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ARTICLE

ON MANDATORY LABELING, WITH SPECIAL REFERENCE TO GENETICALLY MODIFIED FOODS

CASS R. SUNSTEIN†

As a result of movements for labeling food with genetically modified organisms (GMOs), Congress enacted a mandatory labeling requirement in 2016. These movements, and the legislation, raise recurring questions about mandatory product labels: whether there is a market failure, neoclassical or behavioral, that justifies them, and whether the benefits of such labels justify the costs. The first goal of this Article is to identify and to evaluate the four competing approaches that agencies now use to assess the costs and benefits of mandatory labeling in general. The second goal is to apply those approaches to the context of genetically modified (GM) food.

Assessment of the benefits of mandatory labels presents especially serious challenges. Agencies have (1) claimed that quantification is essentially impossible; (2) engaged in breakeven analysis; (3) projected various endpoints, such as health benefits or purely economic savings; and (4) relied on private willingness-to-pay for the relevant information.

† Robert Walmsley University Professor, Harvard University. The author is grateful to Oren Bar-Gill for numerous discussions and ideas; to Hunt Allcott, Jacob Goldin, Michael Greenstone, Louis Kaplow, David Laibson, Lucia Reisch, Steven Shavell, and Adrian Vermeule for valuable suggestions; and to participants in a law and economics workshop at Harvard Law School and work-in-progress workshops at Harvard Law School and the University of Pennsylvania Law School for many helpful comments. Special thanks to Dan Severson for superb research assistance and also to the Program on Behavioral Economics and Public Policy at Harvard Law School. The author served as Administrator of the Office of Information and Regulatory Affairs from 2009 to 2012, and the issues explored here were much discussed at that time.

All of these approaches run into serious normative and empirical challenges. In principle, (4) is best, but in practice, (2) is sometimes both the most that can be expected and the least that can be demanded.

Many people favor labeling GM food on the ground that it poses serious risks to human health and the environment, but with certain qualifications, the prevailing scientific judgment is that it does no such thing. In the face of that judgment, some people respond that even in the absence of evidence of harm, people have “a right to know” about the contents of what they are eating. A simple response to this argument is that the benefits of such labels might well be lower than the costs. Consumers would obtain no health benefits from labels. To the extent that they would be willing to pay for them, the reason (for many though not all) is likely to be erroneous beliefs about health risks, and erroneous beliefs are not a sufficient justification for mandatory labels. Moreover, GMO labels might well lead people to think that the relevant foods are harmful and thus affirmatively mislead them.

Some people contend that GMOs pose risks to the environment (including biodiversity), to intelligible moral commitments, or to nonquantifiable values. Other people think that the key issue involves the need to take precautions in the face of scientific uncertainty: because there is a non-zero risk that GM food will cause irreversible and catastrophic harm, it is appropriate to be precautionary, through labels or through more severe restrictions. The force of this response depends on the science: If there is a small or uncertain risk of serious harm, precautions may indeed be justified. If the risk is essentially zero, as many scientists have concluded, then precautions are difficult to defend. The discussion, though focused on GM foods, has implications for disclosure policies in general, which often raise difficult questions about hard-to-quantify benefits, the proper use of cost-benefit balancing in the face of uncertainty, and the appropriate role of precautionary thinking.

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INTRODUCTION

When should government mandate labels? When would mandatory labels have desirable consequences for social welfare? How can those consequences be measured? When would labels do more good than harm?

Under Executive Order 12866, binding on federal executive agencies, some kind of market failure is ordinarily required to justify regulation, including mandatory labels (either a standard, neoclassical market failure or

a behavioral market failure).¹ And even in the presence of a market failure, Executive Order 12866 allows regulation, including mandatory labels, to be imposed only if the benefits justify the costs²—an issue that presents unusual challenges in light of the immense and pervasive difficulty of quantifying both the benefits and the costs of labels.³

My principal goal here is to attempt to show how agencies can make progress in surmounting that difficulty, and thus to offer a guide suitable for use in many contexts, including (for example) calorie labels, energy efficiency labels, fuel economy labels, graphic warnings, and much more. Sometimes agencies can quantify both benefits and costs, or at least significant subsets of them, either by using endpoints (economic savings or health benefits) or by measuring private willingness-to-pay for labels. Sometimes they can point to human dignity, equity, or distributional concerns.⁴ Sometimes they can engage in “breakeven analysis.” As we will see, private willingness-to-pay is the best approach in theory, but measuring it raises serious empirical and conceptual challenges.

To anchor the discussion, I focus in particular on mandatory labels for food that contains genetically modified organisms (GMOs), because the topic has become significant in light of recent legislation,⁵ and because it raises a number of general puzzles from which broader lessons can be drawn. In Europe, and increasingly in the United States, there is considerable public concern about GMOs and about food that contains them (GM food).⁶ As a

¹ See Exec. Order No. 12,866, § 1, 3 C.F.R. § 638 (1993), reprinted in 5 U.S.C. § 601 app. at 86-91 (2012) (directing federal agencies to “promulgate only such regulations as . . . are made necessary by compelling public need, such as material failures of private markets”).

² See *id.* § 1(b)(6) (requiring agencies to “adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs”).

³ See *infra* Section I.B.

⁴ See Exec. Order No. 12,866, § (1)(a) (noting that the benefits to be considered “includ[e] . . . distributive impacts; and equity”).

⁵ National Bioengineered Food Disclosure Standard, Pub. L. No. 114-216, 130 Stat. 834 (2016) (to be codified at 7 U.S.C. § 1639, 1639 to 1639c). Note that the requirement allows considerable flexibility for the regulated class, and the flexibility should significantly reduce compliance costs: food producers can comply with a symbol or with text, but also with a barcode that consumers can scan to obtain information on ingredients. See *id.* § 293 (allowing food manufacturers the choice of using either “text, symbol, or electronic or digital link”).

⁶ See, e.g., Ben Popken, *Obama Signs Controversial GMO Food Label Law*, NBCNEWS (Aug. 1, 2016, 9:51 AM), <http://www.nbcnews.com/business/consumer/obama-signs-controversial-gmo-food-label-law-n620796> [<https://perma.cc/C6PS-VZ3C>] (reporting that advocates of the GMO labeling law believe “consumers want to know exactly what’s in their food”). For a discussion on movements in Congress, see Dan Flynn, *Just Label It Takes a Victory Lap After Losing: Opts to Move On*, FOOD SAFETY NEWS (July 10, 2016), <http://www.foodsafetynews.com/2016/07/128725/#.V4Iopc5i5FJ> [<https://perma.cc/MZ4B-HRMU>], which reports on the development of the GMO labeling bill. For a discussion of various related issues, see Margaret Rosso Grossman, *European Community Legislation for Traceability and Labeling of Genetically Modified Crops, Food, and Feed*, in LABELING GENETICALLY MODIFIED FOOD: THE PHILOSOPHICAL AND LEGAL DEBATE 32 (Paul Weirich ed., 2007) [hereinafter

matter of science, the principal claims are that GM food poses, or might pose, public health risks, and that GMOs endanger, or might endanger, the environment.⁷ (As we shall see, there are other claims as well.) In response to these claims, the most modest proposal is that GM food should be labeled as such, so that consumers can know what they are buying.⁸ In its simplest and most intuitive form, the argument is that people have a right to know the ingredients of their food, at least when they fear that those ingredients pose risks to health or the environment.

In 2016, Congress embraced that argument, enacting legislation to require labeling of GM food.⁹ The new legislation directs the Secretary of Agriculture to promulgate implementing regulations within two years.¹⁰ Under existing Executive Orders, those regulations will have to be accompanied by some kind of formal cost–benefit analysis.¹¹

The seemingly modest arguments in favor of mandatory labels for GM food raise fundamental questions about product labeling in general. For GM food in particular, a market failure is not simple to demonstrate, and it is even more challenging to show that the benefits of labels justify the costs. The first reason is that GM foods do not pose health risks at all,¹² and the standard (though hardly uncontested) reading of the science appears to be that the environmental risks are somewhere between nonexistent and highly speculative.¹³ To that extent, GM labels might confer no tangible benefits on consumers. The second reason is that GM labels may affirmatively mislead some or many consumers by leading them to believe, falsely, that the government thinks that GM foods do pose risks to health or the environment.¹⁴ Because it is not easy to show that the benefits

LABELING GENETICALLY MODIFIED FOOD], which provides an introduction to the labeling practices of different European countries and their justifications.

⁷ For an instructive discussion, see ALAN MCHUGHEN, *PANDORA'S PICNIC BASKET: THE POTENTIAL AND HAZARDS OF GENETICALLY MODIFIED FOODS* (2000).

⁸ See Peter Markie, *Mandatory Genetic Engineering Labels and Consumer Autonomy*, in LABELING GENETICALLY MODIFIED FOOD, *supra* note 6, at 88, 88 (outlining the “autonomy” argument, which calls for GM labels so that consumers can “make purchase decisions that are informed by their values”).

⁹ National Bioengineered Food Disclosure Standard §§ 291–96.

¹⁰ See *id.* § 293(a) (requiring the Secretary to establish regulations “[n]ot later than 2 years after the date of enactment”).

¹¹ See Exec. Order No. 13,563, § 1, 3 C.F.R. 215 (2011), *reprinted in* 5 U.S.C. § 601 app. at 102-02 (2012) (specifying that an “agency must . . . propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs”).

¹² See Popken, *supra* note 6 (“A recent review of two decades of research and over 900 studies by the National Academy of Science has not found any evidence that genetically modified organisms pose a hazard to human health.”).

¹³ See *infra* notes 115–21 and accompanying text.

¹⁴ See Oren Bar-Gill et al., *Drawing False Inferences from Mandated Disclosures 2* (Feb. 9, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=2914354 [<https://perma.cc/NX9T-9LZU>] (“[C]onsumers may hear “DANGER!” even though the government does not mean to issue a “DANGER!” warning at all.”); Juanjuan Zhang, *Policy and Inference: The Case of Product*

of mandatory GM labels would justify the costs, there is a strong argument that such labels would run into serious difficulty during the process of scrutiny undertaken by the Office of Information and Regulatory Affairs under Executive Orders 12866 and 13563,¹⁵ and may potentially face legal objections.¹⁶

On welfare grounds, a tempting argument for GM labels is straightforward: Many consumers want them, and they would be willing to pay something in return for them. Labeling is required because people demand it; in surveys, the overwhelming majority of Americans do favor mandatory labels.¹⁷ But this argument runs into two objections. The first is the fact that the market is not, on its own, producing such labels. This objection is not fatal in light of potential market failures, behavioral and otherwise, but it does raise questions about the basic claim. People's responses to survey questions may not reflect what they really care about, as reflected in their general lack of interest in the topic at the grocery store or in restaurants.¹⁸

The second and more fundamental objection is that the consumer demand for labels (to the extent that it exists) appears to be based largely on the groundless belief that GM food is dangerous to human health.¹⁹ If that belief is indeed groundless, public officials should correct it rather than cater to it. But it is possible to ask whether that conclusion is too simple. Those who embrace technocratic conceptions of government will have little interest in public fear as such. But those who favor certain forms of populism might insist that if people are fearful, officials should respond, not least because they

Labeling 5 (Sept. 23, 2014) (unpublished manuscript), http://jjzhang.scripts.mit.edu/docs/Zhang_2014_GMO.pdf [<https://perma.cc/J9ZB-HQYT>] (finding that "emphasizing mandatory disclosure of GMOs in food products lowers consumers' perceived GMO safety").

