in a particular project could be invested elsewhere to yield resources in the future larger than the amount invested. This reason can be expressed alternatively as a time preference consideration: most people would prefer to receive an identical consumption benefit (income) now rather than in the future. Yet another reason, only partially separable from [the above], is that the future is uncertain; the expected future benefits from the project may not in fact accrue, or they may turn out to be less valuable than is currently expected—and expected future costs may turn out to be less burdensome than is currently anticipated.²

Because of the need to take into account a discount rate, the interpretation of Fig. 3.1 must be modified. The optimal strength of a standard is not at point d, where net benefits are maximized, but at the point where net discounted present value (or net present value, for short) of benefits is maximized. Application of a discount rate causes curves TB and TC to shift downward, depending on the timing of the flow of costs and benefits. The point at which net present value is maximized could fall either to the left or the right of point d.

Analysts agree that a discount rate should be applied, but disagree over its appropriate value. Four possible approaches have been treated in the economics literature: (a) The private time preference, which reflects an individual’s preference for present goods over future goods; (b) the social time preference, which expresses society’s concern for future generations, who may benefit from investment undertaken now; (c) private productivity, which reflects the returns of some current investments by private investors; and (d) social productivity, which acknowledges private returns plus or minus the external effects of private investment. Difficulties of choosing among these are exacerbated by numerous problems, including the appropriate treatment of taxation and risk, and possibilities that in a market economy the savings and investment preferences of individuals and business firms may not generate optimal choices between consumption by the current generation and that of future generations.

Although much literature has addressed the controversy about an

²Jesse Burkhead and Jerry Miner, Public Expenditure, Aldine Atherton, Chicago, Ill., 1971, p. 228.
appropriate discount rate, no consensus has emerged.$^{3}$ As one economist laments,

We are treated to what may with little exaggeration be described as a sorry spectacle—outstanding members of our profession providing in print estimates of the social discount rate ranging from 4½ to 8 or 9 percent. Some calculations by government agencies and others have even employed discount rates as low as 3 percent . . . or have even discounted at a zero rate! . . . Since the choice of investment projects can be so sensitive to the magnitude of this variable, little help is provided to the decisionmaker who is confronted by such an enormous range of estimates.$^{4}$

Reacting to this disconcerting situation, the U.S. Office of Management and Budget recommended in the early 1970s that a 10 percent rate should be used by government agencies.$^{5}$ This rate was not more easily defended than others, but simply provided a common basis for comparisons across government programs.

**Estimating the Effects on Firms and Consumers**

In determining the likely effect of a new or revised standard on the behavior of firms, benefits and costs become an issue only to the extent that firms alter their behavior in response to the change. At the extreme, both the costs and the benefits would be zero if all firms ignored the new standard and complied with either higher or lower standards, or with none at all. Costs and benefits of the standard can be estimated only for those firms that choose to comply with it.

Determining which firms will in fact alter their behavior and how that modification will affect product safety is no easy task. Among the problems, one must examine the standards that firms would otherwise use, since practices may vary widely within the industry, and then determine their costs in moving to the new standard.

Benefits are measured to a large extent in terms of who will use the product in question. For example, radically different benefits may accrue for a bathtub grab-bar standard that is applied only to rest homes and retirement communities and for one that is applied nation-

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$^{3}$Among the many critiques, see, for example, University of Maryland, Department of Textiles and Consumer Economics, *Cost-Benefit Analysis of Consumer Product Safety Programs*, College Park, Maryland, February 1978, pp. 78-101.


$^{5}$Office of Management and Budget, Circular A-94 (revised), March 27, 1972.
wide. Thus, the characteristics of particular consumers affected by the
standard are an important factor in estimating its effects on deaths
and injuries.

Estimation of Benefits

Estimating Reductions in Deaths and Injuries. The primary
benefit of a safety standard is a reduction in the number of deaths and
injuries, but estimating that number is a complex matter. Cause-and-
effect relationships render the effects of many standards markedly
uncertain. Indeed, the inadequacy of present-day hazard information
makes it very difficult to design well-conceived standards. (For a de-
tailed discussion of hazard information, see Sec. V.)

The Value of Reductions in Deaths and in Pain and Suffering.
The single most difficult estimation problem is to quantify the value
of life, and of pain and suffering. The various approaches that have
been used to make quantitative estimates, and their shortcomings,
are the subject of a voluminous literature.\textsuperscript{6} We shall treat briefly four
approaches that have attracted the greatest attention.

1. Human Capital. The most commonly used measure for the
value of life involves discounting to the present the flow of
the individual's future earnings. Thus, if the present value of
the expected flow is $100,000, the individual's life is valued
at that amount. While this approach is attractive because
quantitative estimates are easier to make, the disadvantages
are obvious. First, it measures the individual's contribution
to economic output rather than the value of life to the indi-
vidual; second, it does not take into account nonmarket ac-
tivities of housewives, retirees, and others not earning direct
income; third, it ignores pain and suffering; and fourth, it
assumes that maximization of the nation's Gross National
Product is an appropriate goal.\textsuperscript{7} Furthermore, valuing
human life as capital contains a number of morally
disturbing implications. "It is, for example, an inescapable
conclusion of this criterion that society should spend no
money on programs that extend the lives of fatally ill

\textsuperscript{6}An extensive recent bibliography of this literature is contained in Technology +
Economics, Inc., The Consumer Product Safety Commission Injury Cost Model, Cam-

\textsuperscript{7}Among the many critiques see, for example, University of Maryland, op. cit., pp.
298-320; and Jan Paul Acton, "Measuring the Monetary Value of Life Saving Pro-
children because the programs would produce no change in future earnings.⁸

To be sure, one can supplement market estimates by explicitly evaluating the nonmarket activities of housewives and others, and one can separately estimate the cost of pain and suffering through examination of jury awards.⁹ But the confounding of the value of livelihood and the value of life poses "a perplexing and possibly unsolvable problem."¹⁰

2. Consumption Forgone. A second approach to the value of life measures individual consumption, on the assumption that an individual's utility depends on his consumption of goods and services. Although workers in the nonmarket sector are included in this measure, children's value may be overestimated since their discounted consumption stream is greater than their discounted earnings.¹¹ Then too, the value that an individual ascribes to his own life, or to pain and suffering, may have little to do with the level of his consumption of goods and services sold in the marketplace.

3. Society's Explicit Evaluation. A third approach is to examine court awards for days of work lost, death, and pain and suffering, in which case the value of life and injury is determined by the jury. Because individual awards are specific to each victim and jury, however, they vary greatly. One study of a small sample of such cases shows values of $170,000 and over a million dollars for the deaths of two young husbands' fathers during the same year.¹²

4. Willingness to Pay. At bottom, the value of an individual's life can be judged only in terms of his own valuation. It is reasonable, therefore, to ask what an individual would be willing to pay to reduce the probability of death by some small amount. For example, if a person is willing to pay a $1 premium for a product that reduces the probability of death by 0.00001, the value of his life is equal to $1/0.00001 or

⁸Acem, op. cit., p. 53.
¹⁰Mishan, op. cit., p. 301.
¹¹For example, using the forgone consumption approach, one study estimates the value of a child at $150,000 while another estimate under the human capital approach puts it at $25,000. (University of Maryland, op. cit., pp. 95-96.) A notable study of estimates of lifetime earnings by age, sex, and race is provided by D. F. Rice and R. S. Cooper, "Economic Value of Human Life," American Journal of Public Health, November 1987.
¹²University of Maryland, op. cit., p. 119.
$100,000.\textsuperscript{13} The major drawback of this approach is the difficulty of making tolerably satisfactory quantitative estimates.

Other Costs of Deaths and Injuries. Other costs associated with accidents include value of lost working time, property damage, medical costs, and the costs of hospitalization, insurance administration, and litigation. These are also difficult to estimate, particularly if litigation results in out-of-court settlements. But the task is far less formidable than that of quantifying the value of life and serious injury.\textsuperscript{14}

Changes in Consumer Behavior. Estimates of the reduction in death and injury afforded by a particular safety standard may be valid only if consumer behavior remains unaffected with respect to the product. Using seat belts may reduce accidents, for example, but they may also encourage drivers to drive faster than otherwise. Installation of grab bars in bathtubs may reduce slips and falls but may also encourage the user to be less careful. Therefore, any such reduction in preventive behavior required of consumers also counts as a benefit. Thus, the benefit of a safety standard should be assessed in terms of both the reduced injuries and deaths and the degree of caution imposed on the products’ users.\textsuperscript{16}

Estimation of Costs

One cost component of a safer standard is the additional expense of manufacture, distribution, retailing, and installation and maintenance, although it would only affect those firms who change their behavior as a consequence of the standard. Expenses vary widely de-
pending on different firms' production practices, size of output, range of product lines, and other considerations. Other costs depend upon the estimated lifetime of a safety device and of money-saving technological advances. Although these difficulties are significant, they are overshadowed by the more formidable difficulties of quantifying the value of life and of pain and suffering.\footnote{Conceivably, some firms operating at standards higher than those being promulgated would reduce their level of safety to comply with the lower level. In this case, reduced manufacturing and other expenses would count as a benefit of the lower standard and the possible increase in deaths and injuries as a cost.}

A second cost component is the possible loss in utility to the consumer of using the safer product. Conceivably, the addition of safety devices could require more manipulations (such as the release of a tricky safety lock) or make the product generally less useful (such as a duller knife).

**CPSC’s Use of Cost-Benefit Analysis**

The CPSC has made extensive and practical use of cost-benefit analysis. A variation was also used in a study sponsored by the National Bureau of Standards. The following discussion will help to show more concretely the ingredients of cost-benefit analysis, and how it can usefully be applied to questions of product safety, in light of both groups’ experience.

