

The Dynamics of Economic Value Depletion: A Proposal for Accelerated Feedback Loops in Production and Purchasing Decisions

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ABSTRACT

Organizations may fail to adopt sustainable solutions as a function of incomplete and/or inaccurate feedback into the decision making process. Events that cause harm - environmental, health, or social - are commonly the delayed effect of a prior course of action, itself the result of decisions that emerge from endogenous policy. By accelerating the cost of future harm into decisions made in the current period, producers and purchasers increase the quantity and the quality of information available to them in their respective decisions to produce and consume. The creation of a financial policy structure that incorporates the present value of the cost of future harm into the cost of goods sold (and which is paid into an interest bearing future harm pool) will correct a current deficiency in the analysis of the costs and benefits that accrue to producer and consumer. Such a feedback loop could reduce the need for governmental regulation and would correct a structural market failure.

BACKGROUND

This paper inquires into the underlying structure of managerial decision-making insofar as the economic health of the organization is concerned. The Financial Accounting Standards Board (FASB) issues the rules that govern the economic valuation of an organization. This author's position is that these rules are incomplete and lead managers/producers to make decisions that result in the long-term depletion of economic value, broadly defined here as natural capital stocks and human wellness stocks. Correspondingly, the lack of information can be understood as a

market failure which leads purchasers to make decisions that also deplete natural capital and human wellness stocks.

Economic value added is defined as the after tax cash flow less the cost of the capital used to generate the cash flow. The cost of capital is included in the cost of the transformation processes. Correspondingly, an organization's attention to the value-chain is part of its efforts to reduce the cost of capital that generates cash flow. In broad simple terms, changes in economic value added are determined by changes in the consumption of the product (affects cash flow), changes in the cost of production (affects the cost of capital), and/or changes in liabilities related to its business practices (affects the cost of capital).

One of the attributes of economic value added is the inclusion of many traditional expenses in the organization's stock of capital. However, current theory and practice of economic valuation fail to correspondingly recognize the depletion of economic value that may occur external to the organization (in future periods) as a result of goods¹ produced (in the current period). As a consequence, producers and purchasers (business to business or business to consumer) make production and purchasing decisions without sufficient information about their long-term implications. In the absence of such information, managerial decision-making is often skewed toward an economic view of the firm that ignores the depletion of natural capital and human wellness stocks. At present, FASB does not require an organization to acknowledge the depletion of such stocks as an expense or liability.

Notwithstanding, there is a growing acknowledgment of the need for reliable and complete information about an organization. In an October, 2002 proposal, "Principles-Based Approach to U.S. Standards Setting", FASB notes, "The primary qualities of decision-useful information are relevance and reliability. To be relevant, information must be capable of making a difference in a decision by helping users to form predictions about the outcomes of past, present, and future events or to confirm or correct prior expectations. Timeliness, that is, having information available to decision makers before it loses its capacity to make a difference, is an ancillary aspect of relevance. To be reliable, information must be representationally faithful, verifiable, and neutral, reporting economic activity as faithfully as possible."

The Security and Exchange Commission (SEC) released its own study of a principles-based approach pursuant to the provisions of Section 108(d) of the Sarbanes-Oxley Act of 2002. Despite the momentum toward transparency in financial accounting, none of these initiatives call for the recognition of any liability or expense associated with the depletion of stocks external to the organization.

CURRENT PRACTICES

Literature on the economic valuation of an organization's activities gives significant attention to the emergence of Economic Value Added, EVA[®]. Developed and promoted by G. Bennet Steward III of Stern Stewart & Co., a New York consulting firm, EVA[®] is described as "net operating profit minus an appropriate charge for the opportunity cost of all capital invested in an enterprise. As such, EVA is an estimate of true "economic" profit, or the amount by which

¹ Includes production processes.

earnings exceed or fall short of the required minimum rate of return that shareholders and lenders could get by investing in other securities of comparable risk.” Their web site (sternstewart.com) lists over 100 companies world-wide that rely on EVA[®].

EVA[®] is not without its skeptics and detractors. Chen and Dodd (2001) compared EVA[®] to two other profitability measures; operating income (OI) and residual income (RI) and found only statistically insignificant advantages. Roger Lowenstein (1997) writes in the Wall Street Journal that EVA[®] is akin to rebottling old wine, failing to find academics with much enthusiasm for the metric. Notwithstanding, he did not challenge the selection of data and [other] ratios used in calculating EVA[®].

Peterson (no date) explored an historical view of economic value added. Noting that the concept has been in place for close to 100 years, she goes on to examine the merits of EVA[®] and concludes that there is insufficient evidence over time to support the claim that it is substantively superior to other more traditional metrics.

While enjoying popularity, EVA[®] is not the only approach to measuring economic activity. In a brief article on the St. Norbert College website (snc.edu), Peter Keen (1996) evaluates EVA (not the registered mark of Stern Stewart but the metric defined as after-tax cash flow minus the cost of capital deployed to generate the cash flow) as compared with earnings per share, return on assets (ROA) and discounted cash flow (DCF). While he notes that different metrics focus managers to pay attention to different dimensions of performance, he cites no deficiencies in the basic assumptions underlying any of the measures.

Weaver and Weston (2002) compare four alternative performance metrics and finds that discounted cash flow (DCF), returns to shareholders (RTS), economic profit (EP, also called EVA[®]), and market value added (MVA) are all highly correlated. They comment that each approach starts with strategic planning, ties performance to incentive compensation, requires top management involvement, and relies on information and training for employees. The four approaches also take into account other stakeholders.

Regardless of the valuation metric, none of these authors suggest that any of the measures of economic valuation are incomplete or insufficient. Likewise none suggest that organizations ought to assume any cost or liability for any harm their product(s) may have on stocks external to the organization. Within the context of current FASB rules it is not surprising that the authors make no reference to future harm to external stocks - no such requirement exists.