¹⁵ See *supra* notes 1–2 and 11. Note, however, the important qualification that the requirement of a cost–benefit justification applies only "to the extent permitted by law." Exec. Order No. 13,563, § 1, 3 C.F.R. 215 (2011), *reprinted in* 5 U.S.C. § 601 app. at 102–02 (2012); Exec. Order No. 12,866, § 1(b), 3 C.F.R. § 638 (1993), *reprinted in* 5 U.S.C. § 601 app. at 86–91 (2012). For that reason, the GMO disclosure mandate might, in this context, fall in the small category of cases in which executive agencies issue a rule, under legal compulsion, for which benefits do not justify costs. Nonetheless, the process of review will put a good deal of pressure on the Department of Agriculture to produce a credible explanation that the benefits justify the costs.

¹⁶ For the legal objections potentially available, in the event that the cost–benefit analysis is arbitrary or does not demonstrate that the benefits justify costs, see *infra* note 45. Of course the fact that disclosure is mandatory may turn out to make those objections irrelevant. See *Nat'l Ass'n of Mfrs. v. SEC*, 748 F.3d 359, 369 (D.C. Cir. 2014) (upholding a regulation by reference to statutory requirements).

¹⁷ See, e.g., Cass R. Sunstein, *Do People Like Nudges?*, 68 ADMIN. L. REV. 177, 189 (2016) (noting that 86% of survey "respondents were in favor of requiring companies to disclose whether the food they sell contains" GMOs).

¹⁸ *Cf. id.* (reporting that respondents were "significantly less likely to favor a law requiring restaurants to order the items on a menu from healthiest to unhealthiest").

¹⁹ See, e.g., *Health Risks*, INST. FOR RESPONSIBLE TECH. (2015), <http://responsibletechnology.org/gmo-education/health-risks/> [<https://perma.cc/5RXV-W22B>] ("Natural genes can be deleted or permanently turned on or off, and hundreds may change their behavior. Even the inserted gene can be damaged or rearranged, and may create proteins that can trigger allergies or promote disease." (internal citations omitted)).

need to maintain public trust (and should themselves be humble about how much the evolving science can establish).

A separate argument relies on difficult-to-quantify values and scientific uncertainty. Perhaps GM food would threaten biodiversity; perhaps it would have adverse distributional effects in poor nations; perhaps it endangers widely held moral commitments. If there is a risk that GM food would cause serious and irreversible environmental harm, it is appropriate to take precautions,²⁰ and labels are a modest way of doing that. Perhaps it will be discovered, in the fullness of time, that the environmental risks (such as the risks to biodiversity) are serious and potentially even catastrophic; perhaps existing research cannot rule out of bounds that possibility.

The force of at least some of these concerns depends on the science. It is clear that if the best reading of the science suggests a certain kind of irreducible uncertainty, the argument for labeling gains force, and it can be fit with a justification that agencies have sometimes given under the general rubric of cost-benefit analysis. But if the risk is vanishingly small, or too speculative to be worth taking seriously—as many scientists have concluded²¹—then precautions (including labels) are difficult to justify. With reference to these various points, I sketch the most plausible arguments that the United States Department of Agriculture (USDA) might make in defending the labeling requirement on cost-benefit grounds and suggest that some form of “breakeven analysis” is probably the best that it can do.

Mandatory labels for GM foods raise pervasive questions about the use of cost-benefit analysis in the context of labeling requirements. As we shall see, that context poses distinctive challenges. The costs of labels may be higher than is readily apparent, because they may produce subtle decreases in consumer welfare (as, for example, when calorie labels lead people to buy goods that are lower-calorie but less tasty, or when energy efficiency labels lead people to purchase appliances that cost less to operate but are less attractive).

At the same time, the benefits of labels are often exceptionally difficult to quantify and monetize, a problem that may lead agencies to make a flat declaration that they cannot be turned into monetary equivalents at all. Alternatively, agencies may rely on anticipated economic savings or health gains, which may be highly speculative, and which will not, in any case, provide anything like an adequate picture of the actual benefits.

²⁰ See Nabil I. Al-Najjar, *A Bayesian Framework for the Precautionary Principle*, J. LEGAL STUD., June 2015, at S337 (explaining that the “precautionary principle” counsels that when faced with possible threats “to human health or the environment, precautionary measures should be taken” even if the risks “are not fully established scientifically”).

²¹ See *infra* notes 115–18.

The remainder of this Article comes in three parts. Part I, the heart of the analysis, offers general remarks on mandatory labels, with particular reference to the four approaches that agencies have taken to specifying the benefits of such labels. These highly disparate approaches, which impose varying levels of information-gathering demands on agencies, have yet to receive serious attention in the academic literature, and Part I explores their vices and virtues. Part II applies the analysis to GM foods, concluding that a mandatory label is not simple to justify on cost-benefit grounds, even if agencies use creative approaches to attempt to monetize the benefits. Part II also specifies the best (or least bad) approach that the government might use in attempting to show that the benefits of GM labels justify the costs.

Part III investigates uncertainty and the precautionary principle. It emphasizes that there is room for precautions in the face of small or uncertain risks of catastrophe but urges that on current readings of the science, mandatory GM labels are not straightforward to defend on that ground. Part III also discusses the claim that the precautionary principle is best understood not in decision-theoretic terms but as a response to democratic imperatives.

I. PRODUCT LABELING IN GENERAL

A. *Market Failure?*

When should government require products to be labeled? Suppose that we care about social welfare, suitably specified, and answer that labels should be required when they would do more good than harm. It is easy to imagine labels that are unnecessary, that are costly to impose, that are widely ignored by consumers, that mislead consumers, or that promote the interests of powerful private groups, not of the public as a whole. It is also easy to imagine labels that help consumers to save money, to avoid serious risks, to protect third parties, or to register their deepest moral commitments. Under the standard economic approach, the initial question is whether there is a market failure. In many cases, we expect the market to produce the necessary information on its own.²² In other words, sellers are expected to disclose relevant information voluntarily.²³ Mandatory disclosure is needed only when voluntary disclosure fails.

²² See Howard Beales et al., *The Efficient Regulation of Consumer Information*, 24 J.L. & ECON. 491, 502 (1981) (“The economic incentive for consumers to gather information is strong. Increases in the efficiency of purchase decisions made are equivalent to increases in real income, and, given the diversity of choices available in a modern economy, improved choices can lead to a large gain. In many markets, price dispersion is substantial for identical or similar products.”).

²³ See *id.* (noting the “substantial economic incentive” that sellers have “to disseminate information to consumers”).

1. Consumer Demand and Incomplete Information

When offering accounts of market failure under the requirements of prevailing executive orders, agencies usually ask about what consumers are likely to demand.²⁴ A standard market failure, often invoked by agencies themselves, involves *incomplete information*. Sometimes consumers lack the information that would enable them to make (sufficiently informed) choices, and government provides that information in order to make the market work efficiently.

It is true, of course, that consumers sometimes insist on product-related information, and hence the market will provide it; there is no need for a mandate. But consumers might not have the information that would put them in the position to demand disclosure of (further) information, and it might not be rational for them to attempt to acquire that information. Consider the health risks posed by trans fats, which raise highly technical questions.²⁵ Rational ignorance on the part of consumers might lead them not to acquire information from which they would ultimately benefit. Without that information, they might lack the knowledge that would lead them to even ask for labels. For that reason, a government response might be appropriate.

A further problem stems from the fact that information has the characteristics of a public good, which means that the market will not generate enough of it.²⁶ Acting on his or her own, each consumer might not seek information from which all or most consumers would benefit. Mandatory labels overcome a collective action problem.

Yet another problem arises when the point of disclosure is to protect third parties.²⁷ Often consumers want to know whether products are harming people, but even if they do not, disclosure might be required in order to reduce that harm. Suppose, for example, that disclosure of information is designed to reduce the risks of second-hand smoke, to prevent harms to animals (such as elephants or dolphins), to protect vulnerable groups (as with disclosure of “conflict minerals”²⁸), or to protect American jobs (as with “country of origin” or “made in America” labels²⁹). If third parties are at risk, we have a

²⁴ See STEPHEN BREYER, *REGULATION AND ITS REFORM* 26-29 (1982) (explaining that regulation is often justified as a means to correct “errors” in the supply of information to consumers).

²⁵ See SARAH CONLY, *AGAINST AUTONOMY: JUSTIFYING COERCIVE PATERNALISM* 152-55 (2013) (discussing the decision by New York City to ban trans fat in restaurants and cafeterias).

²⁶ Beales et al., *supra* note 22, at 503 (“The first . . . market failure arises from the fact that information has *public good* properties. The purchase, production, and use of information by consumers generate a market-perfecting external benefit to uninformed consumers.”).

²⁷ See Eric A. Posner & Cass R. Sunstein, *Moral Commitments in Cost-Benefit Analysis* 4 (Coase-Sandor Inst. for Law & Econ., Working Paper No. 802, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2930450 [<https://perma.cc/HC2N-RALH>].

²⁸ See *infra* note 47.

²⁹ See 7 U.S.C. § 1638a (2012) (requiring retailers of particular products to inform their consumers of each product’s country of origin); *Am. Meat Inst. v. U.S. Dep’t of Agric.*, 760 F.3d 18, 23 (D.C. Cir.

standard argument for government intervention. To the extent that GM food is thought to pose risks to the environment, a market failure seems to be involved. It is true, of course, that the preferred response to such risks is some kind of corrective tax, not disclosure.³⁰ But if a tax is unavailable, for political or other reasons, then disclosure might seem to be a reasonable second-best.

There are behavioral issues as well. If risks are not sufficiently salient, then consumers might not demand relevant information about them, even if those risks are not exactly trivial. In principle, disclosure could therefore increase consumer welfare.³¹ Or suppose that health risks are long-term; if so, then “present bias” might lead consumers not to demand information about them.³² It is true that in the face of present bias, disclosure might not do much good; present-biased consumers might not care about what they learn. But perhaps information could be provided in a way that would reduce present bias. For example, labels might be graphic or specifically focus people on what might happen in the long-term.

2. Producer Behavior

Notwithstanding these points, a standard unraveling argument predicts voluntary disclosure even if consumers do not demand it. Assume that for whatever reason (rational or not), consumers would choose non-GM foods if they were given the information that would enable them to do so. Specifically, assume that consumers are willing to pay \$10 for GM salmon and \$20 for non-GM salmon. Further, assume that GM salmon costs \$5 to produce, whereas non-GM salmon costs \$7 to produce. Finally, assume that, initially, half the salmon on the market is GM and half is not. Without any labeling, the consumer would not know what kind of salmon she is buying and would, therefore, be willing to pay \$15 (= $0.5 * \$10 + 0.5 * \20). This state of (consumer) ignorance benefits the producers of GM salmon and harms the producers of non-GM salmon.