**The Experience of the CPSC**

Under Sec. 9(c) of the Consumer Product Safety Act, prior to the Commission's promulgating a consumer product safety rule it is required "to consider" (a) the degree and nature of the risk of injury that the rule would reduce, (b) the number of consumer products subject to the rule, (c) the effect the rule would have on costs, usefulness, and availability of the products it applies to, and (d) ways to minimize its adverse effects on competition and commercial practices. The Commission has used cost-benefit analysis in making some of these decisions.

An example of a specific analysis made by the CPSC concerns its blade contact requirements for power mowers.\footnote{See Warren V. Prunella and William W. Zamula, *Economic Impact of Blade Contact Requirements for Power Mowers*, CPSC, Washington, D.C., January 1979.} One performance requirement, recently made mandatory by the CPSC, states that the
blade of a rotary walk-behind power lawn mower must stop in three seconds or less after a person leaves the operator’s position.

From accident statistics collected by the CPSC (described in more detail in Sec. V), the Commission estimated the nationwide number of serious, moderate, and minor injuries caused by power mowers. After examining the cause-and-effect relationships in reported accidents, the Commission estimated the number of injuries that would be reduced by compliance with the standard. (See Table 3.1.)

Table 3.1

Costs and Benefits of the Blade Contact Requirements for Power Lawn Mowers
(In $ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Costs</th>
<th>Benefits</th>
<th>10%</th>
<th>5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>189</td>
<td>26.4</td>
<td>24.0</td>
<td>25.1</td>
</tr>
<tr>
<td>2</td>
<td>---</td>
<td>26.4</td>
<td>21.8</td>
<td>23.9</td>
</tr>
<tr>
<td>3</td>
<td>---</td>
<td>26.4</td>
<td>19.8</td>
<td>22.8</td>
</tr>
<tr>
<td>4</td>
<td>---</td>
<td>26.4</td>
<td>18.0</td>
<td>21.7</td>
</tr>
<tr>
<td>5</td>
<td>---</td>
<td>26.4</td>
<td>16.4</td>
<td>20.7</td>
</tr>
<tr>
<td>6</td>
<td>---</td>
<td>26.4</td>
<td>14.9</td>
<td>19.7</td>
</tr>
<tr>
<td>7</td>
<td>---</td>
<td>26.4</td>
<td>13.6</td>
<td>18.8</td>
</tr>
<tr>
<td>8</td>
<td>---</td>
<td>26.4</td>
<td>12.3</td>
<td>17.9</td>
</tr>
<tr>
<td>Total</td>
<td>189</td>
<td>211.2</td>
<td>140.8</td>
<td>170.6</td>
</tr>
</tbody>
</table>


The unit of analysis is one year's production of power mowers manufactured to the CPSC requirements, with the lifetime of the mowers estimated at eight years. The cost of $189 million is a weighted

\footnote{Of course, the life of the standard extends beyond one year. A more complete analysis would include estimation of the discounted flows of both costs and benefits during the time period that the standard is expected to affect the behavior of firms and consumers. The "one-shot" approach in Table 3.1 assumes that the additional cost in each subsequent year and the flow of benefits from each year's investment remain constant.}
average of additional manufacturing and retail costs for several types of mowers. These estimates were provided to the CPSC by an outside contractor.\footnote{Battelle Columbus Laboratories, Research Report on Economic Impact of Proposed Safety Standard for Power Lawn Mowers, CPSC-C-75-0098, February 18, 1977.}

The benefits from one year's production are assumed to remain constant at $26.4 million per year (in 1978 dollars). That figure covers only the medical costs of accidents and the value of lost working time. It excludes the value to potential victims of lives saved, injuries avoided, and pain and suffering. (This omission of lives saved is reasonable because accidents involving lawn mowers result in few fatalities.) Table 3.2 shows how the total benefits of $211.2 million were estimated. With the aid of a private contractor, the Commission computed the costs per injury shown in column (C) and then estimated the injury costs that would be eliminated (at 1978 price levels), shown in the last column. Because of uncertainty about the appropriate discount rate, the CPSC discounted the benefits at both 10 and 5 percent (but not costs, since they are all incurred in the first year).

The analysis presented in Table 3.1 is useful because it permits the decisionmaker to judge for himself whether the unquantified benefits are sufficient to outweigh the excess costs over the benefits estimated in this Commission study. If, for example, the decisionmaker concludes that the loss of a finger or toe involves pain and suffering and other costs at least equal to the quantified benefits in Table 3.1, the present value of benefits discounted at 10 percent would increase from $140.8 million to $280 million—far above the $189 million present value of costs. The results would be even more favorable at a 5 percent discount rate.

Although this analysis is crude, it provides rough benchmarks to aid decisions. It does not encompass some of the other costs of accidents discussed earlier, such as the costs of insurance administration, litigation, or possible technological advance that would tend to increase net benefits. Nor does it grapple with the effect of standards on the behavior of the user, which in turn could also affect the results. But it does treat in qualitative terms how the standard affects the utility of the product, concluding that the effect would be slight. The authors of the CPSC study themselves expressed some reservations:

As evident from the above, not all of the costs and benefits of health and safety standards are readily quantifiable. Therefore, the outcome of cost-benefit analysis is not sufficient for decisionmaking purposes. Other criteria must be considered in balancing the standard against the cost.\footnote{Battelle Columbus Laboratories, Research Report on Economic Impact of Proposed Safety Standard for Power Lawn Mowers, CPSC-C-75-0098, February 18, 1977.}
### Table 3.2

**Calculations of Power Mower Associated Injury Costs**

<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>(A) Estimated Annual Blade Contact Injuries</th>
<th>(B) Estimated Annual Reduction Per Contact Injury</th>
<th>(C) All Blade Injury Costs</th>
<th>Eliminated ($ million)</th>
<th>Annual Eliminated ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger amputations</td>
<td>7,321</td>
<td>6,792</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toe amputations</td>
<td>2,607</td>
<td>1,418</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total, serious</td>
<td>9,928</td>
<td>8,270</td>
<td>$20,000</td>
<td>199</td>
<td>165</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avulsions</td>
<td>2,420</td>
<td>1,809</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fractures</td>
<td>31,558</td>
<td>31,125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total, moderate</td>
<td>33,978</td>
<td>32,934</td>
<td>$1,400</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lacerations</td>
<td>51,378</td>
<td>38,398</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contusions</td>
<td>2,319</td>
<td>323</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total, minor</td>
<td>53,697</td>
<td>38,721</td>
<td>$300</td>
<td>16</td>
<td>12</td>
</tr>
</tbody>
</table>

Total, all injuries | 253 | 211 |


*Data from CPSC, Power Mower Baseline Study Data, July 1-September 30, 1977.*

(Data from Stanford Research Institute, *An Analysis of the Proposed CPSC Lawn Mower Standard*, May 1977. (Costs estimated at 1976 price levels.)

*Adjusted for 1978 price levels.*
The costs of the analysis itself must be weighed against its potential benefits. The regulatory economic analysis required for power lawn mowers under Section 9(c) of the Act cost about $153,900, including CPSC staff time and outside contracts. By comparison, studies of cellulose insulation and of unvented space heaters ran to $113,200 and $125,200, respectively, and costs for 13 other regulations promulgated by the CPSC ranged from about $6,000 to $20,000 each.\textsuperscript{21}

Despite these costs, and the fact that the analysis is only one input of many in the decisionmaking process, the CPSC has received high marks for its efforts. In recent Senate hearings, many emphasized the value of recent improvement in the Commission's analyses. According to one participant:

This is a safety agency, that, I believe, has successfully married the protection of the public with consideration of the costs of regulation. And I would challenge anyone to come up with any instance where a neutral analysis has found that the benefits of a final CPSC regulation issued in the past two years are not reasonably related to its costs.\textsuperscript{22}

To continue improving the quality of its analysis, the CPSC recently issued a description of its proposed improved methodology for treating costs, benefits, and other issues covered by Section 9(c).\textsuperscript{23}

On the benefits side, the CPSC will estimate, from data provided by NEISS (National Electronic Injury Surveillance System), the number and nature of injuries associated with a hazard addressed by a proposed regulatory action. The Commission will then evaluate the extent of injury reduction, taking into account expected compliance and the rate of product replacement, and will estimate the costs of injuries or illnesses that would be eliminated. Where numerical estimates are not possible, it will describe costs in qualitative terms. They may include "indirect costs (e.g., social costs, lost wages, pain and suffering) as well as direct medical costs associated with injuries or illnesses."\textsuperscript{24}

On the cost side, the Commission will evaluate four major factors:

\textsuperscript{20}Prunella and Zamula, op. cit., p. 9.
\textsuperscript{24}Ibid., p. 85775.
The need for the product measured in terms of sales, uses for it, and the availability of close substitutes.

- The effects of changes in functional attributes and aesthetic appeal on the utility of the product and on substitutes.
- The direct cost to the affected firms and to consumers, related effects on international trade, and possible market disruptions.
- The effects on the availability of the product, including how fast firms can adapt to the proposed rule, and whether substitute products or new technologies are available to help meet consumer needs.

The NBS Study of Ground-Fault Circuit Interrupters

In 1978, the National Bureau of Standards, concerned about the cost burden imposed by safety standards included in local building codes, undertook a cost-benefit study of ground-fault circuit interrupters (GFCIs). These devices automatically trip the electric circuit-breaker in cases where an individual might otherwise receive a serious or fatal electrical shock; for example, by accidentally dropping an energized electrical appliance into a filled washbasin. The 1975 National Electrical Code requires GFCI protection at construction sites, for swimming pools, for electrical receptacles installed outdoors, and in bathrooms of new residential construction.