As a result, managers are shielded from taking into account the cost of harm and from assessing the broader social impact of their decisions. Markets are at a disadvantage in gauging the merits of a product. Finally, investors are shielded from a knowledge of future harm, from the actual cost of that harm, and from its adverse impact on their investment.

HISTORICAL SYMPTOMS

The historical symptoms of the depletion of stocks external to organizations are generally well known. Some of them include: waste, the misuse or overuse of resources; threats to public health and safety; loss of natural resources; increased medical illness burden; and environmental degradation.

They all have in common the absence of a structural mechanism that moderates the speed and/or magnitude at which they are depleted. At present, redress, when it occurs, relies on organizational goodwill, regulation, or civil torts.

SYMPTOMATIC SOLUTIONS

Brief History of Problem Symptom Identification

Awareness of the depletion of societal stocks² has been long known. Likewise, calls for making producers responsible for the costs related to societal stock depletion are not new. A brief survey of the last 30 years reveals the awareness of stock depletion and the rationales upon which calls for responsibility rely.

Elbing (1977) concluded that managers are social beings conducting business in a social system and “when it is clear that his role and function are inescapably social as well as economic, it is clear that there is no limit to the extent to which he is responsible for his actual social actions in the firm and in his business society.” McGuire (1977) spoke to social responsibility as a “factor that is embedded in the decision-making process and must therefore be valued at that point.” He went on to conclude that, “It would seem to follow that decisions made without any consideration of social costs or social benefits would be devoid of responsibility.”

Macnamee (1977) quoted Herman Miller who states, “Any accounting system that counts only the cost of producing the goods, and not the costs of destroying the oceans, the airs, the rivers, the lakes, is a poor accounting system, because it does not consider social costs.” In broader terms, Greenleaf (1977) in speaking to the duties of trustees admonished that they should “care for the institution, which means they care for *all of the people the institution touches*³, and that they are determined to make their caring count.”

Ackoff (1981) argued that corporations have the responsibility to improve the quality of life of all of the people they directly affect. Donaldson (1983), on moral grounds, wrote that any organization that produces a dangerous product deserves moral condemnation for having failed to live up to the contract between it and society.

Post (1986) noted that while corporations cannot be responsible for all of society’s ills and problems, they can and should be held responsible for the consequences of their existence. In 1992 Cobb proposed that the full social and ecological costs of a product should be reflected in its price. Block (1993) speaking more broadly, noted that stewardship is the exercise of accountability as an act of service in which a balance of power between the parties is credible. Finally, Sterman (2002) noted that the current definition of GDP fails to include the depletion of natural capital stocks in its definition, rather treating it as production.

² The phrase “societal stocks” is used to broadly describe stocks that are not owned by any person or organization, such as national forests, or stocks in the public interest, such as the public health.

³ Emphasis by the author.

Common Responses to Problem Symptoms: Addressing Market Failure

Market-based approaches to reducing the depletion of societal stocks is also not new. A number of approaches have been suggested, some of them tested. The 1990 Clean Air Act relied in part on economic incentives. In "The Plain English Guide to the Clean Air Act" (2002) the EPA describes pollution allowances that can be bought and sold amongst polluting companies. They describe the trading of credits as "economic incentives for cleaning up pollution."

The Office of Budget and Management addresses the issue of market failure in "Economic Analysis of Federal Regulations Under Executive Order 12866" (1996), citing market failure as one of the major reasons for regulatory intervention. Specifically, "In markets for goods and services, inadequate information can generate a variety of social costs, including inefficiently low innovation, market power, or inefficient resource allocation resulting from deception of consumers. Markets may also fail to allocate resources efficiently when some economic actors have more information than others."

Hahn and Stavins (1992) in an essay examining the relative merits of regulation and market-based policies note that, "Economists continue to claim that market-based policies will not only be cost-effective (in a static sense), but will also provide dynamic incentives for the development and adoption of improved pollution control technologies. In the absence of empirical research, this remains largely an untested hypothesis." They go on to call for empirical investigations that measure "their relative impacts on the diffusion of improved technology."

The Congressional Budget Office (2003) examines the role and efficacy of tort liability and notes that, "What constitutes equity in relation to the tort system is ultimately subjective, but there is consensus that compensating victims for their injuries--at least in some cases and to some degree--is equitable." Noting that tort liability is not the only means to the same end, it points out that, "Under conditions of competition and good information, producers of goods and services respond to consumers' desires for safer products..."

In 2001 the EPA made grants available for proposals on furthering Marketing Mechanisms and Incentives (MM&I) as means to reducing pollution. They describe MM&I as approaches that, "rely on market forces, financial mechanisms, information, or other instruments to encourage regulated entities to reduce emissions, discharges and waste generation, or generally improve environmental performance."

In an address to the International Congress of Advertising and Free Market, Azcuenaga (1995) addressed the role that the free flow of information has on markets. "One of the fundamentals of a market economy is the free flow of information about goods and services offered for sale. The underlying theory is that the more fully consumers are informed, the better equipped they will be to make purchase decisions." However, she notes, "On the other hand, advertising may adversely affect market performance when firms use it to transmit deceptive or fraudulent messages on which reasonable consumers are induced to rely to their detriment. When this happens, we tend to refer to the result as 'market failure.'"

Finally, Furgeson (2004) cited the work of George Akerloff who "showed that a failure of markets arises when the seller does not share honest and complete information about the quality

of a product - in his paper, used cars - with would-be buyers.” Furgeson noted that Akerloff “went on to show that such asymmetry in information and opportunistic behavior will ultimately drive honest dealings out of the market unless it is overcome by new institutional structures.”