2014) (“But here we think several aspects of the government’s interest in country-of-origin labeling for food combine to make the interest substantial: the context and long history of country-of-origin disclosures to enable consumers to choose American-made products; the demonstrated consumer interest in extending country-of-origin labeling to food products; and the individual health concerns and market impacts that can arise in the event of a food-borne illness outbreak.”).

³⁰ See Steven Shavell, *Corrective Taxation Versus Liability as a Solution to the Problem of Harmful Externalities*, 54 J.L. & ECON. S249, S249 (2011) (“The corrective tax has long been viewed by most economists as a, or the, theoretically preferred remedy for the problem of harmful externalities.”).

³¹ See Xavier Gabaix & David Laibson, *Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets*, 121 Q.J. ECON. 505, 511 (2006) (arguing that when consumers have access to more information, they are able to “make more informed choices among the available goods”).

³² See generally Ted O’Donoghue & Matthew Rabin, *Present Bias: Lessons Learned and To Be Learned*, 105 AM. ECON. REV. 273, 274-75 (2015) (discussing the impact of present bias on economic decisionmaking).

But this state of ignorance is not an equilibrium. The non-GM sellers will voluntarily add a “No GMOs” label so that they can charge \$20, rather than \$15 per salmon (as long as the cost of adding such a label is less than \$5 per salmon). The GM salmon will not be labeled, but GM labeling would not be necessary—rational consumers would infer that non-labeled salmon is GM. As Bar-Gill and Board explain, “An implication of this result is that mandatory disclosure of product-attribute information is often unnecessary.”³³

In the example just given, the relevant quality dimension is binary (GMO or non-GMO). A similar argument predicts voluntary disclosure when the relevant quality dimension is continuous. Assume that different microwave ovens in the market emit radiation in the range of 0–10 mW/cm², with levels of radiation distributed uniformly (such that, for example, the number of microwave ovens emitting no radiation is equal to the number of ovens emitting 1 mW/cm² of radiation, and equal to the number of ovens emitting 2 mW/cm² of radiation, and so on). Without any labeling, consumers would not be able to distinguish low-radiation ovens from high-radiation ovens and would attribute the average radiation level, 5 mW/cm², to any oven they consider purchasing. Producers of low-radiation ovens, with radiation levels below 5 mW/cm², would be harmed by this state of consumer ignorance. These producers would voluntarily disclose their ovens’ radiation levels.

Now consumers would know the radiation levels of all ovens with levels below 5 mW/cm². And when considering a non-labeled oven, the consumer would assume an average radiation level of 7.5 mW/cm². But then producers with radiation levels between 5–7.5 mW/cm² will voluntarily disclose. Only producers with radiation levels between 7.5–10 mW/cm² will remain silent, and so consumers would attribute an average radiation level of 8.75 mW/cm² to a non-labeled oven. Now producers with levels between 7.5–8.75 mW/cm² will voluntarily disclose. And so on, until complete unraveling is achieved and all information is voluntarily disclosed.³⁴

As a real-world example analogous to the question of GM food, consider the example of gluten free foods. Some people (including those with celiac disease) are allergic to food that contains gluten. At least to date, we do not observe statutory disclosure requirements (“Warning: this product contains gluten.”). Instead we see voluntary labels, saying (for example) that products are “gluten free.” The FDA has issued guidance for such labels.³⁵ On admittedly optimistic assumptions, voluntary labels provide sufficient information.

³³ Oren Bar-Gill & Oliver Board, *Product-Use Information and the Limits of Voluntary Disclosure*, 14 AM. L. & ECON. REV. 235, 237 (2012).

³⁴ See *id.* (explaining the “unraveling dynamic [that] leads to voluntary disclosure by all firms”).

³⁵ For a summary of gluten-free labeling from the FDA itself, see *Gluten and Food Labeling*, U.S. FOOD & DRUG ADMIN., <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Allergens/ucm367654.htm> [<https://perma.cc/VVP8-98YG>] (last updated May 2, 2016).

3. Markets that Do Not Unravel

This happy unraveling story, however, does not always play out. Failure of voluntary disclosure occurs for several reasons—some neoclassical and some behavioral. Starting with the standard, neoclassical reasons, note that the unraveling result assumes that voluntary disclosure is truthful. But imperfect enforcement might lead to false disclosures, which government must correct—and once government is in the business of correction, it may be essentially mandating a label.

In addition, voluntary disclosure might fail when there is no standardized format or metric for disclosing information. Without standardization, consumers might not be able to make the required distinctions,³⁶ in which case voluntary disclosure will be insufficient. And if the point of disclosure is to protect third parties, the unraveling story might not work because consumers might not care enough about third party effects to respond to the various informational signals. True, consumer indifference would also mean that mandatory labels would be ineffective. But it is plausible to think that consumers care *some*—enough to make mandatory labels work but not enough to promote unraveling.

Behavioral economics suggests an additional and perhaps stronger reason for skepticism about voluntary disclosure. The unraveling result assumes that consumers attend to and draw rational inferences from silence—from the absence of a label. But attention is limited,³⁷ and such inferences can be quite difficult to draw, especially when consumers are receiving numerous signals at the same time (as is true for food) and when there are multiple quality levels or continuous quality dimensions. Suppose, for example, that some products come with labels saying “low fat” or “low sugar.” Would consumers necessarily infer that products lacking such labels are high in fat or sugar? Or would many consumers not think much or at all about the question of fat or sugar?

A standard neoclassical argument is that in a generalization of the “lemons equilibrium,”³⁸ competition might occur over easily observed characteristics, such as price, and less or not at all over less observable characteristics, such

³⁶ For a discussion of neoclassical economic theories of consumer decisionmaking, see Beales et al., *supra* note 22, at 492.

³⁷ See DANIEL KAHNEMAN, ATTENTION AND EFFORT 13-17 (1973) (discussing constraints on consumer attention in relation to informed decision-making). See generally SENDHIL MULLAINATHAN & ELDAR SHAFIR, SCARCITY: WHY HAVING TOO LITTLE MEANS SO MUCH (2013) (examining how cognitive scarcity and “limited bandwidth” affect choices).

³⁸ See generally George A. Akerlof, *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488 (1970) (discussing the relationship between product price and quality and consumer demand).

as ingredients.³⁹ The behavioral suggestion (or exclamation point) is that in view of the scarcity of attention, this limited kind of competition is highly likely.⁴⁰ And even if consumers pay attention to the relevant ingredient (salt, sugar, fat), they might be unable to draw a fully rational inference from the absence of disclosure.

For example, those who are purchasing cereal or milk might attend to a variety of product attributes, and unless high fat or high sugar content is brought to their attention, many of them might not consider those ingredients at all. If many consumers would not pay attention or draw a negative inference (or a sufficiently negative inference) from the absence of a label, voluntary disclosure might fail. Such failure justifies the consideration of mandatory disclosure, at least in principle. The Affordable Care Act, for example, mandates calorie labels,⁴¹ and there is a plausible argument on their behalf based on the considerations just sketched.⁴²

4. “Does Not Contain” Labels vs. “Contains” Labels

There are many differences between a system in which products without some characteristic say “Does Not Contain *X*” and one in which products with some characteristic say “Contains *X*.” As we have seen, “Contains *X*” offers far more salient information to consumers with bounded attention. In addition, “Contains *X*” might offer a distinctive signal, suggesting that private and public institutions think that something is wrong with *X*.⁴³

“Does Not Contain *X*” might also promote a desirable form of sorting. Suppose that ten percent of the population is troubled by *X*, whereas ninety

³⁹ See Beales et al., *supra* note 22, at 510 (“By generalizing the concept of the ‘lemons’ equilibrium, we can show that, if price is more easily observed than quality, competition may be skewed toward less expensive, lower-quality products.” (internal citation omitted)).

⁴⁰ See Gabaix & Laibson, *supra* note 31, at 511 (finding that, absent consumer-education initiatives, consumers are likely to resort to simple baseline-price comparisons when making purchasing decisions).

⁴¹ See Patient Protection and Affordable Care Act § 4205, 21 U.S.C. § 343(q)(5)(H)(ii)(I)(aa) (2012) (requiring restaurants to list “the number of calories contained in the standard menu item” on their menus).

⁴² The FDA’s own explanation disregarded the economic literature on unraveling and spoke instead about how the rule might help consumers:

The final rule may also assist consumers by making the long-term health consequences of consumer food choices more salient and by providing contextual cues of food consumption. The behavioral economics literature suggests that distortions internal to consumers (or internalities) due to time-inconsistent preferences, myopia or present-biased preferences, visceral factors (e.g., hunger), or lack of self-control, can also create the potential for policy intervention to improve consumer welfare.

U.S. FOOD & DRUG ADMIN., FDA-2011-F-0172, FOOD LABELING: NUTRITION LABELING OF STANDARD MENU ITEMS IN RESTAURANTS AND SIMILAR RETAIL FOOD ESTABLISHMENTS 11 (2014) [hereinafter CALORIE LABEL RULE IMPACT ANALYSIS].

⁴³ See *infra* text accompanying notes 182–87.

percent is not; suppose that both groups are informed and rational. If so, there is no need for “Contains *X*.” Those who want to avoid *X* can easily do so, and those who have no interest in avoiding *X* need not be troubled by the issue.

On a certain view of the facts, “Does Not Contain *X*” is the right approach both to gluten-free and to GM food. People who are allergic to gluten should know what to look for. The principal problem is that if they are inattentive, they might become sick simply by virtue of the fact that the issue has not been brought to their attention. (Compare labels saying “Contains peanuts” or “Contains shellfish,” which may be especially important if consumers are inattentive or if it is not self-evident that the relevant food contains either.) With “Does Not Contain” labels, consumers can easily avoid GM food if that is what they want to do. But this approach is not a solution if GM food has harmful systemic effects or threatens to cause environmental harm (or if relevant interest groups want to stigmatize GM food).