Table 3.3 summarizes the analysis of three standards, each involving different key assumptions. As in the CPSC study, the unit of analysis is one year's installation costs and the benefits that result over several years from compliance with the standard. The total number of annual death statistics, reported across the first row, were taken from a newspaper clipping study reporting on fatal and nonfatal electric shock accidents in homes. The numbers of deaths occurring where GFCIs are located were estimated from news story accounts. These were combined with estimated GFCI effectiveness (allowing for the fact that not all electrocutiuons could have been prevented) to obtain the estimate of lives saved annually shown in row 5. The average installation was estimated to cost from $45 to $55 at 1975 prices, with a useful life estimated at 20 years. Since GFCIs use energy, their operating cost, discounted at 10 percent in accordance with OMB's guideline, constitutes the present value of energy cost in row 16. Note that installation cost is not discounted, since the analysis includes

---

### Table 3.3

**Cost-Benefit Analysis for Ground-Fault Circuit Interrupters (GFCIs)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Annual deaths</td>
<td>290</td>
<td>320</td>
<td>290</td>
</tr>
<tr>
<td>(2) % of housing stock protected</td>
<td>0.024</td>
<td>0.024</td>
<td>0.024</td>
</tr>
<tr>
<td>(3) % of deaths outdoors and in bathrooms</td>
<td>0.458</td>
<td>0.59</td>
<td>0.40</td>
</tr>
<tr>
<td>(4) Added GFCI effectiveness</td>
<td>0.385</td>
<td>0.43</td>
<td>0.264</td>
</tr>
<tr>
<td>(5) Annual lives saved ((5) \times (2) \times (3) \times (4))</td>
<td>1.219</td>
<td>1.651</td>
<td>0.724</td>
</tr>
<tr>
<td>(6) Useful life</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>(7) Lives saved over useful life ((7) \times (6))</td>
<td>24.38</td>
<td>33.02</td>
<td>14.48</td>
</tr>
<tr>
<td>(8) Millions of units</td>
<td>1.736</td>
<td>1.736</td>
<td>1.736</td>
</tr>
<tr>
<td>(9) Average installation cost</td>
<td>$53.11</td>
<td>$45.00</td>
<td>$55.00</td>
</tr>
<tr>
<td>(10) Total installation cost ((8) \times (9))</td>
<td>$92,210,000</td>
<td>$78,120,000</td>
<td>$95,480,000</td>
</tr>
<tr>
<td>(11) Annual energy use per GFCI (in kWh)</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>(12) Cost per kWh</td>
<td>$0.04</td>
<td>$0.04</td>
<td>$0.04</td>
</tr>
<tr>
<td>(13) Annual energy cost per GFCI ((11) \times (12))</td>
<td>$0.32</td>
<td>$0.32</td>
<td>$0.32</td>
</tr>
<tr>
<td>(14) Millions of GFCIs</td>
<td>1.736</td>
<td>1.736</td>
<td>1.736</td>
</tr>
<tr>
<td>(15) Annual energy cost ((13) \times (14))</td>
<td>$555,520</td>
<td>$555,520</td>
<td>$555,520</td>
</tr>
<tr>
<td>(16) Present worth of energy cost (10% discount rate)</td>
<td>$4,729,697</td>
<td>$4,729,697</td>
<td>$4,729,697</td>
</tr>
<tr>
<td>(17) Total cost ((10) + (16))</td>
<td>$96,939,697</td>
<td>$82,849,697</td>
<td>$100,209,697</td>
</tr>
<tr>
<td>(18) Cost per life saved ((17) \div (7))</td>
<td>$3,976,198</td>
<td>$2,509,076</td>
<td>$6,920,559</td>
</tr>
</tbody>
</table>

only the cost incurred during the first year. The total estimated cost (row 17) divided by the number of lives saved yields the cost per life, which varies from $2.5 million to nearly $7 million. Optimistic assumptions are made about installation costs and the annual number of lives saved in case 2, contrasting with pessimistic assumptions in case 3, to indicate uncertainties about these two key inputs.

The study explicitly accounts for two other key uncertainties in Tables 3.4 and 3.5. Insufficient experience with GFCIs in an operating environment renders estimates of their lifetimes uncertain; they could range from perhaps 15 to 25 years. As Table 3.4 shows, even in the most optimistic case (2), a 25-year lifetime would imply a value of over $2 million per human life. Installation costs are also subject to uncertainty; conceivably, costs could decline over time to reflect technological advance that might itself be encouraged by mandatory use

Table 3.4

<table>
<thead>
<tr>
<th>Lifetime</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 years</td>
<td>$5,275,000</td>
<td>$3,325,000</td>
<td>$9,181,000</td>
</tr>
<tr>
<td>20 years</td>
<td>$3,976,000</td>
<td>$2,509,000</td>
<td>$6,921,000</td>
</tr>
<tr>
<td>25 years</td>
<td>$3,192,000</td>
<td>$2,015,000</td>
<td>$5,854,000</td>
</tr>
</tbody>
</table>


Table 3.5

| Average Installation Expense Needed to Achieve a Given Cost Per Life Saved |
|-----------------------------|-----------------|-----------------|-----------------|
| Cost Per Life Saved         | $1 Million      | $2 Million      | $3 Million      |
| Case 1                      | $11.30          | $25.40          | $38.40          |
| Case 2                      | $16.30          | $31.30          | $34.30          |
| Case 3                      | $5.60           | $14.00          | $22.30          |

of GFCIs. According to Table 3.5, to reduce the cost per life saved to a
million dollars in the most optimistic case (2), installation costs would
have to fall to $16.30, or roughly one-third of those estimated in 1975.

One difficulty with this study is that no discount rate is applied to
lives saved; a life today is no more valuable than one saved ten years
from now. Although selection of a discount rate is subject to the dif-
ficulties noted earlier, applying a rate only to the cost side introduces
serious distortions. If Table 3.3 were expanded to include the installa-
tion costs for all succeeding years during which the standard could be
expected to affect behavior, presumably those costs would be dis-
counted at the same 10 percent rate applied to energy costs. However,
if no discount rate is applied to lives saved as a consequence of the
stream of costs (or if a lower rate is applied to benefits than to costs),
the cost per life saved will fall. Indeed, as the time span approaches
infinity, the cost per life saved will approach zero! Moreover, if a dis-
count rate is applied to lives saved over the 25-year period of benefits
from the one-shot investment described in Table 3.3, the cost per life
saved would be even greater than the figures shown in row 18.

As with the CPSC case discussed above, the value of this analysis
lies in providing a framework for the assessment of key remaining
variables that are difficult or impossible to quantify. Each decision-
maker must judge for himself whether the standard should be left as
is, modified, or deleted. Perhaps the GFCI requirement should be
limited, say, only to swimming pools and other outdoor uses, or other
standards might be developed that would save lives at lower costs. In
any event, however, the GFCI requirements of the National Electrical
Code have not been modified as a consequence of this analysis.

CONCLUDING REMARKS

The most notable feature of the CPSC and NBS studies is that they
quantify many of the factors for which values can be estimated toler-
ably well, and they provide a framework within which the decision-
maker can assess the potential effects of nonquantified factors on the
wisdom of alternative decisions. In other words, the analysis helps to
narrow the range of uncertainty by identifying nonquantified factors
and showing how important they would need to be to support alterna-
tive decisions. For example, given the fact that pain and suffering
cannot be easily valued, the CPSC analysis makes it possible to decide
whether the standard would be justified even without considering
pain and suffering; and if it would not be, whether the additional
benefits of reduced pain and suffering (and of other nonquantified
benefits) would more than make up the difference. The NBS study
treats benefits only in terms of estimated lives saved, but it treats costs in terms of quantifiable factors such as hardware and installation requirements. The study shows the sensitivity of the cost per life saved to variations in several key assumptions, although not whether the benefits are worth the cost.26

A question always difficult to answer is what effect such analysis has on decisionmaking when it is only one of many inputs. The evidence suggests that the CPSC finds it a useful ingredient, while it is not certain whether the NBS study has had any effect on deliberations regarding building codes.

26 An enlightening study of the use of quantitative analysis in social decisionmaking, treating cases outside the ones included here, concludes that analysis offers insights in such areas as food additives, personal health services, and automobile safety. See Lester B. Lave, The Strategy of Social Regulations, The Brookings Institution, Washington, D.C., 1981.
IV. COST-BENEFIT ANALYSIS AND VOLUNTARY STANDARDS

Cost-benefit analysis could be a useful tool in framing and adopting voluntary standards in the same way it is useful to the CPSC in considering mandatory actions. Compliance with voluntary standards is frequently made mandatory and firms may be encouraged to comply as partial protection in product liability suits. When compliance is purely voluntary, users are free to determine on their own whether the benefits they derive are worth the costs they bear. In such cases, standards can be viewed as information based on experts' knowledge, which users may accept or reject according to their needs and interests. But mandatory compliance may saddle individual users and society in general with inappropriate requirements. For example, costs could conceivably be far greater than benefits, estimated by any of the techniques discussed in Sec. III.

Even when compliance remains fully voluntary, cost-benefit analysis can improve the value of the information to users. One purpose of a standard is to let users without the requisite knowledge substitute the "best judgment" of experts and others who write and approve standards. Economic appraisal, along with engineering and other technical inputs, could provide guidelines for better-informed deliberations on the design of standards. For example, it would help participants in deciding by how much compliance might reduce hazards, the value of that reduction to society, and whether alternative standards would be superior. Analysis showing high expected payoffs might target specific kinds of products or hazards that would profit from other standards, also with high expected payoffs. If a particular draft standard's estimated benefits exceed costs, but are nevertheless low, additional net benefits might be achieved by strengthening it. Conversely, analysis of standards whose expected costs greatly exceed their expected benefits may indicate that alternative standards, perhaps otherwise ignored, would be better.