Regardless of the particular reference point of the various authors and agencies, while acknowledgment of market failures exist, there is no suggestion that managerial decision-making is a key leverage point. Furgeson perhaps comes close in his call for “new institutional structures.” Notwithstanding, the prevailing framework for thinking appears to be some variation of taxes or a bargaining chip that addresses some but not all of the depletion of societal stocks.

DIFFICULTIES WITH SYMPTOMATIC SOLUTIONS

In general, symptomatic solutions have historically relied on regulation, oversight, and torts to either constrain production processes or to seek redress for alleged harm incurred. Some progress has been realized. For example, corporate behavior has improved insofar as pollution output is concerned while changes in behavior have taken place in the tobacco industry. Notwithstanding, the successes fail to rise to the level of a full acceptance of responsibility for the cost of harm incurred as societal stocks are depleted. In that context this author posits that the fundamental solution lies deeper in structure than has already been identified.

Most existing symptomatic solutions share a common attribute - regardless of the result of the symptomatic solution action, the redress for corporations that have caused harm are generally limited to the specific harm that has been recognized, and for which a one-time fine or judgment is levied. None of the solutions take into account the recognition that organizations continuously engage in the production of products that deplete societal stocks.

In light of this, corporations tend to view their duties to stakeholders more through the lens of probability rather than as a matter of socially responsible endogenous policies and processes. Risk management, as commonly practiced, has more to do with game theory than social responsibility.

As an example, consider the production of harmful chemicals that are known to cause future harm. Typically, no action is taken either in terms of regulatory enforcement or civil (and perhaps criminal) torts unless a specific claim of harm is made. Further, when harm is recognized, the onus is generally on the party that incurred the harm to trace responsibility back to the alleged source of harm. If a link between the company, the party claiming harm, and the specific harm incurred cannot be demonstrated, the company that produced the chemicals incurs no significant cost or liability⁴. Even if a link is found it remains unlikely that the company will be required to suspend production of the harmful product.

The failure to anchor a solution in a deeper structure leads to a recurring “limits to improvement” pattern. New regulations can be promulgated that spur incremental improvement; however, each time the bar is moved it simply represents a new, static limit that is exogenously imposed and not infrequently perceived by organizations as an impediment to reaching their goals.

⁴ This is not to suggest that legal fees are trivial. Under competent risk management such fees will likely to have been already accrued and available in the period in which the legal and/or regulatory action is taken.

From a philosophical perspective, the discussion of sustainable practices in organizations has been explored from a number of points of view, including ethics, morals, stakeholder theory, and the sustainability of resources. Such arguments are the basis for calling upon organizations to adopt policies that will lead to more sustainable practices. Although the arguments are proposed as policy changes and as such do speak to changes in the structure of the organization (structure in the context of the Structure-Patterns-Events pyramid), they leave open the question, “Are these policies sufficient leverage to effect a shift in managerial decision-making?”

These arguments fail to take into account the economic advantages of disregarding such policy considerations. Organizations continue to produce goods or engage in practices and logistics that cause harm to societal stocks. Not infrequently the harm is only recognized after a delay. Such delays can be relatively short (e.g., the impact of crude oil spills) or long (e.g., prolonged consumption of foods high in saturated fats).

When the harm is recognized, the cost of curing the harm is generally born by parties other than the producers (e.g., the government in the case of crude oil spills and insurers and/or the government in the case of cardiovascular disease). In some cases the people affected are neither the producers nor the primary purchasers of the goods (e.g., chemical or nuclear plant failures).

Lacking in the discussion is the identification of a leverage point that is at the heart of the firm’s approach to economic valuation. At present no such leverage point exists; current FASB rules impose no requirement to assess future harm and to recognize the present value of such future harm in financial statements, be that the balance sheet or the income statement.

While regulation and legal action against a firm that is alleged to have caused harm serves an important purpose, it is an unreliable means of ensuring that sustainability, social responsibility, and self-regulating markets prevail.

The difficulties with symptomatic solutions share a number of common attributes, including:

- Corporate product decision-making relies on incomplete information about the long-term impact of its products, giving rise to a skewed and unwarranted emphasis on EVA
- Markets have incomplete information about the long-term impact of products consumed giving rise to harmful purchasing decisions
- Creativity in research and development (R&D) is suppressed; sustainable practices are undermined
- When harm is incurred, the cost of redress has an adverse economic impact on sectors of the economy not responsible for the production and consumption of the product, resulting in cost shifting responsibility; in effect, those sectors of the economy subsidize the favorable EVA of organizations producing harmful products

CONCEPTUAL FRAMEWORK FOR PROPOSED CHANGES

All of the symptomatic solutions rest on arguments citing moral and ethical codes of conduct, conscience, social responsibility, and sustainability. Each of these are powerful, compelling arguments, but, in the opinion of this author, lack the leverage to force real change in the decision-making process of managers.

Structure

The Structure-Patterns-Events pyramid posits that events and behavior are emergent properties of structure, and, correspondingly, how changes in structure can lead to significant, enduring improvements (Senge, 1990). For the purposes of this paper, leverage is framed in the question, “What structural depth is sufficient for policy to effect a sustained change in managerial/producer and purchaser decision making?”

The relationship of structure to events can be understood in relative terms. What we identify as structure relative to a pattern of specific events might also be viewed as the symptomatic behavior relative to a yet deeper structure. If structure is likened to the Hindu mythology of “turtles all the way down,” at what level can we conclude that “real” leverage is available?

Without diminishing the foundations of moral and ethical codes of conduct, conscience, social responsibility, and the principles of sustainability, it is reasonable to ask, “Are they sufficiently deep to cause the desired change in managerial behavior?” A cursory examination of the rate at which stocks continue to be depleted would suggest the answer is “no.” The costs of these stock depletions continue to be born by stakeholders other than the organization that caused or contributed to the stock depletion.