B. *Costs and Benefits*

Even if there is a market failure, the question remains: do the benefits of labels justify the costs? If it would be expensive to comply with a labeling requirement—say, \$800 million annually—the question whether the benefits are sufficient would be put in stark relief. We could easily imagine disclosure requirements that do little good, perhaps because consumers pay no attention to them.⁴⁴ If so, such requirements would be unjustified on cost-benefit grounds. Those who are skeptical of the benefits of disclosure requirements, in general or in particular cases, are not merely making a point about public policy. Whether or not they intend to do so, they are also making a provocative claim about how regulatory review should occur within the executive branch and potentially about judicial review as well. (Recall the limited nature of attention, which raises the possibility that many disclosure requirements could not survive scrutiny under Executive Orders 12866 and 13563, and possibly could not survive judicial review under the Administrative Procedure Act.⁴⁵) We could also imagine disclosure requirements from which

⁴⁴ See OMRI BEN-SHAHAR & CARL SCHNEIDER, MORE THAN YOU WANTED TO KNOW: THE FAILURE OF MANDATED DISCLOSURE 8, 11 (2014) (contending that “disclosures are unreadable and unread” and that “[o]ne Web site’s disclosure offered \$100 to anyone noticing it; it kept its \$100”); ARCHON FUNG ET AL., FULL DISCLOSURE: THE PERILS AND PROMISE OF TRANSPARENCY 16 (2007) (“Because information disclosers and users have limited time and energy, they are likely to act on new information only if it has value to them, is compatible with the way they make choices, and is easily comprehensible.”); George Loewenstein et al., *Disclosure: Psychology Changes Everything*, 6 ANN. REV. ECON. 391, 398-99 (2014) (discussing the impact of attention scarcity on the effectiveness of disclosures).

⁴⁵ On the relevance of the APA and the possibility that a failure to offer a cost-benefit justification can be a form of unlawful arbitrariness, see Cass R. Sunstein, *Cost-Benefit Analysis and*

consumers and third parties would benefit greatly.⁴⁶ But assessment of costs and benefits can produce a convincing legal challenge.

As we will see, agencies have not always responded well to the difficulty of quantifying the costs and benefits of disclosure requirements. In fact, they have adopted four distinctive approaches, imposing increasingly severe information-gathering demands on agencies. It is not always easy to explain why they choose one or another in particular cases.

The first approach—and it may be the most candid—is to confess a lack of knowledge by acknowledging that, in light of existing information, some costs and (especially) benefits simply cannot be quantified.⁴⁷ The problem with this approach is that it suggests that the decision to proceed is essentially a stab in the dark.

The second approach involves “breakeven analysis,” by which agencies describe what the benefits would have to be in order to justify the costs—and

Arbitrariness Review, 41 HARV. ENVTL. L. REV. (forthcoming 2017). See also Nat'l Ass'n of Mfrs. v. SEC, 748 F.3d 359, 369 (D.C. Cir. 2014) (upholding a regulation by reference to statutory requirements, in the face of a challenge that the SEC failed to properly analyze the benefits of the rule due to a lack of data). To the extent that a statute requires an agency to proceed whether or not the benefits justify the costs—as does the GM labeling statute under discussion here—it is exceedingly unlikely that an inability to offer such a justification would render a regulatory decision legally vulnerable. See *id.* (“Despite the lack of data, the Commission *had* to promulgate a disclosure rule.”). It is possible, however, that the choice of a particular approach to labeling, as opposed to legally permissible alternatives, would be vulnerable if the latter has higher net benefits. And as noted, there will be considerable attention within the executive branch as to whether the benefits justify the costs.

⁴⁶ See Partha Deb & Carmen Vargas, *Who Benefits from Calorie Labeling? An Analysis of Its Effects on Body Mass* 14 (Nat'l Bureau of Econ. Research, Working Paper No. 21,992, 2016), <http://www.nber.org/papers/w21992> [<https://perma.cc/B695-RL98>] (finding that the “mandatory calorie labeling laws implemented over the past few years in a number of states and counties appear to be having substantial effects in terms of decreased BMI following implementation of such laws”); see also FUNG ET AL., *supra* note 44, at 1-10 (discussing the virtues and power of disclosures).

⁴⁷ For an important decision upholding a refusal to quantify benefits, on the ground that quantification was not feasible, see *Investment Co. Institute v. Commodity Futures Trading Comm'n*, 720 F.3d 370, 372-75 (D.C. Cir. 2013). In the context of disclosure, the leading decision is *National Ass'n of Manufacturers v. SEC*, which upheld against arbitrariness review a regulation that would require disclosure of the use of “conflict minerals”:

An agency is not required “to measure the immeasurable,” and need not conduct a “rigorous, quantitative economic analysis” unless the statute explicitly directs it to do so. Here, the rule’s benefits would occur half-a-world away in the midst of an opaque conflict about which little reliable information exists, and concern a subject about which the Commission has no particular expertise. Even if one could estimate how many lives are saved or rapes prevented as a direct result of the final rule, doing so would be pointless because the costs of the rule—measured in dollars—would create an apples-to-bricks comparison. Despite the lack of data, the Commission *had* to promulgate a disclosure rule.

748 F.3d at 369 (quoting *Inv. Co. Inst. v. Commodity Futures Trading Comm'n*, 720 F.3d at 379).

suggest that the benefits are indeed likely to be of the requisite magnitude.⁴⁸ In principle, this approach is better than a simple confession of ignorance, and it is often the best path forward. But it involves a high degree of guesswork, and it may be a mere conclusion, a kind of ipse dixit, masquerading as an analytic device.⁴⁹ Without a great deal of discipline, it too may not be so different from a confession of ignorance.

The third approach is to attempt to specify outcomes in terms of (say) economic savings or health endpoints.⁵⁰ The advantage of this approach is that it actually points to concrete benefits, and it attempts to measure and to monetize them. But it too runs into difficulties. The first is that agencies may lack anything like the information that would enable them to venture such a specification. The second and more interesting is that, for reasons I will explore, even an accurate specification will not give a complete picture of the actual benefits, and, in crucial respects, it will almost certainly overstate them.⁵¹ In brief, the problem is that people might experience significant losses as well as gains as a result of the label (for example, if they switch to a product that is inferior along certain dimensions), and an account of endpoints will ignore those losses.

The fourth approach is to identify consumers' willingness-to-pay.⁵² In principle, that approach is (mostly) the right one, because it should capture the full universe of losses and gains from the label. At the same time, it runs into serious and perhaps insuperable normative, conceptual, and empirical challenges.⁵³ As we shall see, the most obvious problem is that it is difficult to elicit people's *informed and unbiased* willingness-to-pay for labels.

1. Costs

On the cost side, some of the questions are relatively straightforward. Regulators may well be able to learn the total cost of (for example) producing fuel economy labels and placing them on new vehicles. The principal

⁴⁸ See Cass R. Sunstein, *The Limits of Quantification*, 102 CALIF. L. REV. 1369, 1387 (2014) (“[T]he central goal of breakeven analysis is straightforward. It is to pose this question: How high would the benefits have to be, in order for the costs to be justified?”).

⁴⁹ See *id.* at 1392 (“When lower or upper bounds cannot be specified in any way, it might be objected that breakeven analysis is not much more than a description or a hunch . . .”).

⁵⁰ See, e.g., Cary Coglianese & Gary E. Marchant, *Shifting Sands: The Limits of Science in Setting Risk Standards*, 152 U. PA. L. REV. 1255, 1302 (2004) (discussing the EPA's process of setting standards for fine particulate matter, which involved analysis of various health endpoints).

⁵¹ See *infra* subsection I.B.2.

⁵² See Sunstein, *supra* note 48, at 1375 (discussing the use of willingness-to-pay as a measure of the benefits of a regulation).

⁵³ See *id.* at 1377 (“[I]f we monetize regulatory benefits in terms of the willingness-to-pay criterion, we might not have an adequate measure of the welfare consequences of regulations. . . . It seems plain that the willingness-to-pay numbers should not be decisive when we are deciding whether and how to promote distributive goals.”).

difficulty arises *when the information itself imposes costs on consumers*. It is a mistake to ignore those costs, even if they prove difficult to quantify, and even if consumers benefit on net.⁵⁴ Those costs come in several different forms. Some of them will usually be low—but not always.

a. *A Small Cognitive Tax*

First, a cost is involved in reading and processing the information.⁵⁵ For each consumer, that cost is likely to be quite low, but across a large number of purchasers, it might turn out to be significant. Information disclosure is, in a sense, akin to a paperwork burden. To be sure, consumers are not compelled to read and process what is disclosed. But even for those who seek to ignore it, its very presence may operate as a kind of cognitive tax.

b. *A Hedonic Tax on Those Who Do Not Change Their Behavior*

Second, and more importantly, the cost may be hedonic, not cognitive.⁵⁶ Suppose that smokers are given information about the adverse health effects of smoking or that visitors to chain restaurants are given information about the caloric contents of food. Many members of both groups will suffer a hedonic loss. Consider, for example, smokers who cannot quit and customers who decide to choose high-calorie foods notwithstanding the labels. In hedonic terms, such people will lose, rather than gain, if they are miserable or at least sadder at the time of purchase.⁵⁷ To be sure, there is a serious normative question whether regulators should count, as costs, the adverse hedonic effect of truthful information. (Is it a cost, or a benefit, if people learn, truthfully, that they have diabetes or cancer? Is there not a cost as well as a benefit, even if the net effect is positive?) But if we are operating within a welfarist framework, the hedonic loss must be treated as a cost. It might turn out to be low, but regulators should not ignore it (as they typically do).

⁵⁴ For a useful discussion in an especially controversial area, see Helen Levy et al., *Tobacco Regulation and Cost-Benefit Analysis: How Should We Value Foregone Consumer Surplus?* (Nat'l Bureau of Econ. Research, Working Paper No. 22,471, 2016), <http://www.nber.org/papers/w22471.pdf> [<https://perma.cc/G6RD-gZHD>].

⁵⁵ See James Gibson, *Vertical Boilerplate*, 70 WASH. & LEE L. REV. 161, 171-80 (2013) (discussing the costs of information acquisition and processing in the context of form contracts).

⁵⁶ See John Bronsteen et al., *Well-Being Analysis vs. Cost-Benefit Analysis*, 62 DUKE L.J. 1603, 1608-09 (2013) (describing the field of hedonic psychology, which measures “how much any factor improves or worsens” the human experience, and its implications for public policy).

⁵⁷ See Emily Oster, *Calorie Counts on Menus Won't Change What Americans Eat*, FIVETHIRTYEIGHT (Dec. 2, 2014, 1:08 PM), <https://fivethirtyeight.com/features/calorie-counts-on-menus-wont-change-what-americans-eat/> [<https://perma.cc/MA7E-W4MX>] (“If the actual impact of calorie labeling is to encourage only a few people to eat fewer calories but to make many more people feel worse about themselves, it seems less than obvious that it is a welfare-improving idea.”).

c. *A Hedonic Tax on Those Who Do Change Their Behavior*

Even if people might be able to quit smoking or end up choosing lower-calorie items, and will hence benefit greatly on net, they will incur a cost by seeing something that inflicts pain. In principle, that cost should also count, even if it is greatly outweighed by benefits.⁵⁸ The point, then, is not that the hedonic cost is a trump card; if people make different choices once they are informed, the presumption should be that they are better off. But *by how much?* To answer that question, the hedonic cost must be taken into account. For many people, a calorie label imposes a serious cost, simply because it informs them that the delicious cheeseburger they are about to eat is also going to make their belly bulge. (As a friend remarked to me after hearing that the calorie labeling requirement in the Affordable Care Act would be applied to movie theaters, “They just ruined popcorn.”)

d. *A Consumer Welfare Loss*

There is a fourth loss, in the form of foregone consumer surplus. Suppose that people decide that on balance, they should have a salad rather than a cheeseburger, on the ground that the latter has many more calories. If they choose the salad because of the label, they are probably better off on balance⁵⁹—and in a sense, they are sadder but wiser (and healthier). They are sadder to the extent that they enjoy their meal less. Assessment of the magnitude of the loss poses serious conceptual and empirical challenges, but there is no question that it exists, and that it might turn out to be a significant fraction of the benefits. In principle, a decision to forego the hamburger might make people only modestly better off, if the hedonic loss is almost as high as the health gain.⁶⁰

Suppose, for example, that consumers are choosing between two essentially equivalent cars; that the more fuel-efficient one would cost \$2000 less annually to operate because of its fuel efficiency; that the less fuel-efficient one would

⁵⁸ See Hunt Allcott & Cass R. Sunstein, *Regulating Internalities*, 34 J. POL’Y ANALYSIS & MGMT. 698, 704 (2015) (laying out a “model . . . [for] how policy intervention can increase welfare, whether by restricting choices, changing prices, or by ‘nudging’ individuals toward privately-optimal decisions”).