This section has four purposes:

- To describe briefly the kinds of information that voluntary standard-writers consider, drawing from the sample described in Sec. II.
- To discuss one case where cost-benefit analysis was used.
• To explain why such analysis has been limited in voluntary standards development.
• To explore possibilities of expanding its use.

INFORMATION INPUTS IN STANDARDS DEVELOPMENT

The search of files and interviews outlined in Sec. II reveals that standard-writing groups focus heavily on epidemiological and engineering inputs, not on economic inputs. The mechanics of accidents and their prevention are of prime concern: how accidents happen, what injuries result, and what technical means are available to reduce hazards, for example. Moreover, a good deal of time is typically spent discussing testing procedures for judging compliance with a contemplated standard of product performance or quality.

As one example, in testing for the slipperiness of bathtubs (relevant to standards developed by Task Group F-15.03 discussed below), the water/soap combination must be specified, along with the soap itself, which can significantly affect slipperiness encountered during testing procedures. However, this study disclosed no evidence beyond the instance discussed below that standard-writers estimate the savings in accident costs to be achieved by compliance with proposed standards, compared with costs imposed on manufacturers and others. The files lacked any systematic analysis of the sort included in the CPSC and NBS studies treated in Sec. III.

Moreover, interviews with individuals having personal experience in numerous standard-setting activities disclose that systematic analysis of cost and benefits is not included in the development of standards. This conclusion is supported by evidence presented in hearings before the Federal Trade Commission on standards and certification across a wide range of product categories. In the words of one official:

In writing a standard, we are doing something, making a performance standard and test to prove the performance to do the job that is necessary for protecting public health. We are not analyzing whether it makes the product cost two dollars or not. . . .

I would say (that for) a standard that doesn’t involve health, life and safety, the economics needs to be considered. But where health, life and safety is concerned, I think that’s the bottom rung of the ladder of consideration.1

Of course, participants may object to a proposed standard on grounds that it is too costly or too weak, and may cast negative ballots if the proposal goes to a vote. Objections can also be raised within higher-level review bodies.

For example, the F-15.03 Task Group considered writing a standard for cushioning the edges of bathtubs to reduce the severity of slips and falls, but dismissed the idea because it would cost too much for the limited benefits likely to be gained.

This situation is different from the CPSC's offeror process discussed in Sec. II. In the latter case the clear initial intent is to write a standard to be made mandatory, and cost-benefit analysis is typically included. But for standards written without that initial intent (although they may later be made mandatory by a local, state, or federal agency), the analysis is absent, with one exception. During the deliberations of ASTM’s Task Group F-15.03 dealing with bathtubs and shower stalls, a cost-benefit analysis was performed for the four standards that were adopted. It is to this experience that we now turn.

THE COST-BENEFIT ANALYSIS OF ASTM TASK GROUP F-15.03

In the mid-1970s, Task Group F-15.03 wrote standards dealing with (a) thermal shock, the danger that a sudden change in water temperature could cause quick, abrupt movement that could result in a slip or fall, (b) scalding, where extremely hot water could cause serious burns, (c) grab bars for preventing slips and falls, and (d) slip-resistant surfaces for bathtubs. The Task Group estimated that over a 40-year period, the cumulative costs would exceed the benefits of complying with the four standards by factors of 47, 25, 14, and 6, respectively.

Table 4.1, drawn from the Task Group's 1975 cost-benefit analysis for the grab bar standard, illustrates its methodology and presents data relevant to our concerns. Assuming that compliance with the standard affects only new housing, the Group estimated a constant level of housing starts at 2.4 million units annually (column 3) comprising 2.5 percent of the total national housing inventory (column 2).

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2For example, cost-benefit analysis was included in the proposed mandatory standard for color television sets when Underwriters Laboratories, as documented in the study by Hoffman and Duda, op. cit.

3These standards were approved by ASTM under its consensus procedures, and are printed (along with the thousands of others) in ASTM's Annual Book of ASTM Standards. For the year 1980, these four standards appear in Part 46, pp. 749-757, 779-778.
### Cost-Benefit Analysis for Compliance with Grab Bar Standard

(Costs and savings in $ million)

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**Source:** Files of AETM Working Group F-15.03.
Assuming a constant housing stock of 96 million units and a 40-year turnover, compliance with the grab bar standard for all new housing would permit 100 percent saturation of the housing stock after 40 years. The Task Group estimated that the cost of grab bars meeting the standard would be $30 per housing unit or $72 million per year, and that grab bars would prevent 25 percent of the accidents. Thus, as a progressively larger portion of the housing stock met the standard, accident savings would rise to a maximum of $10 million annually in the fortieth year. After that, figures would be constant for incremental grab bar costs (at $72 million) and accident savings ($10 million), yielding a long-run cost-benefit ratio of 7.2.

The Task Group used several sources for its statistics. It drew on the knowledge of industry participants in estimating the manufacturing, installation, and other sellers’ costs in complying with the standards. Its estimates of benefits relied on a study funded by the CPSC, which also supplied estimates of the number and severity of accidents involving bathtubs and shower stalls. (For more about the CPSC’s accident statistics data bases, see Sec. V.) The value of life was based on the human capital approach discussed in Sec. III, but was adjusted upward to account for the undervaluation of retirees; the overall figure was $200,000 (in 1975 dollars). This amount, which included medical and hospitalization costs, was scaled downward according to the severity of injuries relating to bathtubs and shower stalls as reported by the CPSC.

Several problems are immediately apparent with this analysis: (a) Neither costs nor benefits are discounted; (b) no sensitivity analysis is conducted to determine how the results would be affected by changes in key assumptions such as the value of life and injury or the lifetimes of the safety devices in question; and (c) the analysis concentrates on cost-benefit ratios rather than on net present value, which was emphasized as the appropriate criterion in Sec. III.

Cost-benefit ratios show only whether benefits exceed costs. They do not provide an appropriate criterion either for ranking standards by their social desirability or for evaluating the optimal strengths of a given standard as described in Fig. 3.1. A basic difficulty of using

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5 Ibid., pp. 95-96.
6 Aside from this problem of calculation, only the "long-run" ratio of 7.2 derived from Table 4.1 (with a proper discounting) is relevant in judging whether benefits exceed costs. Such ratios as 2.88 in year 1 have no meaning. This situation is analogous to a cost-benefit ratio for a seat belt on an automobile just off the assembly line. Because the total cost of the belt is already incurred at that point, while time is required for benefits to accrue, the cost-benefit ratio would be infinitely large.
cost-benefit analysis to rank standards lies in distinguishing between a positive (or negative) benefit and a negative (or positive) cost. For example, recalling the previous dull-knife illustration, we could consider a reduction in the usefulness of the product either as a reduction in the benefits to consumers as a consequence of compliance with the hypothetical standard, or as an increase in the cost imposed on consumers. Suppose that we estimate reduced product usefulness at a value of $100. Suppose further that we subtract this value from benefits and arrive at a total net benefit of $200 and a total cost of $150—giving a cost-benefit ratio of 0.75. If, in contrast, we consider reduced usefulness as an increase in cost, the benefits would rise to $300 and the cost would rise to $250, giving us a new cost-benefit ratio of 0.84. In principle, there is no reason to prefer one method of calculation to the other. In contrast, the net present value criterion is not affected by the mechanics of the computation. To take the simplest illustration, suppose all costs and benefits accrue instantaneously. In either case, the net present value of complying with the hypothetical standard would be $50.

Indeed, the appropriateness of the net present value criterion is even clearer if we consider the possibility that because of institutional and organizational constraints, no more than a given number of standards can be written or revised in any one year. In that case, clearly, one would want to choose those that have the highest net present values.°

The analysis summarized in Table 4.1 has other flaws as well. Although it puts a dollar value on life (unlike the CPSC and NBS studies discussed in Sec. III), it does not do so for pain and suffering. Nor does it include litigation and insurance administration costs, the likelihood of technological advance over a period as long as 40 years, or the impact of the standard on consumer behavior, which could affect precautionary costs.

Nevertheless, Table 4.1 indicates the large dollar amounts that could be involved in widespread compliance even with only a few standards. Table 4.2 shows that in present value terms, with a 10 percent discount rate applied over the 40-year period, the four standards together could involve discounted costs and negative net present values of over $3 billion. Although these figures are quite

°For example, consider standard A with discounted costs of $1.0 billion and discounted benefits of $1.5 billion, a net present value of $500 million, and a cost-benefit ratio of 0.67. Standard B has a discounted cost of $20 million and discounted benefits of $100 million, with a net present value of $80 million and a cost-benefit ratio of 0.2. If one must choose between them, standard A is preferable.
Table 4.2

COST-BENEFIT ANALYSIS: ASTM COMMITTEE
F-15.03 STANDARDS
(in $ million)

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<th>Discounted 40-Year Cumulative Costs</th>
<th>Discounted 40-Year Cumulative Benefits</th>
<th>Net Present Value</th>
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<td>Anti-slip</td>
<td>191</td>
<td>25</td>
<td>-166</td>
</tr>
</tbody>
</table>

SOURCE: Figures as reported in Task Group Study, with 10 percent discount rate applied.

uncertain, they suggest the need for analysis of economic factors as one input into decisions about the writing and adopting of standards.

The reason that Task Group F-15.03 used cost-benefit analysis when other groups chose not to was its concern that the CPSC would make the bathtub and shower stall standards mandatory, and that the analysis would therefore be more important for these than for other voluntary standards. Furthermore, the availability of the bathtub and shower stall accident study commissioned by the CPSC facilitated the analysis.