Basic Principle

The cost of future harm from goods and services should be self-funded by the producers and purchasers of these goods and services. The present value of these costs, paid into interest bearing “pool” accounts which could be maintained by the insurance industry, would be expensed as part of the cost of goods sold. This introduces a market based mechanism that would reduce reliance on regulations and inspection, as well as lawsuits arising from claims of negligence.

Accelerated Feedback Loops

Inclusive of the arguments put forth by the advocates and detractors of EVA[®], the metric fails to take into account the adverse effects (i.e., harm) that an organization’s decisions have on stakeholders external to the organization. While such effects cannot be known with certainty at the time managerial decisions are made, they can be actuarially estimated.

This paper takes the position that if the present value of the cost of future harm is incorporated into managerial decisions in the current period, managers will make decisions based on a more complete information set. Second, it suggests that regardless of the change in managerial decision-making, responsibility for the cost of future harm - paid from future harm “pool” accounts - will be borne by the producers and purchasers/consumers of products that cause future harm to stakeholders.

Third, it suggests that free markets, with the foreknowledge of the harm and its future costs, will correct themselves to behave in a manner that promotes sustainability and community health. Finally, it suggests that governmental regulations (other than FASB or GAAP) could be

reduced since (a) managers and markets are better informed and (b) regardless of the behavior of markets, the costs of redressing future harm will have already been funded by the time the harm is visibly incurred and requires correction.

PROPOSED CHANGE - FUNDAMENTAL SOLUTION

The proposed change expands the calculation of economic value by balancing short-term financial gain (value added) with long-term financial liability (value depleted). The expected effects of incorporating economic value depletion accounting include (a) a shift in products selected for production, (b) a shift in product and service R&D, (c) markets' improved ability to self-regulate in a sustainable manner, (d) a reduction in the social and economic cost of future harm, and (e) increased pressure on sustainable business practices.

Fundamental Solution Hypothesis

A balancing (negative) feedback loop that brings the cost of future period harm into the organization's current period decision making process will induce managers/producers to make sustainable, socially responsible decisions.

Specifically, a change in FASB rules would alter the structure from which decision making emerges by requiring the recognition of the present value of future harm (i.e., the economic value depletion). The present value of future harm, when recognized as an addition to the cost of goods sold, will act upon the cost of capital in such manner that managers/producers operating with EVA[®] in mind will adjust their decision-making to take future harm costs into account.

Specific Recommended Addition to FASB Rules⁵

For known harmful effects that result from goods or services produced, organizations that produce such goods or services shall assume the present value of the cost of curing the future harm that is caused by such goods or services, proportional to the production contribution to said future harm⁶. The present value of the cost of future harm shall be incurred as a cost of goods sold and be paid into interest bearing future harm "pools".

Calculating Future Harm

The calculation of the cost of future harm will rely on actuarially derived estimates. Examples of the data and sources upon which actuaries would rely could include:

⁵ At present, the disposition of FASB's principles-based approach is not known. This wording of this recommendation may be reconsidered in the context of a principles-based approach, although the mechanism of recognizing the present value of future harm would remain unchanged.

⁶ This could be a specific product (e.g, a chemical) or a class of products (e.g., all foods in which calories from fat are greater than 50%).

- Replicable scientific studies, i.e., science has concluded that a causal relationship between the good or service and a disease exists, and no scientific study has refuted⁷ those findings
- Societal consensus of concern, i.e., public health professionals have identified the good or service as a contributor to the natural history of the disease
- Generally accepted historical data that is already in use as the basis for existing regulations

SIGNIFICANCE OF PROPOSED CHANGES

The call for sustainable business practices frequently relies upon the goodwill of the firm. In the absence of FASB requirements to consider the future implications of its actions beyond risk management, there is no compelling reason to factor the cost of the harm into decision-making.

As such, both managers and purchasers/consumers make decisions without the benefit of information that would expand the dynamics of their decision-making process. For managers, their duty under agency theory can be fulfilled without taking future harm into consideration. Purchasers/consumers, correspondingly, are denied information that may alter their assessment of the price/value relationship of goods and services.

This proposal introduces the awareness and the actual cost directly into the decision-making structure of the organization, and has a direct impact on the economic value of the organization. Beyond decision-making, there are broader implications such as investor perception of value that will place additional pressure on managers to take the cost of future harm into account.

EXPECTED OUTCOMES

The adoption of an accelerated feedback loop approach to dismantling the incentive to produce goods (or rely on production processes) that cause future harm to societal stocks is anticipated to lead to multiple outcomes. Some examples follow.

Research and Development, Product Selection, Production Processes

A change in products produced (and/or production processes in use) could follow several (or all) paths. One, products currently in production could be the focus of R&D investment, reducing the product's harm rating which in turn would lead to a decrease in the product's Future Harm Index (see model description below). Two, the product could be abandoned in favor of developing a replacement product with a lower harm rating to which a lower Future Harm Index would be assigned.

Sustainability/Replenishment of Societal Stocks

Long-term sustainable growth could be realized through several means. One, if products that deplete societal stocks continue to be produced, after the initial implementation phase, the accelerated feedback loops would generate a continual supply of economic resources that would

⁷ Industry funded studies would be prohibited.

be used to replenish the societal stocks. Two, if the cost of replenishing the stocks were significant (and thereby imposing a considerable increase on Cost of Goods Sold), such products would be abandoned (see note above). In both cases, organizations would move toward a greater level of social responsibility as a function of becoming directly responsible for the depletion of societal stocks.

Changes in Legal Liability and Torts

Once products are identified and labeled according to their Future Harm Index, the production and purchase of the product would take place within the context of an admission of liability by the producer and an acceptance by the purchaser of full (albeit future) redress for any harm incurred. As such, the purchase of a product known to cause or contribute to future harm would constitute a legal agreement between producer and purchaser to fund the cost of future harm at its present value and to constitute a legal agreement that the purchaser, having already been guaranteed future redress for harm incurred through the purchase of a known harmful product, would not seek additional damages against the producer.