⁵⁹ The assumption here is that people know what is the best choice for them, once they are informed, but a behavioral bias cannot be entirely ruled out.

⁶⁰ I am bracketing here the possible endogeneity of preferences. See PREFERENCE CHANGE: APPROACHES FROM PHILOSOPHY, ECONOMICS AND PSYCHOLOGY 4 (Till Grüne-Yanoff & Sven Ove Hansson eds., 2009) (discussing the work of economists to incorporate individuals’ changing preferences into models of supply and demand). Suppose that at Time 1, people enjoy hamburgers a lot and enjoy salads only a little. Now suppose that people switch at Time 2 because they want to eat healthier. At Time 3, people might come to dislike hamburgers (disgusting!) and to love salad (fresh!). In principle, preference change must be taken into account by the considered cost-benefit analysis, though doing so presents serious challenges: it might be difficult to know the magnitude of the change and even the sign (perhaps those who switch to salad will crave hamburgers and grow to despise salad).

cost \$500 upfront; and that because of the fuel economy label, they select the fuel-efficient car. For each such consumer, we might be tempted to say that the label has produced \$1500 in gains. But in actual practice, the effects of a fuel economy label will be much more complicated to assess. Some consumers will end up purchasing cars that are more fuel-efficient but inferior along some dimension, so that they will gain \$1500 minus X , where X refers to the desirable features of the unchosen car that they otherwise prefer. It is hard for public officials to know whether X is, on average, \$100, or \$1000, or \$1450.⁶¹

2. Benefits

On the benefits side, the assessment is even more challenging.⁶² If the government mandates a fuel economy label, agencies should project the economic and environmental benefits from the mandate. But to do that, they have to *know the effect of labels on behavior*. In principle, a randomized controlled trial would be valuable and perhaps necessary for that purpose. If one group sees a particular label and a similar group sees a different label (or no label), regulators should be able to specify the effect of the label on purchasing

⁶¹ This claim does not depend on the objection that a fleet-wide fuel-efficiency requirement will impose costs in the form of a less attractive fleet (with, for example, less powerful vehicles). See Ted Gayer & W. Kip Viscusi, *Overriding Consumer Preferences with Energy Regulations* 16 (Mercatus Ctr., George Mason Univ., Working Paper No. 12-21, 2012), http://mercatus.org/sites/default/files/Energy_regulations_GayerViscusi_WP1221_1.pdf [<https://perma.cc/2UHC-HWHS>] (arguing against use of bounded rationality to assess the benefits of fuel economy regulations). All that is necessary is that consumers choose more fuel-efficient vehicles over vehicles that are better along some dimension.

⁶² For example, according to the Environmental Protection Agency and the Department of Transportation, speaking of new fuel economy labels,

The agencies recognize that Executive Order 13563 directs agencies “to use the best available techniques to quantify anticipated present and future benefits as accurately as possible.” In this context, however, quantitative information is not available, and the agencies have therefore chosen instead to continue with a qualitative assessment of benefits. It is difficult to develop a good baseline for the fleet using the existing label, partly because the existing label is not designed to incorporate advanced technology vehicles. It is even more difficult to develop a comparison for the fleet with the new labels, because the effects of label designs on vehicle purchases are not known. Thus, any assessment of quantitative effects of label design on vehicle sales involves a great deal of speculation. The agencies believe that informed choice is an end in itself, even if it is hard to quantify; the agencies also believe that the new labels will provide significant benefits for consumers, including economic benefits, though these benefits cannot be quantified at this time.

Revisions and Additions to Motor Vehicle Fuel Economy Label, 76 Fed. Reg. 39,478, 39,517 (proposed July 6, 2011) (to be codified at 40 C.F.R. pts. 85, 86, 600; 49 C.F.R. pt. 575) [hereinafter Fuel Economy Labels Rule]. In short, “The primary benefits associated with this rule are associated with improved consumer decision-making resulting from improved presentation of information. At this time, EPA and NHTSA do not have data to quantify these impacts.” *Id.*

decisions. Armed with that information, they could estimate economic and environmental consequences (at least if they could generalize from the trial).

Unfortunately, it is sometimes difficult or impossible to run randomized controlled trials. In these circumstances, making any kind of projection of how consumers will react to a label is exceedingly difficult. An additional problem is that for the reasons given thus far, the projection would not give an adequate estimate of the (net) benefits. We have seen that if people are buying cars that are more fuel-efficient but otherwise highly undesirable, there will be a welfare loss. For that reason, regulators might explore the issue from another direction.⁶³ Rather than asking about the economic savings from the fuel-efficient car, they might ask an entirely different question: *how much would consumers be willing to pay for a fuel economy label?*

Under ideal conditions, the right question for regulators to ask involves willingness-to-pay; they should not focus on the economic benefits that consumers might receive if (for example) they purchase more fuel-efficient cars.⁶⁴ The reason is that on optimistic assumptions, the willingness-to-pay question ought to capture everything that matters to consumers.⁶⁵ (Of course it is true that the question will not fully capture third-party effects.)

⁶³ See Hunt Allcott & Judd B. Kessler, *The Welfare Effects of Nudges: A Case Study of Energy Use Social Comparisons 2* (Nat'l Bureau of Econ. Research, Working Paper No. 21,671, 2015), <http://www.nber.org/papers/w21671> [<https://perma.cc/9MD3-8QX2>] (noting that nudges “can affect behavior without changing prices or choice sets”).

⁶⁴ See *id.* at 1 (responding to policy interventions by “measur[ing] consumer welfare . . . by willingness-to-pay”).

⁶⁵ See *id.* at 7-8 (defining a formula to measure consumer welfare). As noted, I am assuming that the answers to this question are not a product of an absence of relevant information or behavioral biases. I am also bracketing some questions about the difference between subjective and objective welfare. See MATTHEW D. ADLER, WELL-BEING AND FAIR DISTRIBUTION: BEYOND COST-BENEFIT ANALYSIS 165-66 (2012) (noting various philosophical approaches to studying well-being, including subjective “individual well-being” and the “objective list” approach); JON ELSTER, SOUR GRAPES: STUDIES IN THE SUBVERSION OF RATIONALITY 125 (1983) (considering adaptive preferences and the interplay between power, freedom, and welfare, underscoring “freedom and how it is related to welfare”); MARTHA C. NUSSBAUM, CREATING CAPABILITIES: THE HUMAN DEVELOPMENT APPROACH 81 (2011) (defending the capabilities approach while also discussing the “welfarist” approach, which “ask[s] what people’s preferences would be if they had full and comprehensive information”). The difference between subjective and objective welfare might turn out to be relevant in some health-related contexts. See CALORIE LABEL RULE IMPACT ANALYSIS, *supra* note 42, at 62 (relying on “willingness-to-pay for nutrition information . . . to estimate welfare gain that serves as our estimate of the benefits of the final rule”). For example, the Calorie Label Rule Impact Analysis undertook quantifying the potential benefits of the regulation in the following way,

We begin by describing a study (Abaluck 2011) that estimates the welfare gains from increased nutritional information provided by the Nutrition Labeling and Education Act of 1990 (NLEA) and additional labeling (i.e. extending nutritional information provided by the NLEA to include food away from home, fresh produce, and meats); our primary estimate of the benefits of the final rule uses the willingness-to-pay for nutrition information from that study to estimate welfare gain that serves as our estimate of the benefits of the final rule (Ref. 43). Next, we provide a thorough review

As an empirical matter, however, it is not easy to obtain a reliable answer to that question, or anything close to it. We might simply ask people, but for their answers to be relevant, it would be important to provide pertinent information⁶⁶—for example, about the potential benefits (purely economic and otherwise) of labels. Providing that information is no simple endeavor, not least because offering some numbers about those potential benefits would be important, and any numbers might “anchor” consumers and hence bias their answers.⁶⁷ Suppose that the problem of anchoring could be overcome and that informed consumers would be willing to pay (say) \$10, on average, for fuel economy labels. If so, we might have some sense of the benefits, at least if behavioral biases are not distorting people’s answers. Unfortunately, however, such biases might well produce distortions; consider present bias and optimistic bias, which may lead to unduly low willingness-to-pay. In any case, survey evidence is imperfectly reliable, in part because of the familiar problems with contingent valuation studies,⁶⁸ in part because of the immense difficulty of informing consumers in a sufficiently neutral way.⁶⁹

For health-related disclosures, the problem is even harder. One goal of calorie labels, for example, is to reduce obesity, which causes an assortment of health problems, including premature mortality.⁷⁰ Regulators have established

of the literature on the potential effects of interventions similar to the final rule on consumer behavior. We then compare the main benefit estimate with two supplemental, illustrative examples of benefits using the literature’s average reduction in calories consumed at restaurants due to menu labeling. These supplemental estimates are not included in the final reported values. Last, we conduct a sensitivity analysis and discuss the sources of uncertainty in our estimate.

Id. at 62-63.

⁶⁶ This is an objection to the particular numbers produced by Allcott and Kessler, *supra* note 63, at 19-21, 27-29, in their valuable paper on the welfare effects of nudges. In their study, information was not provided to participants, so the elicited responses regarding willingness-to-pay for energy conservation notices are insufficiently informed. *See id.* at 9-15 (explaining the experimental design). Nonetheless, Allcott and Kessler convincingly argue that, in principle, willingness-to-pay is the right question, *id.* at 33, subject to the qualifications in *supra* notes 63-65 and accompanying text.

⁶⁷ *See* Nicholas Epley & Thomas Gilovich, *The Anchoring-and-Adjustment Heuristic: Why the Adjustments Are Insufficient*, 17 *PSYCHOL. SCI.* 311, 311 (2006) (noting that “the starting information, or anchor, tends to exert drag on the subsequent adjustment process, leaving final estimates too close to the original anchor”).