The results, however, had little if any effect on the Working Group's deliberations. The analysis was performed near the end of the writing process after a standard had been drafted. Because the Working Group was under great pressure to write standards that would be acceptable to the CPSC, the analysis was done hastily, without time to consider it carefully when revising a draft that had already been subject to substantial technical review.8

8The time pressure imposed on Working Group F-15.03, as well as on the other working groups within Committee F-15, arose because of the criticism that had been leveled at the voluntary standards-setting process by the National Commission on Product Safety and the desire of the voluntary standards community to respond by developing quickly a number of consumer product standards that would prove useful to the CPSC.
One wonders why manufacturers, who were heavily represented on the Task Group, or some of its other members, were willing to approve standards that would impose such high costs on themselves. Three answers come out of the interviews with those involved. One was that the manufacturers who helped to write the standards were not particularly concerned by these figures as long as all manufacturers were expected to conform to the standards. If the manufacturer is not placed at a competitive disadvantage, the additional costs of these safety measures would not be likely to cut into his sales or profits significantly.

The second was that some nonmanufacturers were not disturbed by the high apparent costs. They felt either that accidents should be reduced regardless of cost, or that increased costs assumed by the manufacturers would not be passed on to consumers.

The third was that the Task Group was fearful that failure to develop such standards would trigger CPSC mandatory action that possibly would be even more stringent and burdensome on manufacturers. However, the CPSC did not adopt the standards, nor has it taken action to develop bathtub and shower stall standards of its own.

WHY COST-BENEFIT ANALYSIS IS NOT MORE WIDELY USED

The reasons for the limited use of cost-benefit analysis are not hard to find:

- **The usefulness of analysis.** The many problems of undertaking satisfactory analysis emphasized earlier, especially placing a monetary value on life and pain and suffering, scare off many participants. No matter how carefully estimates are refined, they cannot eliminate all uncertainties, leaving the results vulnerable to challenge.

- **Ethical objections.** Some are troubled by moral considerations of trying to value human lives and pain and suffering. Comparing the value of a child and that of an adult must surely strike some readers as cold-blooded. To be sure, individuals and society make implicit trade-offs every day, such as decisions about whether to place guards at school crossings, or about maintenance policies for school buses. But the shift from implicit trade-offs to the explicit ones embodied in cost-

benefit analysis is sometimes morally troubling. However, cost-benefit analysis can place these intangibles in a framework within which one can more clearly evaluate their effects on the wisdom of alternative decisions.

- **Questions of distribution.** Some participants are concerned not only with the total cost estimated for compliance with a particular standard, but also with how that cost is distributed among manufacturers, consumers, and others. Those who are concerned with consumers’ welfare may not mind the high cost of compliance if it is likely to be borne primarily or solely by sellers, and thus will not be very interested in cost-benefit analysis.

  Costs initially borne by one group are often transferred to others, however, depending upon the price elasticity of demand and other considerations. Moreover, a cost imposed on one group, even if it is not passed on to consumers, nevertheless applies to society, and should be taken into account in decisionmaking.

- **The cost of analysis.** The cost of the analysis itself must be weighed against its benefits. For instance, more than $100,000 was spent on the analysis of the CPSC lawn mower standard, which drew from studies undertaken by outside contractors in combination with work by in-house staff.

- **Budgetary constraints.** Budgets for standard-writing activities are small, designed to cover miscellaneous expenses such as secretarial support and meeting rooms. The time and out-of-pocket expenses incurred by members of private firms, universities, and government agencies are generally covered by those organizations. Although consumer representatives are sometimes reimbursed by standards organizations such as ASTM, the skills, expertise, and information must come from the members themselves or from the organizations they represent. Standards groups have no budgets to commission.

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9Ethical objections to cost-benefit analysis in matters of health, safety, and the environment are expressed by Steven Kelman, “Cost-Benefit Analysis, An Ethical Critique,” Regulation, January-February 1981. He argues, for example, that the very attempt to place a value on human life devalues it. Comments on his views, including strong objections, are continued in the March April and May-June 1981 issues of Regulation.

10For example, according to principles of economic theory, a monopoly firm seeking to maximize profits and facing a linear demand curve and constant average (and marginal) costs for its product will pass one-half of any cost increase on to the consumer by raising prices. In a perfectly competitive industry—one in which no single firm is large enough to affect market price—the proportion of cost-increase passed on to consumers will depend upon the relative price elasticities of the industry’s demand and supply curves.
outside studies or to support more intensive work by members beyond the help that their own organizations are willing to provide.\textsuperscript{11}

**EXPANDING THE USE OF COST-BENEFIT ANALYSIS: A POLICY DILEMMA**

In light of the above difficulties, the prospects appear dim that cost-benefit analysis will play a significant role in voluntary standards-setting in the foreseeable future. This is a worrisome conclusion; one has reason to be uneasy about accepting it once and for all. The frequent conversion of voluntary standards to mandatory ones, and the quasi-mandatory character that some standards may have in the eyes of firms seeking to protect themselves in product liability suits, will continue to raise questions about whether compliance encourages the appropriate level of safety. The problem would be less worrisome if the dollar stakes were trivial—but the wide range of products covered by standards, and the evidence from the analysis of ASTM Task Group F-15.03, suggest that the dollar stakes are substantial. Without the guidance of cost-benefit analysis, standards-setting organizations may miss promising opportunities for improvement or end up promulgating costly but ineffectual standards. In some cases, compliance with standards may reduce deaths and injuries impressively, but the standards could be modified to reduce them even further at little additional cost. In other cases, society may be burdened with millions, if not billions, of dollars to comply with standards that contribute little to reducing death and injury.

Cost-benefit analysis provides a framework that can contribute to better-informed decisions. But the analysis itself involves a cost that must be included in determining whether it is worthwhile. Moreover, it is uncertain whether standard-writers would take such analysis seriously even if it were offered for free.

Thus the standard-setting process could remain as it is, subject to continuing attempts to strike a reasonable balance between costs and benefits. Or the expanded use of cost-benefit analysis could provide a partial remedy, but continue to raise questions of justifying its own

\textsuperscript{11}As a case in point, the Abt Associates study that provided inputs into the cost-benefit analysis of ASTM Task Group F-15.03 was funded not by ASTM but by the CPSC. In 1980, ANSI's total budget ran to less than $5.2 million, of which less than $2.2 million was available for national and international standards programs. ANSI, 1980 Progress Report, New York, p. 11. In 1978, ASTM's budget ran to about $6.0 million. See Cropper, op. cit., p. 1. Such budgets would not go far in covering the costs of analysis at the level incurred by the CPSC, as noted in Sec. III.
costs and whether, in fact, it would have a significant impact on decisionmaking.

The purpose here is to concentrate on whether there are ways in which cost-benefit analysis could be introduced so that it would be useful in decisionmaking. We shall address two aspects of this question: first, how the standards-setting community might test or expand the use of cost-benefit analysis, and second, whether it might be undertaken by the government agencies that mandate compliance.

A Pilot Test of Cost-Benefit Analysis by Voluntary Standard-Writers

One possible approach would consist of voluntary standards groups undertaking pilot tests of cost-benefit analysis for a carefully selected number of standards already being developed or revised. The following steps would be taken:

- First, staff members of standards-setting organizations would examine standards coming up for revision and monitor preliminary discussions about drafting new standards, to identify those for which economic analysis would be most feasible and relevant. Given budget limitations, the assessment would focus on consumer product standards involving relatively large potential costs and benefits. Only a few standards out of the thousands currently approved would probably qualify, at least in the early stages of this test.\(^\text{12}\)

- The sponsoring organization would explicitly charge the task groups with undertaking cost-benefit analysis as an integral part of their work on test standards along with engineering and other inputs. Participating organizations could be encouraged to choose staff members as representatives who are familiar with cost-benefit techniques—those with backgrounds in operations research, economics, and economic engineering, for instance. As a supplement, voluntary standards organizations could encourage participation by such individuals by reimbursing their travel and other direct expenses, just as they sometimes provide financial support to consumers. It is important that this process be free of the severe time pressures faced by Task Group 15.03 discussed above.

\(^\text{12}\)ANSI lists about 100 consumer product safety standards as part of its approximately 9000 approved standards. ANSI, American National Standards for Safety and Health, New York, 1978.
• Detailed minutes of meetings would be kept in order to determine the problems of undertaking the analysis, to estimate its costs, and to provide a record of participants' views as to whether, and in what way, the analysis influenced their decisions. The sponsoring organization would then have a basis for deciding whether to expand these efforts subsequently.

Some of the work done in the past on product safety standards would be useful with respect to the costs imposed on standards-setting organizations and participants, making such analysis less burdensome now than it was five or ten years ago. Both the studies described in Sec. III and others in the public domain would facilitate further analysis. For example, the CPSC has already sponsored work on an injury cost model that includes estimates for such items as medical costs and the cost of insurance administration, for a wide range of injuries. Adjusted for inflation, these estimates could be used by the voluntary standards community.  

Moreover, eventual support for cost-benefit analysis is not out of the question. Since the early 1970s the desirability and feasibility of a unified federal policy on voluntary standards development has been under close scrutiny. A sound policy would enable the federal government to rely more securely on voluntary standards as a basis for issuing mandatory standards. So, two years ago, OMB issued Circular A-119, "Federal Participation in the Development and Use of Voluntary Standards." Unfortunately, the strict due process requirements it specifies for standards-setting organizations have been criticized as too costly, awkward, and time-consuming. However, in return for complying with its conditions, federal agencies would actively assist the work of voluntary standards groups by providing

(i) direct financial support such as grants, sustaining memberships, and contracts; (ii) administrative support such as travel costs, hosting of meetings, and secretarial functions; (iii) technical support such as cooperative testing for standards evaluation and participation of agency personnel in the activities of standards-developing groups; and (iv) cooperative planning with voluntary standards bodies to facilitate the coordinated effort in resolving priority standardization problems.