In simple terms, the production and purchase of a harmful product is acknowledged to be a collusion between producer and purchaser, with both parties in agreement that the producer has fulfilled all legal and ethical obligations to the purchaser⁸. Reimbursement to purchasers from the Future Harm Pool (see model description) would constitute full restitution for the harm incurred. Purchasers would have no other recourse to damages.

Such an agreement at the time of purchase would cause a significant reduction in legal tort cases. Since harmful products would carry both health and tort warnings (implicit in the Future Harm Index assigned to the product), producers' and purchasers' contributions to the Future Harm Pool would constitute full redress. Since purchasers would suffer no economic harm for their own decisions, no further redress is warranted. Harm to things such as their future earnings or related quality of life are their own business and a consequence of their own acts and choices⁹, made with the benefit of full and accurate information.

Behavior of Markets

The accelerated feedback loops add the full economic consequence of the producers' and purchasers' actions to the cost of the product at the point of sale. Purchasers will have the benefit of knowing the future harm of the product through the Future Harm Index. The FASB rule(s) would introduce sufficient information that would permit markets to self-regulate themselves through the joint decisions of producer and consumer.

⁸ This holds for business to consumer transactions. For business to business transactions, the liability shall be established at each organization involved in the value chain, with the final incremental future harm cost falling to the producer who delivers the product to the purchaser at the point of sale.

⁹ That said, there is no reason that a long-term disability component could not be added to the actuarial forecast of future harm.

In the early stages of the implementation of the Future Harm Index and the assessment of the present value of future harm, it is probable that a sentinel effect would make itself felt in markets. It is clear that all products cannot be actuarially assessed at the same time. Producers who are at future harm risk for products may begin to make product improvement related decisions - prior to their products' assessment - to position the product for a lower Future Harm Index rating.

Appropriate Cost Shifting

The cost of future harm from products is generally absorbed by parties who have undertaken to indemnify parties affected by future harm. The implementation of accelerated feedback loops would place the burden of cost directly on the parties who colluded to create or maintain the product's market. As a consequence, those costs would be removed from stakeholders who did not contribute to the future harm. Premiums for health insurance, as an example, would decline insofar as the actuarial basis for premiums would exclude costs associated with identified products that cause future harm. In similar fashion the tax burden (that is the portion that is used to fund the cost of harm) on citizens would be lowered as the responsible parties fund their own producing and purchasing decisions. The notion of personal responsibility, historically an issue of choices made, is now broadened to include the responsibility for choices that are available.

Policy Resistance

The model presented below relies on a single third order reinforcing loop. It was constructed only for the purpose of illustrating the expected behavior that would result from implementing accelerated feedback loops to correct for the cost of future harm. Notwithstanding, the failure to acknowledge balancing loops leaves the impression that the dynamics of policy resistance can be ignored.

There are a multiple areas where policy resistance could manifest itself; several examples follow.

- Industry Sponsored Science: Attempts to counter or confuse the science upon which actuaries rely
- Political Influence: The use of lobbies to carve out exceptions or reductions to future harm liability
- Illegal Markets: These markets could range from entrepreneurial efforts to organized crime
- Incentive to Falsify or Obfuscate Data: Producers' attempts to manipulate the assessments made by actuaries
- Distinctions Between Behavioral and Non-Behavior Factors: Where science has not produced clear evidence ambiguity will likely prevail

There are means to counter such resistance, though some of those means may, ironically, rely on regulatory based approaches.

Cost of Regulatory Compliance

The premise of accelerated feedback loops is the transition from regulatory based mechanisms to free-market based mechanisms. If the market failures are corrected, and the markets now have an effective force that regulates managerial decision-making behavior, the potential for a significant decrease in governmental regulations exists. Compliance with regulation carries a cost (beyond the costs associated with curing harmful practices). These administrative costs could be significantly reduced as reliance on regulations is reduced.

DYNAMICS OF PROPOSED CHANGES

A model was constructed to illustrate policy level dynamics of the accelerated feedback loop of the present value of the cost of future harm and its effect on decisions to produce and purchase. As currently developed, it lacks the detail and validation to be used in any other capacity. The model examines a single product called “Satfat” which serves as a proxy for all foods high in saturated fats. The model assumes that there is evidence that Satfat is the known cause of Coronary Artery Disease (CAD).

Model Overview

The model is a single, second order reinforcing loop into which a third order response to product changes exerts its influence. Figure 1 is an overview of the model’s dynamic behavior. Details of the model are presented in the Model Design section.

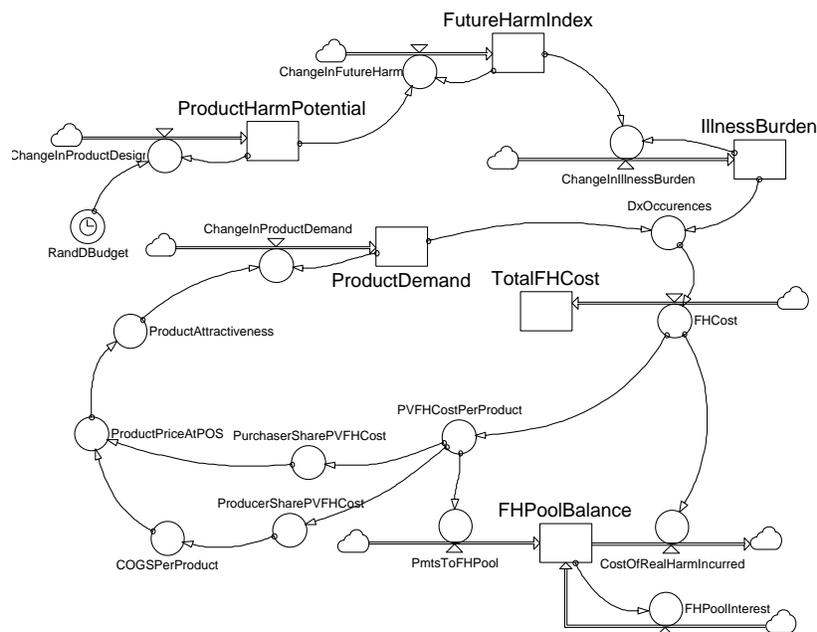


Figure 1

Model Design

The incurred disease burden (which drives treatment cost) is calculated as the frequency of diagnosis per 1,000 Satfats consumed for every 1,000 persons in the population. The actual number of diagnoses are moderated by the actual illness burden and product demand. People in the population consume, on average, three servings of Satfat per day (Figure 2).