⁶⁸ *See* Jerry Hausman, *Contingent Valuation: From Dubious to Hopeless*, 26 *J. ECON. PERSP.* 43, 44 (2012) (noting that “the results of [contingent valuation] surveys are unlikely to be accurate predictors of informed opinion. Contingent valuation about specific projects does not improve the inputs to the analysis, so it should not be included in the policy analysis”).

⁶⁹ Researchers might want to inform consumers about the economic savings from a fuel-efficient car, but that number is highly likely to serve as an anchor, biasing judgments. *See supra* note 67.

⁷⁰ *See* Calorie Label Rule, 21 C.F.R. § 101.78 (2016) (discussing the relationship between diet and cancer risk); *see also* CALORIE LABEL RULE IMPACT ANALYSIS, *supra* note 42, at 65 (noting that “consumption of more calories than is necessary to maintain a healthy weight is one of the primary

ways to turn health-endpoints into monetary equivalents. For example, a statistical death is now valued at about nine million dollars.⁷¹ But how many premature deaths would be prevented by calorie labels? And what would be the effect of such labels on adverse health outcomes short of death?

To answer such questions, regulators have to undertake two tasks. First, they must begin by making some prediction about the effect of calorie labels on what people choose to eat.⁷² Second, they have to follow that prediction by specifying the health consequences of lower levels of caloric intake.⁷³ At least it can be said that if they can accomplish those tasks, they will have some sense of the benefits of the labels, once (and this is a third task) they turn the various consequences into monetary equivalents.⁷⁴ After undertaking all three tasks, regulators will have specified endpoints—but for the reasons given, a specification of endpoints will overstate benefits because it will not include various cognitive and hedonic losses.

risk factors for overweight and obesity . . . [M]any menu labeling studies provide evidence to suggest that calorie intake will be influenced by the nutrition labeling requirements”).

⁷¹ See, e.g., Memorandum from Kathryn Thomson, Gen. Counsel & Carlos Monje, Assistant Sec’y for Policy, U.S. Dep’t of Transp., to Secretarial Officers & Modal Adm’rs, U.S. Dep’t of Transp. 2 (June 17, 2015), https://www.transportation.gov/sites/dot.gov/files/docs/VSL2015_0.pdf [<https://perma.cc/C6RQ-4ZZR>] (“On the basis of the best available evidence, this guidance identifies \$9.4 million as the value of a statistical life.”); see also CASS R. SUNSTEIN, VALUING LIFE: HUMANIZING THE REGULATORY STATE 85 (2014) (providing the underlying theory and a discussion of how “agencies . . . assign monetary values to the human lives that would be saved by a proposed regulation”).

⁷² See *id.* (noting that a calorie labeling rule would have the benefit of “decreasing the consumption of calories from standard menu items”).

⁷³ See *id.* (specifying that the benefits of the rule were measured “as the direct medical costs and total burden of lost quality adjusted life years (QALYs) that could be averted from an improved diet . . . minus the value of lost utility from reduced or altered consumption”).

⁷⁴ See CALORIE LABEL RULE IMPACT ANALYSIS, *supra* note 42, at 89 (discussing the methodology used to assume numerical figures to the proposed benefits of the rule). For another example, see Required Warnings for Cigarette Packages and Advertisements, 76 Fed. Reg. 36,628, 36,719 (proposed June 22, 2011) (to be codified at 21 C.F.R. pt. 1141), <http://www.fda.gov/downloads/TobaccoProducts/Labeling/RulesRegulationsGuidance/UCM339834.pdf> [<https://perma.cc/UY5U-JJEE>] [hereinafter Graphic Warnings for Cigarettes Rule], explaining,

We estimate the benefits of the final rule by comparing expected life-cycle events of smokers with those of nonsmokers. Nonsmokers tend to live longer and develop fewer cancers, cardiovascular, pulmonary, and other diseases, so the benefits in our analysis include the discounted value of life-years gained, health status improvements and medical services freed for other uses. We also include an estimate of the monetary value of the property and lives saved as a result of the rule-induced reduction in the number of accidental fires caused by smoking. There are other benefits, such as reductions in nonsmokers’ morbidity and mortality associated with both passive smoking and mothers smoking during pregnancy, that are likely generated by the final rule, but FDA has been unable to obtain reliable data with which to quantify them. In particular, we were not able to project future levels of exposure to secondhand smoke from historical trends, nor predict future decreases in maternal smoking during pregnancy.

Alternatively, we could (again) ask how much people would be willing to pay for calorie labels.⁷⁵ As before, asking that question is, in principle, preferable to an effort to assess health-states because the answer will capture all variables that matter to consumers.⁷⁶ Also, as before, there are formidable challenges in using surveys to elicit reliable numbers free from biases of various kinds.

In light of these challenges, regulators have two reasonable options. First, they can work on the two relevant tracks to try to produce answers: exploring end-points and enlisting surveys. On prominent occasions, they have tried the former.⁷⁷ Second, they can acknowledge the difficulties, confess that they cannot surmount them, and use “breakeven analysis,” by which they ask what the benefits would have to be, in order to justify the costs, and then do what they can to generate a reasonable lower bound.⁷⁸ Suppose, for example, that an

⁷⁵ See Maria L. Loureiro et al., *Do Consumers Value Nutritional Labels?*, 33 EUR. REV. AGRIC. ECON. 249, 263 (2006) (finding that “on average, consumers are willing to pay close to 11 per cent above the initial price to obtain cookies with nutritional labelling”); see also *id.* at 249 (“Consistent with prior expectations, our results also indicate a difference between the [willingness-to-pay] of individuals suffering from diet-related health problems (estimated mean 13 per cent) and those who do not suffer any diet-related health problems (estimated mean 9 per cent).”).

⁷⁶ In the words of the FDA,

To our knowledge, Abaluck (2011) is the only study that translates the potential effect of increasing nutrition information on consumption into estimates of welfare gains using willingness-to-pay based on revealed preferences (Ref. 43). This study uses the variation in nutrition information generated by Nutrition Labeling and Education Act (NLEA) as a method to determine how changes in individuals’ beliefs about nutrient content affect consumption decisions. The differential changes in nutrition information across food categories, measured in units of calories per gram, allow the study to identify a general model of food demand as a function of nutrient characteristics that accounts for the total daily diet, prior beliefs about nutrient content, and preferences, including willingness to substitute across food categories.

CALORIE LABEL RULE IMPACT ANALYSIS, *supra* note 42, at 64. As before, however, the willingness-to-pay criterion may run into normative objections, even from the standpoint of welfare. See generally JOHN BRONSTEEN ET AL., *HAPPINESS AND THE LAW* (2015) (raising questions about willingness-to-pay in view of people’s occasional failure to know what will promote their welfare).

⁷⁷ See Graphic Warnings for Cigarettes Rule, *supra* note 74, at 36,719 (noting the longer lifespans, fewer cancers and diseases, as well as increased property and monetary values of non-smokers); Improve Tracking of Workplace Injuries and Illnesses, 81 Fed. Reg. 29,624, 29,628 (proposed May 12, 2016) (to be codified at 29 C.F.R. pts. 1904, 1902) [hereinafter OSHA Reporting Requirement Rule] (requiring that employees have access to OSHA logs); Fuel Economy Labels Rule, *supra* note 62, at 39,517 (“The agencies believe that informed choice is an end in itself, even if it is hard to quantify; the agencies also believe that the new labels will provide significant benefits for consumers, including economic benefits, though these benefits cannot be quantified at this time.”); see also CALORIE LABEL RULE IMPACT ANALYSIS, *supra* note 42, at 11 (“The final rule may also assist consumers by making the long-term health consequences of consumer food choices more salient and by providing contextual cues of food consumption.”).

⁷⁸ See Sunstein, *supra* note 48, at 1372 (“Breakeven analysis . . . is a way to engage in a form of cost-benefit analysis (understood with suitable capaciousness) when regulators face serious limitations in knowledge.”). The FDA ultimately chose an approach of this kind in an important regulation involving tobacco products. For an outline and a discussion of the context of this decision, see Levy et al., *supra* note 54, at 8, which explains,

energy-efficiency label for refrigerators would cost \$10 million annually and that eight million refrigerators are sold in the United States every year. Even if the average consumer saves only \$0.50 annually as a result of the label, the cost will be made up in just three years. Breakeven analysis can be crude, but in some cases, it will suggest that the argument for labels is either very strong or very weak.⁷⁹

3. Third Parties—and Morality

Some actual or imaginable labels are meant to protect third parties, not consumers as such. Suppose that some or many consumers are concerned about the use of certain minerals to finance mass atrocities, and they favor labeling, or some kind of disclosure requirement, so that consumers can decline to purchase products that contain such minerals.⁸⁰ Or suppose that consumers care about where goods were made, perhaps because they want to purchase products from their own nation or perhaps because they do not want to purchase products from nations that do not respect human rights. They might seek “country of origin” labels for that reason.⁸¹ Or suppose that some or many consumers care about the welfare of animals in general or certain animals in particular; because they do, they seek labels to reflect how animals were (mis)treated.

In some of these cases, the third-party effects are not obscure, and the real challenge is how to quantify them. As before, it is necessary to begin by making

A more recent rule issued by the FDA in April 25, 2014 proposes deeming tobacco products such as cigars and e-cigarettes subject to FDA regulation. Although the regulatory impact analysis accompanying this proposed rule avoids even using the term “consumer surplus” (referring instead to “full welfare gains”), the approach is conceptually similar to the regulatory impact analysis accompanying the final rule for the graphic warning labels, with foregone consumer surplus offsetting 67 to 84 percent of the value of smokers’ private health gains. The regulatory impact analysis accompanying the final version of this rule, released in May 2016, backed away from this estimate. Instead, the May 2016 analysis took a “breakeven” approach that did not quantify the rule’s benefits but instead calculated how large the benefits of the rule would have to be to justify the costs (which are quantified), effectively sidestepping the question of how large the consumer surplus offset should be.

⁷⁹ See OSHA Reporting Requirement Rule, *supra* note 77, at 29,686 (stating that “if the final rule leads to either 1.5 fewer fatalities or 0.025 percent fewer injuries per year, the rule’s benefits will be equal to or greater than the costs. Many accident-prevention measures will have some costs, but even if these costs are 75 percent of the benefits, the final rule will have benefits exceeding costs if it prevented 4.8 fatalities or 0.8 percent fewer injuries per year. OSHA expects the rule’s beneficial effects to exceed these values”).

⁸⁰ See generally *Nat’l Ass’n of Mfrs. v. SEC*, 800 F.3d 518 (D.C. Cir. 2015) (addressing the constitutionality of “conflict minerals” disclosures required under Dodd–Frank). For a general discussion of conflicts minerals regulation, see Posner & Sunstein, *supra* note 27, at 17–19.