13Technology + Economics, Inc., op. cit. In addition, data provided by other studies previously referenced would be useful, particularly the discussion of methodologies and data sources in University of Maryland, op. cit., and McConnaughey, op. cit.

14A detailed historical account of the attempts to forge a unified national policy, and of the role played by the Office of Management and Budget, is provided by Hamilton, op. cit., pp. 1456-1464.

15Federal Register, January 21, 1980.
Some of that support could be used by standards-writing groups to consider economic factors. Indeed, heavier federal reliance on voluntary standards would render cost-benefit analysis even more important.

At this writing, the federal government is again reviewing Circular A-119 along with other proposed regulatory actions. This process reflects the new Administration’s commitment to reduce regulation by the federal government wherever possible, and to rely more heavily on market forces to meet national needs. Whether Circular A-119 will be adopted or further revised remains an open question.

With respect to ethical objections noted earlier: If attaching explicit dollar values to human life and suffering meets strong antagonism from task group participants, useful analysis could be performed even without such values. The CPSC study of lawn mower standards based its comparisons on the direct and relatively easily estimated costs of injury. This approach showed that relatively small increments in benefits, reflecting pain, suffering, and other hard-to-measure variables, would make the standards economically attractive, thus ruling out costs grossly in excess of expected benefits. According to the NBS study, the estimated cost of saving a life by forcing compliance with the GFCI standards would amount to millions of dollars, which raises the question of whether modifying this standard or substituting others might reduce the cost per life saved.

Despite ethical objections, standards-writers cannot avoid questions of whether a reduction in accidents is worth the cost. ASTM Task Group 15.03 explicitly rejected the notion of cushioning the sides of bathtubs on grounds that not enough accidents would be prevented to justify the investment. The advantage of the step-by-step approach suggested here is that it provides a systematic framework for comparing a wide range of options, some of which might otherwise have been ignored.

In conclusion, one cannot be more than guardedly optimistic that the above approach will be adopted. Voluntary standard-setting organizations have not taken economic inputs systematically into account in the past, and are likely to be reluctant to include more costly and time-consuming inputs now. Moreover, the recent drastic reduction of the CPSC’s budget (and therefore of its power) may make it all the less likely that firms will support the approach. Some firms may have participated in the work of ASTM Committee F-15 and others dealing with consumer products during the last decade in order to forestall mandatory action by the CPSC. With that threat now less credible,

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10Ibid., p. 1584.
they may be less motivated to participate, making it more difficult to include cost-benefit analysis and other inputs as well.

Cost-Benefit Analysis by Agencies that Make Compliance Mandatory

Cost-benefit analysis could also be used by the local, state, and federal agencies that make compliance mandatory before they make final decisions on voluntary standards. Many standards are incorporated by reference in government contracts and in state and local building codes. Building code standards might best be analyzed by the national associations, such as the National Fire Protection Association (NFPA), that write uniform or model building codes for adoption by local agencies.17

One advantage to this approach is that the analysis can be adapted to the specific needs of the agency in question. Thus, a municipality deciding whether to adopt an antiscale standard just for rest homes and convalescent homes would surely find results strikingly different from those in Table 4.2, which is based on the assumption that the standard is to be applied to all new residential construction nationwide. A second advantage is that only those standards being considered for mandatory action would need analysis, whereas voluntary standards-writing groups are one step removed from making standards mandatory.

The CPSC is a special case by virtue of its legislative mandate. In some instances, it has decided not to develop mandatory standards because existing voluntary standards are strong enough and compliance is adequate. It has also established a few mandatory standards through either the offeror process or its internal resources. But, unlike other government agencies, it has not adopted voluntary standards as originally written without its own analysis. If the 1981 amendments to the Consumer Product Safety Act are passed, the CPSC will become more dependent on voluntary standards. The emphasis of its scope will change: Where previously it has had the discretion to forbear taking mandatory action if it judged that existing

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17Such model codes are widely used because "generally, code officials at the county and municipal level are not very knowledgeable about the substantive aspects of the standards in which they are or should be involved, nor do they have the time and staff for detailed study of them." (Cropper, op. cit.) These organizations include the Building Officials and Code Administrators, International; the International Conference of Building Officials; and the Southern Building Code Congress. See also the Federal Trade Commission's Report (1978) about the many instances of compliance with voluntary standards that are enforced without systematic regard for the costs and benefits imposed on society.
voluntary standards were adequate, it would in the future be precluded from taking mandatory action unless it found relevant voluntary standards inadequate.

To make such a determination, the CPSC will be under pressure to expand its cost-benefit analysis of voluntary standards. If the CPSC determines, for example, that firms are not widely complying with a given standard, it may undertake a study to determine whether the standard merits widespread compliance. If compliance would impose large costs on society but yield little benefit, the CPSC would have reason to take no further action. On the other hand, lack of compliance with weak standards that could be strengthened at relatively little cost would provide grounds for the CPSC either to persuade the voluntary standards community to upgrade the standards in question, or to seek mandatory action.

In summary, cost-benefit analysis should be attractive to those who make compliance with voluntary standards mandatory, because their work would be aimed only at those standards subject to mandatory action and only for particular applications. But it is not certain that the agencies have either the financial resources or the interest to perform this task. The CPSC will therefore be under pressure to undertake more cost-benefit analysis of voluntary standards than it has in the past; but this activity must compete with others for the Commission's reduced budget.
V. THE IMPORTANCE OF BETTER HAZARD INFORMATION

A particularly important facet emerges from this study: Either to help groups to undertake cost-benefit analysis, or to help standard-writers working within the consensus process as it now operates, better hazard information is needed. Detailed and accurate hazard information showing cause-and-effect relationships would provide a basis for identifying cases in which development of particular standards may have high payoffs, and for developing the standards appropriately.

Because this information is so important, this section addresses

- The nature and use of current CPSC hazard data,
- The inadequacy of present-day information,
- Problems posed in seeking additional information from two potentially useful sources—product liability cases and insurance claims—and
- The future role of the CPSC.

THE NATURE AND USE OF CPSC HAZARD DATA

The National Electronic Injury Surveillance System

One source of basic accident data is the National Electronic Injury Surveillance System (NEISS), established by the CPSC in 1972. Every day NEISS collects product-related injury data from over 70 emergency hospital rooms, a representative sample of the approximately 6000 U.S. hospitals with emergency rooms.1 The data are coded for the type of product involved, the nature of the injury, the disposition of the case, and other characteristics.

The CPSC assigns a total severity value to each injury. The value depends upon the injury diagnosis, the body part involved, and disposition of the case. For each product category associated with accidents, the CPSC computes a mean severity index that is the average severity value for the estimated number of total injuries associated with

1 The number of hospitals in the sample has varied as a result of several factors including budget limitations, design changes, and attrition. As of July 1981, 73 hospitals were included.
that product category. For example, during the period October-
December 1980, the highest severity value, 168, was recorded for "liq-
uid fuels." This was followed by a value of 150 for "drain and oven
cleaners and other caustics," and also for "batteries, all types." The
lowest score, 13, was accorded to "trimmers and other small-power
garden tools." ²

For obvious reasons, this system has been subject to criticism. The
methodology used in computing the severity index leads to arbitrary
results.² Moreover, one cannot determine the degree to which
accidents were related to defective products, rather than to consumer
misuse or negligence. The fact that thousands of recorded injuries are
associated with knives and scissors tells us nothing about how these
products might be made safer. Nevertheless, the surveillance system
is useful in pinpointing patterns of accidents across product lines and
the ways these patterns change over time.

Other Sources of Information

The Commission obtains information from its news clipping service,
telephone hotline, letters, newspaper articles, and referrals from
other federal agencies, Underwriters Laboratory, and Consumers
Union.³ The Medical Examiners and Coroners Alert Project (MECAP)
provides information about product-related deaths through voluntary
reports from its members. Other data from death certificates are
gathered by the CPSC from the 50 states and other U.S. jurisdictions,
and from records kept by the National Center for Health Statistics.

Outside organization sources include the data base for the U.S. Fire
Administration’s National Fire Incident Reporting System, which has
enhanced the CPSC’s knowledge of how home furnishings and equip-

²Consumer Product Safety Commission, NEISS Data Highlights, Washington, D.C.,
October-December 1980.

³As calculated, the hazard index is unbelievably arbitrary. The numerical weights
assigned to injuries of different severity are without any rational foundation…. While
considerable attention was devoted to constructing a qualitative ranking of the severity
of various kinds of injuries, no effort was made to establish some foundation for aggre-
gating injuries or even for testing the sensitivity of the hazard index to alternative
aggregation schemes." Nina Cornell, Roger G. Noll, and Barry Weingast, "Safety Regu-
lations," in Henry Owen and Charles L. Schultze (eds.), Setting National Priorities: The

⁴During the years 1978-1980, the CPSC received an annual average of more than
13,000 news clippings and 7,000 reports from these other sources. More than 1,400
reports on average were selected for further investigation. CPSC, Hazard Data Task
a detailed treatment, going far beyond the above discussion, about the sources of hazard
data, the way they are used, deficiencies in the system, and recommendations for im-

ment are involved in fires; the National Ambulatory Medical Care Survey, which samples physicians' office data; the National Health Survey, conducted by the National Center for Health Statistics, which is a continuing nationwide survey conducted by household interview; and the Association of Trial Lawyers of America, which provides information on product liability and medical malpractice cases.

Special Accident Investigations

Information from the above sources supports CPSC investigations—sometimes called in-depth investigations—to obtain detailed information from victims and witnesses. Investigations are conducted for all burn injuries associated with wearing apparel, cases relevant to the CPSC's "priority" projects, and all product-related deaths. Although not without shortcomings, these investigations are much more helpful than the data from the NEISS system and from other sources.