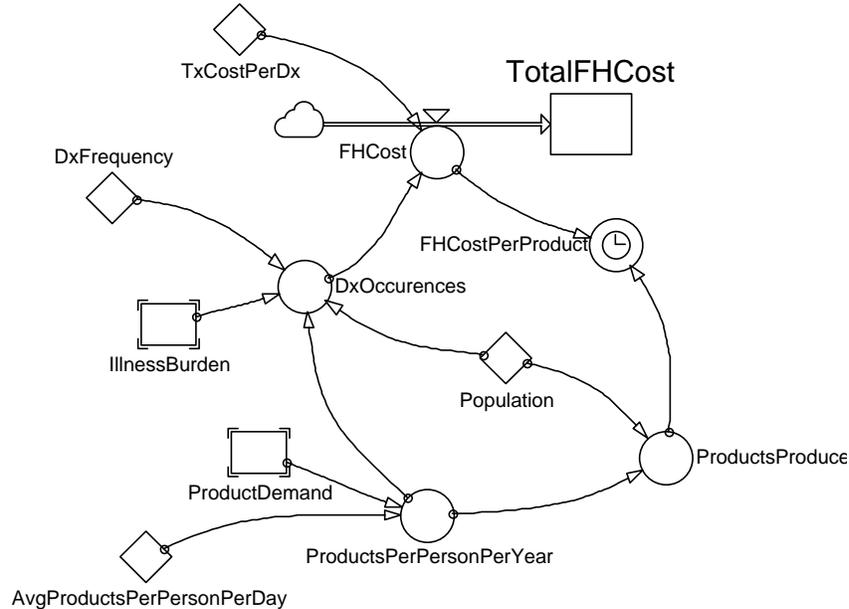


Figure 2

Satfat, like other products, includes the Future Harm Index on its label. The Future Harm Index is the delayed response to a product's Product Harm Potential. The Product Harm Potential is actuarially assessed. Once there is sufficient evidence to support the effect of any changes in a product, its Future Harm Index is adjusted (Figure 3).

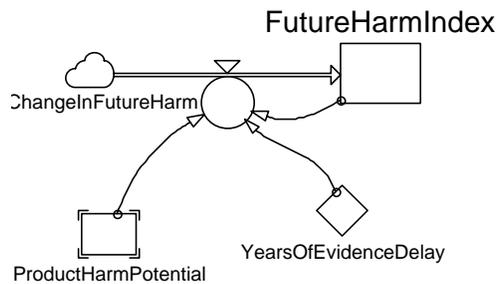


Figure 3

The Future Harm Index is based on the specific attributes of the product. Each product is assessed based on a set of attributes and is assigned a Product Harm Potential . The Product

Harm Potential is responsive to R&D and can be improved over time (Figure 4). The effects of R&D are introduced in the model in time period 10.

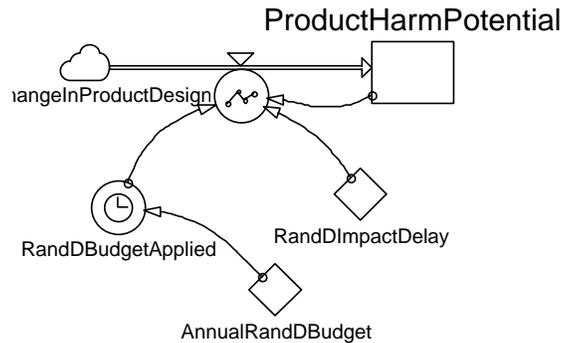


Figure 4

The Future Harm Index in turn influences the Illness Burden that Saffat (as a consequence of its product attributes, reflected in the Product Harm Potential) has on the population (Figure 5).

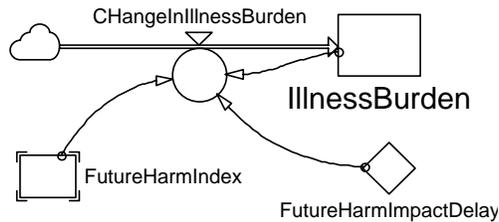


Figure 5

The cost of Future Harm (FHCost in Figure 2) is converted to its present value before either the producer or the purchaser are assessed their share of the cost of funding their own decision-making. A key element of the model is the equal share born by producer and purchaser (Figure 6). This effectively addresses the claim that producers only produce in response to the demand of a market and should not be the only party held responsible for the cost of redress. It likewise addresses the argument that purchasers are attracted to products as a result of their availability and the promotion and advertising directed at them. In effect, the equal sharing of the present value of the future harm cost acknowledges that producer and purchaser collude with each other to create and/or maintain the products's market.

There are three inflows into the Future Harm Pool; the producer's share of the present value of future harm, paid at the time the product is shipped, the purchaser's share paid at the time delivery is taken on the product, and the interest that the pool accrues over time.

Figure 6 includes the cost of the harm at the point in time when the harm actually occurs. For Saffat, this is set at 60 years, the approximate interval between the onset of regular consumption of Saffat and when the CAD is like to become symptomatic and require medical intervention.