⁸¹ See *Am. Meat Inst. v. U.S. Dep’t of Agric.*, 760 F.3d 18, 23 (D.C. Cir. 2014) (noting the “the context and long history of country-of-origin disclosures to enable consumers to choose American-made products”).

some projections about consumer behavior. To what extent would consumers change their purchasing habits in response? Even if that question can be answered, it would be necessary to tie any such changes to reduced harm or increased benefit for third parties. And even if that problem can be resolved, it would be necessary to quantify and monetize the resulting effects. It is no wonder that in the context of conflict minerals, the agency concluded that quantification was not possible.⁸² Perhaps it should have engaged in some form of breakeven analysis, explaining that the requirement was likely to survive cost–benefit analysis even if its effect were modest. But perhaps it lacked the information that would have allowed it to make that analysis plausible.⁸³

Some disclosure requirements, including mandatory labels, are not simple to defend within a standard cost–benefit framework, not for the reasons I have been sketching, but because considerations of equity, distributional effects, or human dignity are involved. When values of this kind are involved, it is perfectly legitimate for agencies to consider them.⁸⁴ Under the prevailing executive order, it might well be sufficient for agencies simply to point to such considerations and not to fold them into a cost–benefit analysis.⁸⁵ Agencies are authorized to give independent consideration to equity and human dignity.⁸⁶ If the statutory goal is to achieve distributional goals, by transferring resources from some people to others, then cost–benefit balancing is not the rule of decision, and it is not all that matters. A rule might have costs in excess of benefits, in the sense that the losers lose more than the winners gain, but perhaps the winners are poor or otherwise deprived, and perhaps have a special claim to attention under the relevant law or as a matter of principle.⁸⁷

⁸² See Nat'l Ass'n of Mfrs. v. SEC, 800 F.3d at 547 (“The Commission was ‘unable to readily quantify’ the ‘compelling social benefits’ the rule was supposed to achieve: reducing violence and promoting peace and stability in the Congo.” (quoting Conflict Materials, 77 Fed. Reg. 56,274, 56,350 (Sept. 12, 2012) (to be codified at 17 C.F.R. pts. 240 & 249b))).

⁸³ On the importance of including consumers’ willingness-to-pay to protect their own moral commitments, see Posner & Sunstein, *supra* note 27, at 16.

⁸⁴ See Exec. Order 13,563, § 1, 3 C.F.R. 215, 216 (2011), *reprinted in* 5 U.S.C. § 601 app. at 102-02 (2012) (“Where appropriate and permitted by law, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts.”). I am bracketing some theoretical issues here. See *generally* LOUIS KAPLOW & STEVEN SHAVELL, *FAIRNESS VERSUS WELFARE* (2006), which explores economic and moral arguments and concludes that welfare is the appropriate criteria for evaluating legal rules.

⁸⁵ See Exec. Order 13,563, § 1, 3 C.F.R. 215 (directing agencies to “propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify)”).

⁸⁶ See *supra* note 84.

⁸⁷ On the complexities here, see W. Kip Viscusi, *Risk Equity*, 29 J. LEGAL STUD. 843, 853 (2000), which states, “Market outcomes that generate the same risk levels as would benefit-cost analysis will differ in an important way in that those bearing the risk will receive some form of compensation in terms of higher wages or lower prices for the risk. In the situation of risk regulation coupled with a complete lack of information regarding the risk, there will be no associated compensation.” See also

I have suggested that if quantification of the benefits of labels is required, the question might be: how much would (informed) consumers be willing to pay for such labels? Within a certain framework, that question is the right one. But it is not at all clear that the framework is the right one. If the issue involves human dignity, equity, or distributional considerations—or any kind of harm to third parties—why should the proper analysis depend on how much people are willing to pay for it? It seems senseless to say that labels motivated by distributive goals should be imposed to the extent that people are willing to pay for them.

To say this is not to say that consequentialist considerations do not matter at all. Insofar as harms to third parties are involved, cost–benefit analysis can be used, acknowledging the empirical problems sketched above. Insofar as the issue involves equity or dignity, breakeven analysis might be useful.⁸⁸ To the extent that distributive goals are involved, a key question is whether such goals would, in fact, be promoted by labels or disclosure. That question would seem relevant to the “conflict minerals” problem.⁸⁹ Some kind of means–ends analysis, explaining how the means are connected to the ends, would seem indispensable to an evaluation of labels that are designed to promote distributive goals (or for that matter equity or human dignity). Agencies should be expected to undertake that analysis—or to explain why they cannot.

4. Risk–Risk Tradeoffs: A Brisk Note

Some labels might reduce risks but also simultaneously create risks. Suppose, for example, that consumers are concerned about Omicron Z (a hypothetical ingredient) and the government responds with a mandatory label. Suppose too that if consumers shift from products with Omicron Z, they will purchase products that contain higher risks. If so, labels will increase risks on balance. As we shall see, the problem is not hypothetical: products that are GMO-free create risks of their own.

II. GENETICALLY MODIFIED FOODS

I now turn to the question of mandatory labels for GM foods. As we shall see, all of the points discussed thus far—and especially the question of valuing benefits—must be taken into account by the USDA when it produces a regulatory impact analysis to accompany implementing regulations. I offer

SUNSTEIN, *supra* note 71, at 127–30 (noting that society may want to promote a goal that achieves certain goals, even when the “losers” lose more than the “winners” win).

⁸⁸ For an explanation with examples, see Sunstein, *supra* note 48, at 1387–89, which offers a number of illustrative examples of breakeven analysis.

⁸⁹ See *supra* note 47 and accompanying text.

two general conclusions. The first is that it will not be easy for the USDA to show that the benefits of the mandate justify the costs. The second is that, of the USDA's various options, the best (or least bad) is probably to use breakeven analysis, accompanied by an account of consumers' desire to be informed or by reference to the remaining uncertainties about the environmental risks of GM foods. In view of the highly technical nature of some of the underlying questions, and the existence of reasonable disputes among specialists, my goal is less to offer final conclusions about the cost–benefit analysis for GMO labels than to outline the considerations that must be taken into account by those who must produce that analysis.

A. *A Little Science*

1. Definition and Pervasiveness

The World Health Organization defines GMOs as “organisms . . . in which the genetic material (DNA) has been altered in a way that does not occur naturally.”⁹⁰ According to a common understanding, a GMO is “one that has been deliberately created to contain a piece of ‘foreign’ DNA, usually a full-length ‘foreign’ gene incorporated in its genome.”⁹¹ As a result of the underlying technology, sometimes called “recombinant DNA technology” or “genetic engineering,” certain individual genes are transferred into one organism from another.⁹² The magnitude of the benefits of GM foods is disputed, but they can potentially grow faster, taste better, resist diseases, have a lower reliance on pesticides, cost less to produce, and prove more nutritious.⁹³

In the United States, GM food has become pervasive. According to the USDA, adoption of GM “crop varieties by U.S. farmers has reached about 90 percent of the planted acres of corn, soybeans, and cotton.”⁹⁴ American

⁹⁰ *Food Safety: Frequently Asked Questions on Genetically Modified Foods*, WORLD HEALTH ORG., http://www.who.int/foodsafety/areas_work/food-technology/faq-genetically-modified-food/en/ [<https://perma.cc/JF9F-6Q6C>].

⁹¹ R. Michael Roberts, *Genetically Modified Organisms for Agricultural Food Production: The Extent of the Art and the State of the Science*, in LABELING GENETICALLY MODIFIED FOOD, *supra* note 6, at 10–11.

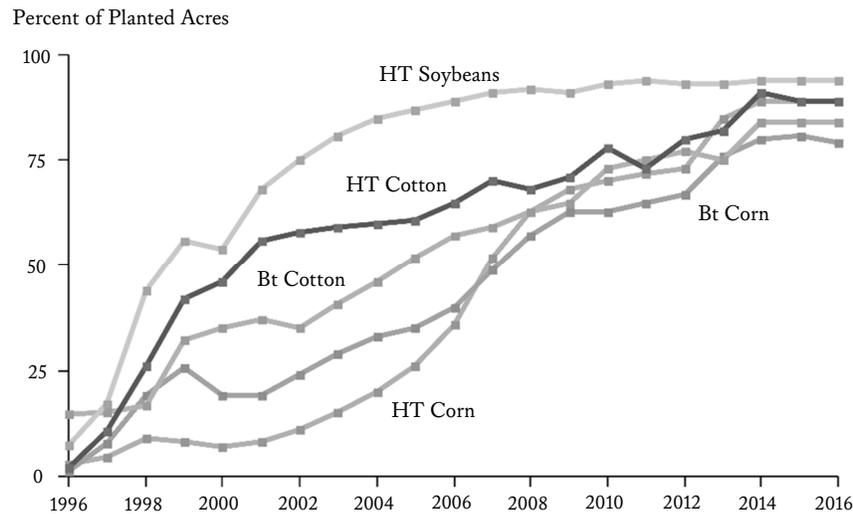
⁹² *See id.* at 11–12 (providing a brief overview of the process of creating GMOs).

⁹³ *See* Hans De Steur et al., *Status and Market Potential of Transgenic Biofortified Crops*, 33 NATURE BIOTECHNOLOGY 25, 25–26 (2015) (describing “Golden Rice,” which is fortified with vitamin A and was able to “expand the range of micronutrient strategies available to malnourished populations”); L.L. Wolfenbarger & P.R. Phifer, *The Ecological Risks and Benefits of Genetically Engineered Plants*, 290 SCI. 2088, 2091 (2000) (discussing sustainability of crops that have “insecticidal properties, viral resistance, or herbicide tolerance”).

⁹⁴ JORGE FERNANDEZ-CORNEJO ET AL., U.S. DEP’T OF AGRIC., NO. 162, GENETICALLY ENGINEERED CROPS IN THE UNITED STATES 2 (2014), https://www.ers.usda.gov/webdocs/publications/err162/43668_err162.pdf [<https://perma.cc/H7H5-W4B4>].

“consumers eat many products derived from these crops—including cornmeal, oils, and sugars—even though they are generally unaware of that fact.⁹⁵ In American supermarkets, GM ingredients can be found in about 70 percent of processed foods.⁹⁶ Among them are pizza, cookies, ice cream, salad dressing, corn syrup and chips. Consider the following figure:

Figure 1: Adoption of Genetically Engineered Crops in the United States, 1996–2016⁹⁷



2. Benefits

Do GM foods have significant benefits? The answer is sharply disputed, and I hardly mean to settle it here, but the standard arguments on behalf of GM ingredients are that they can produce superior foods with not only more

⁹⁵ *Id.*

⁹⁶ See *About Genetically Engineered Foods*, CTR. FOR FOOD SAFETY, <http://www.centerforfood safety.org/issues/311/ge-foods/about-ge-foods> [<https://perma.cc/H7PK-FDYL>] (“It has been estimated that upwards of 75% of processed foods on supermarket shelves – from soda to soup, crackers to condiments – contain genetically engineered ingredients.”).