The Use of Hazard Information in Developing Voluntary Standards

Many cases, in the files of ASTM Task Groups within Committee F-15 and elsewhere, have relied on the NEISS system and on in-depth investigations. For example:

- The first products selected for standard-setting by Committee F-15 in 1973 were bathtubs, minibikes, high chairs, and cigarette lighters because hazard analyses issued by the CPSC on all four showed significant problems that would be reduced through the application of standards.
- Task Group F-15.02, dealing with cigarette lighters, was formed partly because many accidents were reported to NEISS involving lighter fluid poisonings and lighter burn injuries. Subsequently, CPSC accident reports identified unexpectedly high flames and various types of explosions that helped to guide deliberations over what standards would be appropriate.
- When Task Group F-15.08 on carriages and strollers first met, it emphasized that standards could not be written without injury data compiled by the CPSC. A subsequent in-depth study by the CPSC provided guidance.
— Task Group F-15.09, dealing with shopping carts, found the CPSC’s data insufficient to show hazards addressable by that task group. It was not clear, however, whether hazards did not exist or whether the CPSC accident and reporting system was not adequate to disclose hazards.

— Task Group F-15.10, writing standards for flammable-liquid containers, drew from data in the in-depth investigation reports and from the Flammable Fabrics Accident Case and Testing System.

— Task Group F-15.06, on nonpowder guns, learned from the Commission’s investigations the importance of guarding against the guns’ susceptibility to firing upon being dropped from various positions.

— The severity index and other features of the NEISS system were used heavily in the contractor’s study of the basis for estimating the benefits of the standards written by Task Group F-15.03, dealing with bathtubs and shower stalls.

— Hazards with trampolines quickly showed up in the NEISS data base, encouraging manufacturers to meet with ASTM members to write a standard.

— The CPSC supplied data provided by the NEISS system to Task Group F-4.04 on 485 high-chair-related injuries during an 18-month period. In-depth study of 116 of these injuries showed that in the vast majority of cases the child fell out of the chair because the restraining system failed or was not used.6

Because of incomplete coverage by CPSC’s data sources, some standards groups rely on information from other groups that are tailored to specific needs. The ANSI Committee Z-86 on underwater safety, for instance, draws heavily from the National Underwater Accident Data Center, because most emergency rooms in the NEISS sample are not located in parts of the country where diving accidents take place.7

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6Abt Associates, op. cit.
8The work of the National Underwater Accident Data Center is sponsored by the National Oceanic and Atmospheric Administration, the U.S. Coast Guard, and the National Institute for Occupational Safety and Health. For examples of its analysis, see U.S. Underwater Diving Fatality Statistics, 1970-78, College of Human Science and Services, University of Rhode Island, September 1980.
THE INADEQUACY OF PRESENT-DAY HAZARD INFORMATION

To pursue cost-benefit analysis effectively, voluntary standards-setting groups need access to a broader base of hazard information. Following are several examples of the problems that arise in trying to reduce risks without adequate hazard information.

ASTM Task Group F-15.08, formed to consider standards for strollers and carriages, found CPSC's investigations report helpful but incomplete. Table 5.1 reproduces a typical page of that report.8 It shows, for example, that no reasonable change in the design of the stroller in case number 33 could have protected the child from his older brother. But it suggests that the collapse of the front restraining bar in case 38 might have been prevented by a different design on which, in principle, a performance standard for restraining bars could be based. At the same time, writing a standard is difficult when the product information does not include the name of the manufacturer, as in case 41. Without knowing more about the product, a standard-writing group would have difficulty addressing the question of child restraint when the nature of a restraint that "does not work in that position" is unclear.9

These inadequacies reflect the fact that CPSC investigations of reported hazards are conducted by telephone instead of by site visits.10 Unable to examine the product, investigators have to rely on the sometimes sketchy information provided by telephone respondents.

The files of Committee F-08 on skiing illustrate particularly well the need for reliable and extensive accident information. The problem was not that designing safer products would necessarily cost more money, but that lack of knowledge about the nature and mechanics of accidents under a variety of environmental and other conditions made it difficult to design appropriate standards. The long deliberations about the nature of accidents and alternative ways of preventing them would have been aided with better information.

Lack of data was a handicap when ASTM wrote a proposed standard for matchbooks under the CPSC's offeror procedure. A major issue was whether matches should be designed to extinguish themselves automatically after a given number of seconds. But there

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9Some investigation reports include photographs of the product to help trace the nature and the cause of the accident and, in particular, to suggest whether a design or manufacturing defect was involved. However, interviews with chairman of task groups within the ASTM Committee F-15 disclosed that the photographs submitted were usually so poor as to be virtually useless.

10CPSC, Task Force Report, p. 17.
Table 5.1
SUMMARY AND ANALYSIS OF ACCIDENTS ASSOCIATED WITH STROLLERS AND CARRIAGES IN SPECIAL STUDY #36

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Description</th>
<th>Accident Analysis</th>
<th>Product Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>7/94/78</td>
<td>Child riding in stroller was injured by falling on ground while ISO was</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>injured.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>7/25/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>7/30/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>7/29/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>7/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>7/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>7/31/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>8/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>8/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>8/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>8/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
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<tr>
<td></td>
<td></td>
<td>Child fell from stroller while riding in stroller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>8/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
<td>N.A.</td>
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<td></td>
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<td>Child fell from stroller while riding in stroller.</td>
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<td>42</td>
<td>8/27/75</td>
<td>Child fell from stroller while riding in stroller.</td>
<td>N.A.</td>
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<tr>
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<td>Child fell from stroller while riding in stroller.</td>
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Note: The table continues with more entries that are not shown in the excerpt.
were few data to support the notion that self-extinguishing matches would reduce accidents. Even if such data did exist, it would have been difficult to determine how long a match should burn. Also, so many of the accidents occurred at the hands of small, unattended children that it was impossible to determine the chain of events that led to the accidents.

This evidence suggests that the highest priority for improving hazard information is to undertake more intensive accident investigations than the CPSC has conducted in the past. The CPSC itself emphasizes the importance of these investigations by noting:

Unquestionably the single most important component of CPSC’s hazard data system is the follow-up investigation of product-related accidents reported through the NEISS, MECAP, Hotline calls, letters, newspaper clippings and referrals. It is the hazard data source relied upon by the greatest number of hazard programs and contributes information to almost every Commission decision to act to reduce or eliminate the risk associated with the particular hazard.¹¹

Because of the importance of accident investigations, the CPSC Task Force has recommended that during FY 1982 the Commission “examine in more detail the selection, assignment, conduct, and use of accident investigations.”¹²

Another high priority is the review and possible modification of the selection criteria for in-depth investigations. The products that most warrant investigation may not be the ones that show a high risk index according to the NEISS scheme. The problem is not simply to identify products with a high rate of accidents that, when weighted by severity, provide the basis for assignment of investigations. Rather, the problem is to assess how aware consumers are of the hazards of the product in use. Although consumers may have difficulty in assessing the safety of a particular product, this difficulty varies among products and is likely to be greatest for those that consumers use infrequently.

This point is supported by Weingast et al., who consider the contrast between the markets for kitchen knives and for baby cribs. The risk of using knives is well known but people continue to use them, of course. The risk of using baby cribs is not well known, however. And because a single consumer may never buy more than one or two, any hazards may not be apparent at the time of purchase or even after prolonged use. With its accident data collection system, however, the CPSC determined the dangers of babies choking to death by sliding

¹¹Ibid., p. 49.
¹²Ibid., p. 63.
through the slats. This discovery was possible only by drawing on a large database showing a stable but low frequency of this kind of accident. Thus, an appropriate objective is to identify, through adequate data-gathering, the accidents that occur with such low frequency that most consumers may never hear of them.

Despite the CPSC’s success in the baby crib case, Weingast et al. criticize the CPSC’s priority agenda for developing standards on the basis of its index of the severity of accidents.

Products with a greater risk index receive a higher priority. Yet, this is precisely the reverse of the appropriate goal since these products are the ones about which consumers are most likely to be familiar and therefore able to make informed choices. Instead, the agency should search for those products with low probability of accidents, each of which are considered flukes.

This task of identifying risks about which consumers are poorly informed is important for voluntary standard-setters who depend on the CPSC’s hazard analysis. Weingast et al. conclude that in cases where the risks are known to consumers, compliance with standards that reduce product risk leads to inefficient results; that is, compliance increases the cost of such products even though previous consumers had evidently accepted the combination of risk and cost that the products formerly embodied—leading away from the socially optimal level of safety. However, in cases where consumers are not able to adequately assess risks, standards may lower the social costs of accidents and lead toward the social optimum. As the authors note, “Markets in which consumers make informed choices should be considered to have no safety problems despite any degree of risk. On the other hand, markets in which consumers systematically lack knowledge about underlying events constitute potential safety problems.”

Thus the search for “flukes”—low-frequency but stable rates of accidents—should receive high priority in future activities. Expanding the information base would promote that objective. We briefly explore here the use of two major sources of information about product-related accidents: the product liability system and the insurance industry.

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14Ibid., p. 21.
15Ibid., p. 19. Although their analysis is couched in terms of mandatory standards, it is also relevant in cases where producers fully comply with voluntary standards. Contrary to their argument, even if the consumer is fully informed, a safety regulation may be justified where deaths and injuries impose external effects on society—for example, medical and hospitalization costs that are not fully covered by the individual.
EVIDENCE FROM PRODUCT LIABILITY CASES

Product liability cases might be expected to provide information important in the development of standards, especially cases involving individuals or groups who customarily participate in writing standards. A firm losing a suit brought for a defective product design, for example, might offer its experience in helping to develop corrective standards. Indeed, the firm might have a positive incentive to do so. If it bears additional costs in taking preventive measures to avoid future defects, its competitive position would be strengthened if new or revised standards forced other firms to bear the same costs. One might also expect task groups and subcommittees to survey the outcomes of recent court cases to determine whether experience relating to design defects, manufacturing defects, failure to warn, or negligence could help guide standards development. One might especially expect product liability actions in the 1970s to serve as a rich source of information because the number of cases and the sizes of settlements were rising so rapidly.