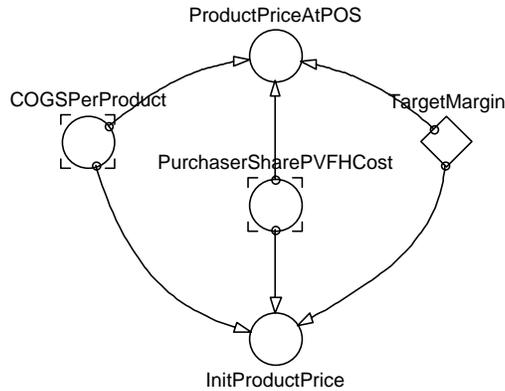


Figure 8

The combined increase in price has an effect on the attractiveness of Satfat which in turn affects demand for the product (Figure 9). As the demand for the product declines, so too does the actual harm incurred and its associated cost.

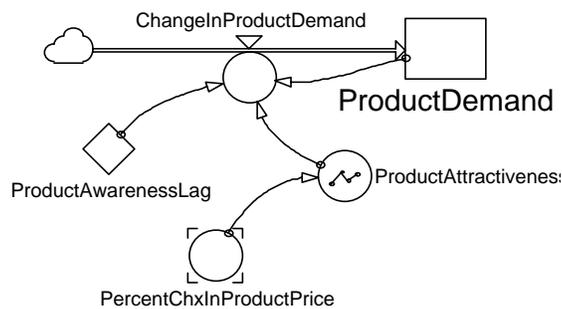


Figure 9

Model Behavior

The model tracks behavior over a 120 year period (roughly six generations). The cost of future harm is introduced in time period 5 and the effects of R&D occur in time period 10. For purposes of comparison, two views of model behavior are presented side by side. The left side illustrates behavior after the responsibility for future harm is introduced without any influence from R&D. The right side illustrates behavior in response to an annual investment of \$500,000 which will improve (that is, decrease) the Product Harm Potential of Satfat by approximately 47%.

Figures 10, 12, and 14 shows the effect that price has on the demand for Satfat. There is a corresponding decline in the number of CAD diagnoses, and in the aggregate future harm cost. Figures 11, 13, and 15 illustrates the response to the initiation of R&D¹⁰.

¹⁰ The response to R&D can be interpreted as either a decline in the Product Harm Potential or as an abandonment of the product in favor of a new product with a lower harm potential.

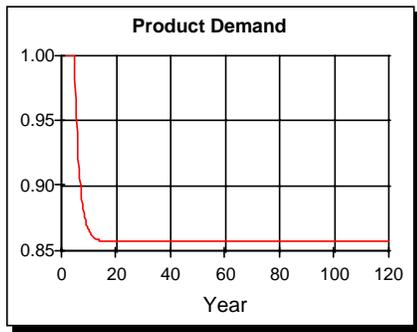


Figure 10

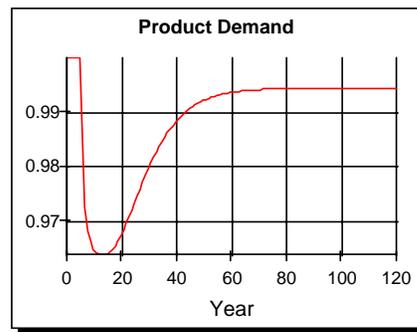


Figure 11

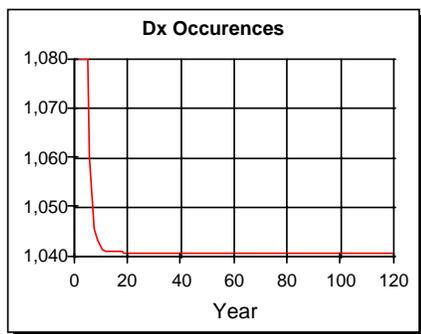


Figure 12

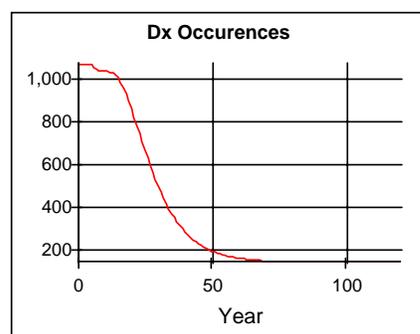


Figure 13

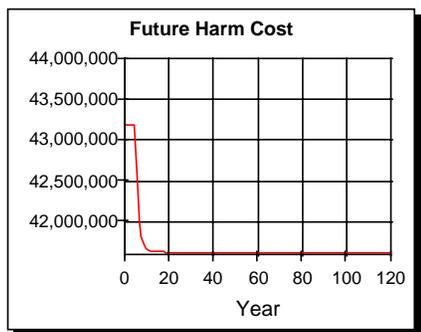


Figure 14

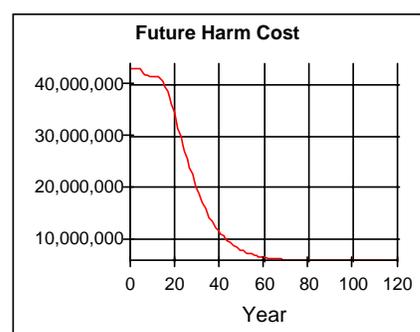


Figure 15

As a product's harm actually occurs, the difference in its growth with and without R&D are considerable. In the absence of research and development the harm incurred approaches the annual Future Harm Cost (Figure 17). With R&D (the delayed effects are illustrated in Figure 16), the delayed response of fewer occurrences of Coronary Artery Disease contribute to an overall decline in the Cost of Real Harm Incurred (Figure 18).



Figure 16

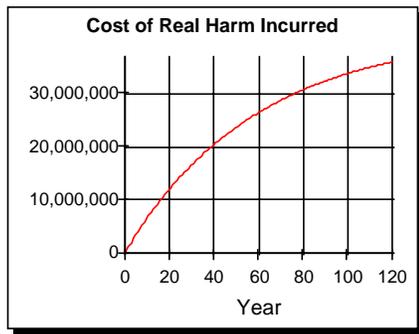


Figure 17

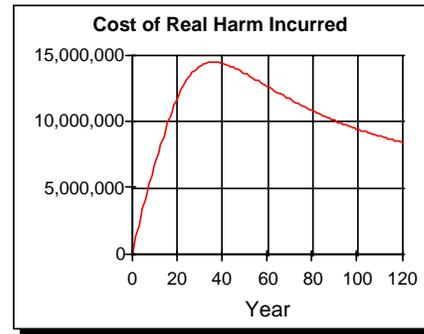


Figure 18

There are three delays and two table functions that influence model behavior when R&D efforts are introduced. There are delays between the annual investment of R&D and its effect on the Product Harm Potential, between Product Harm Potential and the Future Harm Index (reflecting the lag between the end of R&D and the collection of evidence for actuarial purposes) and between the Future Harm Index and the Illness Burden (reflecting the time for the change in the Future Harm Index to have an effect).

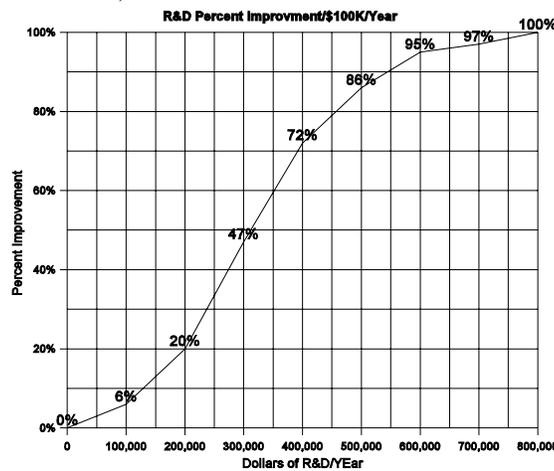


Figure 19

The table function that determines the influence of R&D (Figure 19) assumes a range of zero to \$800K per year. The other table function (Figure 20) describes the change in Satfat's attractiveness as a function of the R&D investment.

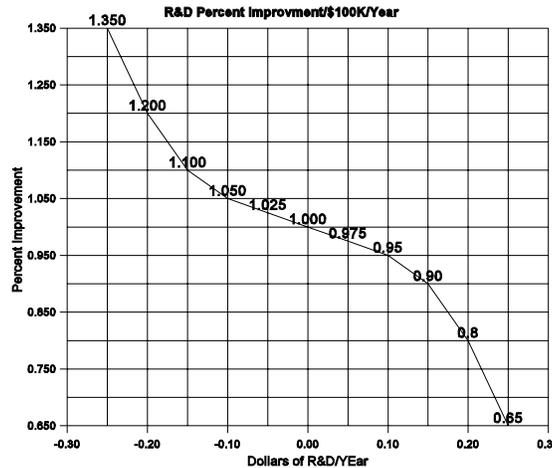


Figure 20

Model Validity

The model was constructed to illustrate the effect that a change in FASB rules would have on the production and consumption of a product. The assumptions used in the model, including the table functions, have no basis in reality. The Implementation, Open Questions, Future Work section below speaks to the need to fit the model with initial values and table functions that can be supported with evidence.

IMPLEMENTATION, OPEN QUESTIONS, FUTURE WORK

There are a number of issues surrounding the implementation of the proposed FASB rule. A sampling is considered here.

Actuarial Assessments

Chief amongst the issues are the actuarial assessments of products to determine their relative Future Harm Indices. With the number of products on the market, it is clearly not feasible to wait until all products have been assessed.

Selection of Products

The challenge surrounding actuarial assessment is closely tied to the question of developing a rationale for selecting the first wave of products that would form the basis for the Future Harm Index. A feasible approach would be to select several products for which there is already ample evidence that they lead to future harm.

Governance and Administration

An undertaking of this magnitude would not be possible without a governing and administrative body to support it. The cost of such a support system would have to be factored into contributions to the Future Harm Pool.

Legal Rights of Juveniles

As proposed, the FASB rule would ignore the age of purchasers insofar as their rights to redress are concerned. This raises the issue of juveniles' ability to fully understand the consequences of their decisions, and whether abridging their rights to redress for harm incurred (under this proposed rule) will withstand scrutiny under existing law designed to protect juveniles' legitimate interests.

Political Influence

The response to such a FASB rule is likely to generate a significant amount of public and private discourse. The ultimate impact of such a rule will in large part be in proportion to the degree to which special interests are deflected.

Policies Governing Future Harm Pool Balance

The pool balance in the model constructed for this paper shows high sensitivity to initial conditions. If the initial pool balance is below the optimum starting point, the outflows eventually overcome the inflows and the pool is bankrupted. If the pool balance is above the optimum starting point, the inflows, fueled by compounding interest, fuel exponential growth.

In addition to questions surrounding implementation there are any number of questions prompted by this model, and significant work that would precede undertaking the actual drafting, adoption, and implementation of the proposed FASB rule. A brief sampling includes:

- Impact on jobs; quality of the labor force and wages paid.
- Impact on economic cycles¹¹
- Impact on trends in the global economy
- Other dimensions of policy resistance
- Changes in the flow of capital
- Critical assessment of price as a sufficient influence on purchasing behavior
- Data to determine probable responses to R&D efforts

¹¹ At the macro level the author anticipates no significant effect on economic cycles. The proposed rule does not effect a change in the monies spent on products, only on the selection of products purchased. This assumption also needs further work.

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