This study has uncovered no evidence of contributions from those cases, however. The files of ASTM's Committees F-08, F-15, and D-13 show not a single reference to any particular court case or set of cases, nor any examples of firms discussing their own experience with product liability. Moreover, none of the interviewees in the sample identified experiences drawn from such cases to provide inputs into working group and subcommittee deliberations. (One might conjecture, however, that manufacturers suggest requirements to alleviate their problems with product liability without identifying the source of their concern.)

Were experience from product liability cases an important input, some of the subcommittee and working-group members would probably come from legal firms that serve as outside counsel to companies subject to product liability suits. Such representation is absent from the subcommittee and working group rosters in the sample examined for this study; and one observer who has attended a number of other ASTM meetings noted that "my most vivid impression of the Denver meeting was that there were no lawyers."16

One interviewee observed that more lawyers are now attending meetings, but that they are primarily concerned with either (a) guiding the discussion to avoid the antitrust problems continually plaguing the voluntary standards-setting process, or (b) monitoring discussions about product liability—not to divulge useful information.

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16 Hamilton, op. cit., p. 1360.
but to guard against their firms possibly revealing information that could be used against them in future liability cases.

Of course, information from product liability cases might not be very useful even if it were freely provided. Complaints voiced by many of the interviewees, especially those in the insurance industry, tend to be similar: Long delays frequently occur between the time of the accident and the time that a claim is filed; the original claim is often ambiguous about the alleged cause of the accident; and additional time, sometimes years, is required to sort out the facts and to determine cause-and-effect relationships.⁷ By the time the facts are known, the nature of the problem with the product (if there was one) is frequently well known from other sources such as the firm’s own internal testing programs, consumer complaints, or warranty experience.

In short, the product liability system may serve a useful function in compensating victims, and also act as a deterrent by encouraging firms to improve their design and manufacturing practices.⁸ But evidence from the sample in this study suggests that it contributes little if anything to the sound development of voluntary standards. Although more extensive investigation may suggest better ways of using information from the product liability system, the difficulties may prove insuperable.

Nevertheless, recognizing the potential value of such information, the CPSC has entered into an agreement with the Association of Trial Lawyers of America (ATLA). Under this agreement, CPSC staff has access to the ATLA Products Liability-Medical Malpractice Exchange to examine documents that include inquiries received by the Exchange from ATLA member attorneys involved in personal injury cases. The Exchange has agreed to contact attorneys at the CPSC’s request for further investigation, leaving the decision to cooperate and the extent of cooperation to the discretion of each attorney. However, this study uncovered no evidence that this information source has been significant. The CPSC Task Force Report mentions its connection with ATLA only in passing (p. 21), while devoting the rest of its attention to other sources of information, especially the NEISS data base.

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⁷According to one survey, for 40 percent of product liability claims, more than a year elapsed from the date of the accident until the claim was reported to the product liability insurer. Alliance of American Insurers, Survey of Large Loss Product Liability Claims, Chicago, Ill., August 1980, p. 1.

⁸The argument that the product liability system serves a strong deterrent function (supported by a few specific examples) is emphasized by Anita Johnson, "Products Liability Reform: A Hazard to Consumers," North Carolina Law Review, May 1978, p. 689.
EVIDENCE FROM INSURANCE COMPANIES

One might also conjecture that insurance company representatives would play an important role in the subcommittee and working group deliberations by bringing to bear their experiences in handling product liability claims. Given the mounting number of claims during the 1970s, insurance companies would likely have accumulated a rich body of experience about the nature of defects in particular products and instances of defendants’ negligence that could contribute to the development of new or revised standards.10 The search of files in this study, however, disclosed no insurance company representation on any of the task groups or subcommittees of Committee F-15, F-08, or D-13.

The insurance industry may be more active in areas outside of consumer products that pose casualty risks, but they do not systematically provide information drawn from claims that could be used to supplement other accident-reporting data bases in identifying hazards.

Early after its establishment, the CPSC and segments of the property-casualty insurance industry sought to devise a satisfactory way to extract information from claims files. But the usefulness of the information remained in doubt because time lags in the claims process compromise the usefulness of the information for "early warning" purposes, and because claims files do not routinely contain much of the information the CPSC wanted. Moreover, problems arose because of the confidential relationship between the insured and the insurer. Sec. 15(b) of the Consumer Product Safety Act specifies that

Every manufacturer of a consumer product distributed in commerce, and every distributor and retailer of such a product, who obtains information which reasonably supports the conclusion that such a product—

(1) fails to comply with an applicable consumer product safety rule; or

(2) contains a defect which could create a substantial product hazard described in subsection (a)(2),

shall immediately inform the Commission of such failure to comply or of such defect, unless such manufacturer, distributor, or retailer

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10For example, a standard recommending a particular practice as an accepted procedure for accomplishing a specified task might be strengthened based on inputs from the large body of knowledge about the kinds of negligent behavior that have caused past claims. A standard for specifying a method of testing might be strengthened by drawing on the body of evidence relating to product defects that are preventable by certain testing procedures.
has actual knowledge that the Commission has been adequately in-
formed of such defect or failure to comply.

If the disclosure of claims information to a standard-setting body were
to disclose subsequently a claim in settlement of a defect that could
"create a substantial product hazard," or in other ways showed that
the insured had earlier failed to comply with the provisions of Sec.
15(b), the insured firm could be subject to penalty by the CPSC.

THE FUTURE ROLE OF THE CPSC

The CPSC provides a central point for the collection of nationwide
accident data. By collating and evaluating information from diverse
sources, it is in a position to identify nationwide patterns and to spot
trouble areas—including the flukes noted earlier—in ways not avail-
able to organizations with more specialized missions, such as the U.S.
Fire Administration.

The CPSC will be handicapped by its severe budget cuts. Neverthe-
less, there is a strong rationale for a government role in providing
information to the large audience concerned with safety, including
standards-setters, in both the public and private sectors. Sustained
government information programs may be justified because of the
"public good" of information. A pure "public good" is one whose use by
one individual does not reduce the supply available to others; once
produced, it is available to everyone at no additional cost. (For exam-
ple, within its transmitting range, a television signal is equally avail-
able to all viewers.) Information usually involves some cost of
dissemination, but generally the cost of serving an additional consum-
er is less than the average cost of serving all consumers.

The optimal amount of information with public-good characteris-
tics, such as detailed accident information, will generally not be pro-
vided by private firms. The optimal level is one for which the
combined value to all users of the last unit provided is just equal to
the additional cost of providing it. However, a uniform price to all
consumers equal only to the additional cost of serving them would not
generate sufficient revenue to cover the total cost of producing the
information.

Of course, the mere fact that information has these characteristics
does not mean that in all cases the government should supply it.
Again, the benefits derived from the information must be weighed
against the costs imposed on the taxpayer.
VI. CONCLUDING REMARKS

This study suggests that cost-benefit analysis can provide insight in developing voluntary standards for consumer products. Its value lies in providing a systematic framework for deliberation in drafting and adopting standards to help avoid outcomes that would either unduly burden society or not benefit society enough. Such analysis can enable participants to estimate the reduction in hazards made possible by compliance, and the value of that reduction to society. If analysis shows that estimated benefits exceed costs by only a small amount for a particular draft standard, its writers should consider whether strengthening the standard would yield additional net benefits. Conversely, draft standards whose expected costs greatly exceed their expected benefits should encourage participants to search for more promising alternative standards.

Although it is only one input in the decision-making process, cost-benefit analysis has proved useful to the CPSC and other regulatory agencies in considering mandatory standards. It established the empirical and methodological tools that voluntary standard groups could employ to reduce the time and cost of performing similar analysis.

However, we cannot be optimistic that cost-benefit analysis will play a significant future role in voluntary standards development, because of formidable problems: the large uncertainties that beset numerical estimates and make their usefulness open to question; objections by some to putting monetary values on human life and suffering; and the cost of doing the analysis itself.

A pilot test of cost-benefit analysis by standards groups may be worthwhile to examine its value in developing a few voluntary standards that involve particularly high costs of compliance. A major hurdle, however, lies in obtaining the resources necessary for the work from either standards-writing organizations or from participants.

An alternative is for the analysis to be done by the local, state, and federal agencies that adopt voluntary standards as mandatory. This approach has the advantage of focusing attention on standards that are, in fact, made mandatory—and for which questions of cost and benefits therefore are the most pressing.

Better hazard information, as one input in the consensus decision-making process, would improve the quality of cost-benefit analysis if it is adopted; and even if it is not, this information would improve the consensus process in the formulation of voluntary standards. In either case, examination of the differential effects on accidents exerted by
alternative standards or their modification requires more detailed and reliable information than now exists.

However, collection and analysis of this information, too, involves a cost. If we are concerned with the broader question of how to assure an optimal level of safety, we must consider the degree to which hazard information can substitute for cost-benefit analysis. Conceivably, for a given level of resources, improved hazard information would contribute more to socially appropriate standards than would cost-benefit analysis. Alternatively, allocating one portion of these resources to provision of better information and another to cost-benefit analysis might improve outcomes even more. Another possibility is that the same resources devoted to yet other actions (say, a strengthened product-recall program) would lead to even better results.

Consideration of these broader trade-offs is beyond the scope of this study. They are mentioned here to emphasize that it is not enough simply to identify a proposed action that would confer net benefits. If there are overall budget constraints, whether a given action should be pursued can be determined only by comparing it with alternatives, frequently quite different in approach, designed to achieve the same end.
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