⁹⁷ *Recent Trends in GE Adoption*, U.S. DEP’T OF AGRIC., ECON. RES. SERV., <http://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx> [<https://perma.cc/DC3L-YU7M>] (last updated Nov. 3, 2016). See also *id.* (“Data for each crop category include varieties with both HT and Bt (stacked) traits. Sources: USDA, Economic Research Service using data from Fernandez-Cornejo and McBride (2002) for the years 1966-99 and USDA, National Agricultural Statistics Service, June Agricultural Survey for the years 2000-16.”).

nutritional value and greater resistance to herbicides (requiring less use of pesticides) but also improved texture and taste.⁹⁸ GM food is often engineered for longer shelf-life, furthering the reach of shipping fresh food.⁹⁹ For example, the Innate potato has been engineered to prevent bruising and browning, as well as to reduce the amount of the possible-carcinogen acrylamide released when the potato is fried.¹⁰⁰

The most famous nutritional supplementation may be Golden Rice, a variety engineered to provide vitamin A.¹⁰¹ In hopes of combatting protein malnutrition, cereals such as maize, canola, and soybean have been engineered for greater amounts of lysine, an essential amino acid.¹⁰² Some products are alternatives to unhealthy foods, such as the sweet protein brazzein, developed in maize as an alternative sweetener to unhealthy sugar.¹⁰³ Scientists have also been able to reduce the harmful effects of food products, in one instance isolating proteins that cause allergic reactions in the development of a hypoallergenic peanut.¹⁰⁴ In addition, GM foods have been engineered to act

⁹⁸ See Peter Celec et al., *Biological and Biomedical Aspects of Genetically Modified Food*, 59 BIOMEDICINE & PHARMACOTHERAPY 531, 532-33 (2005) (discussing the potential for genes to “improve[] flavor characteristics,” “increase [the] nutritional status of the foods,” and confer higher food quality such as “shelf-life, taste, [and] nutritional value.”).

⁹⁹ See *id.*

¹⁰⁰ See Andrew Pollack, *U.S.D.A. Approves Modified Potato. Next Up: French Fry Fans*, N.Y. TIMES (Nov. 7, 2014), <http://www.nytimes.com/2014/11/08/business/genetically-modified-potato-from-simplot-approved-by-usda.html> [<https://perma.cc/46FK-TXF8>] (“The potato’s DNA has been altered so that less of a chemical called acrylamide, which is suspected of causing cancer in people, is produced when the potato is fried. The new potato also resists bruising . . .”).

¹⁰¹ See Xudong Ye et al., *Engineering the Provitamin A (β-Carotene) Biosynthetic Pathway into (Carotenoid-Free) Rice Endosperm*, 287 SCIENCE 303, 303 (2000) (discussing how genetically engineered rice can combat vitamin A deficiency); see also Robert E. Black et al., *Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries*, 382 LANCET 427, 433 (2013) (finding Vitamin A deficiencies to be responsible for 157,000 deaths of those aged 5 years and younger in 2011).

¹⁰² See Martina Newell-McGloughlin, *Nutritionally Improved Agricultural Crops*, 147 PLANT PHYSIOLOGY 939, 940 tbl.I (2008), <http://www.plantphysiol.org/content/147/3/939.full.pdf+htm> [<https://perma.cc/4W33-FZ8V>] (listing canola, maize, and soybeans as crops with high “Lys”). Newell-McGloughlin provides an overview of techniques and products of GM nutritional supplementing—with carbohydrates, fiber, vitamins, and more—as well as for reduced antinutrients, allergens, and toxins.

¹⁰³ See Barry J. Lamphear et al., *Expression of the Sweet Protein Brazzein in Maize for Production of a New Commercial Sweetener*, 3 PLANT BIOTECHNOLOGY J. 103, 109 (2005) (reporting on “the use of a maize expression system for the economical production of the intensely sweet protein, brazzein, for both low- and high-intensity sweetener markets”).

¹⁰⁴ See Hortense W. Dodo et al., *Alleviating Peanut Allergy Using Genetic Engineering: The Silencing of the Immunodominant Allergen Ara h 2 Leads To Its Significant Reduction and a Decrease in Peanut Allergenicity*, 6 PLANT BIOTECHNOLOGY J. 135, 140 (2007) (reporting that the study produced “a significant reduction in the level of Ara h 2, the most immunodominant peanut allergen”); see also Steven Novella, *CRISPR and a Hypoallergenic Peanut*, NEUROLOGICA BLOG (Oct. 8, 2015), <http://theness.com/neurologicablog/index.php/crispr-and-a-hypoallergenic-peanut/> [<https://perma.cc/RRJ3-S9KB>] (“In 2005 a study was published showing that it is possible to silence the gene for the Ara H2 protein, the primary allergenic protein in peanuts. A 2008 follow up by the same team showed decreased allergenicity of the altered peanut.”).

as inexpensive vaccines; for example, Applied Biotechnology Institute has developed a hepatitis B vaccine in maize.¹⁰⁵ It remains possible, of course, that techniques will be developed to produce the relevant benefits with greatly reduced reliance on GMOs, especially in wealthy nations.

3. Health

With respect to safety, the consensus of the scientific community seems unambiguous: GM foods do not present health risks.¹⁰⁶ In 2012, the American Association for the Advancement of Science summarized the consensus, writing that “[t]he World Health Organization, the American Medical Association, the U.S. National Academy of Sciences, the British Royal Society, and every other respected organization that has examined the evidence has come to the same conclusion: consuming foods containing ingredients derived from GM crops is no riskier than consuming the same

¹⁰⁵ See Celine A. Hayden et al., *Oral Delivery of Wafers Made from HBsAg-expressing Maize Germ Induces Long-term Immunological Systemic and Mucosal Responses*, 33 VACCINE 2881, 2885 (2015) (reporting that “evidence for long-term efficacy . . . [and] safety of oral administration of the wafers”); see also Celine A. Hayden et al., *Production of Highly Concentrated, Heat-Stable Hepatitis B Surface Antigen in Maize*, PLANT BIOTECHNOLOGY J. 979, 984 (2012) (reporting the results of further studies); Celine A. Hayden et al., *Bioencapsulation of the Hepatitis B Surface Antigen and Its Use as an Effective Oral Immunogen*, 30 VACCINE 2937, 2940-42 (2012) (same).

¹⁰⁶ See Fred H. Degnan, *Biotechnology and the Food Label*, in LABELING GENETICALLY MODIFIED FOOD, *supra* note 6, at 17, 17 (discussing “the FDA’s science-backed conclusion that, as a general rule, there is nothing inherently unsafe or mysterious about food biotechnology”). For a more recent overview, see U.S. FOOD & DRUG ADMIN., GUIDANCE FOR INDUSTRY: VOLUNTARY LABELING INDICATING WHETHER FOODS HAVE OR HAVE NOT BEEN DERIVED FROM GENETICALLY ENGINEERED PLANTS (Nov. 2015), <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm059098.htm> [<https://perma.cc/YY79-H86J>] [hereinafter VOLUNTARY GMO LABELING GUIDANCE], stating,

In the 1992 Policy, FDA stated that it was not aware of any information showing that bioengineered foods differ from other foods in any meaningful or uniform way, or that, as a class, foods developed by the new techniques present any different or greater safety concern than foods developed by traditional plant breeding Further, FDA concluded that the method of development of a new plant variety (including the use of new techniques such as rDNA technology) is generally not material information within the meaning of section 201(n) of the FD&C Act, and would not usually be required to be disclosed in the labeling for the food. This determination was reviewed and upheld by the court in *Alliance for Bio-Integrity v. Shalala*, 116 F. Supp. 2d 166, 178-79 (D.D.C. 2000) (finding that FDA’s determination that genetic engineering, alone, is not a material fact that warrants food labeling was entitled to deference) Labeling provided by manufacturers on a wholly voluntary basis regarding whether a food was or was not bioengineered as described in this guidance is acceptable to FDA, provided that such labeling is truthful and not misleading. Some consumers are interested in the information provided in such labeling.

foods containing ingredients from crop plants modified by conventional plant improvement techniques.”¹⁰⁷

In 2016, the National Academies of Sciences, Engineering, and Medicine issued a book-length report,¹⁰⁸ strongly reaffirming what American and European scientists have long found: food from GM crops is no more dangerous to eat than food produced by conventional agriculture.¹⁰⁹ In the words of the report, there is “no substantiated evidence” that genetic modification of crops produces less safe foods.¹¹⁰ In the United States, Canada, the United Kingdom, and Western Europe, “no differences have been found that implicate a higher risk to human health safety” from genetically engineered foods.¹¹¹ In its summary, the report states,

On the basis of its detailed examination of comparisons between currently commercialized GE and non-GE foods in compositional analysis, acute and chronic animal toxicity tests, long-term data on health of livestock fed GE foods, and epidemiological data, the committee concluded that no differences have been found that implicate a higher risk to human health safety from these GE foods than from their non-GE counterparts.¹¹²

This conclusion tracks that of many others. In 2015, the American Association for the Advancement of Science spoke unequivocally. In its words, “The science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe.”¹¹³ The European Commission has similarly proclaimed,

The main conclusion to be drawn from the efforts of more than 130 research projects, covering a period of more than 25 years of research and involving more than 500 independent research groups, is that biotechnology, and in

¹⁰⁷ AM. ASS’N FOR THE ADVANCEMENT OF SCI., STATEMENT BY THE AAAS BOARD OF DIRECTORS ON LABELING OF GENETICALLY MODIFIED FOODS (2012), http://www.aaas.org/sites/default/files/AAAS_GM_statement.pdf [<https://perma.cc/J7E4-NBDE>]; *see also id.* (“[T]he science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe.”).

¹⁰⁸ *See* NAT’L ACADS. OF SCI., ENG’G, & MED., GENETICALLY ENGINEERED CROPS: EXPERIENCES AND PROSPECTS 10 (2016) [hereinafter GENETICALLY ENGINEERED CROPS REPORT].

¹⁰⁹ *See id.*

¹¹⁰ *Id.* at xvii.

¹¹¹ *Id.* at 10; *see also Labeling of Foods Derived from Genetically Engineered Plants*, U.S. FOOD & DRUG ADMIN., <http://www.fda.gov/Food/IngredientsPackagingLabeling/GEPlants/ucm346858.htm> [<https://perma.cc/B4RC-LP7R>] (last updated Jan. 18, 2017) (“[T]he agency is not aware of any information showing that foods derived from genetically engineered plants, as a class, differ from other foods in any meaningful or uniform way. These foods also don’t present different or greater safety concerns than their non-genetically engineered counterparts.”).

¹¹² GENETICALLY ENGINEERED CROPS REPORT, *supra* note 108, at 10.

¹¹³ Am. Ass’n for the Advancement of Sci., Statement by the AAAS Board of Directors on Labeling of Genetically Modified Foods (Oct. 20, 2012), http://www.aaas.org/sites/default/files/AAAS_GM_statement.pdf [<https://perma.cc/3FFK-7QQG>].

particular GMOs, are not *per se* more risky than e.g. conventional plant breeding technologies.¹¹⁴

The World Health Organization, the National Academy of Sciences, and the Royal Society in the United Kingdom are in agreement.

4. Ecology and the Environment

There would also be an argument for labeling if GMOs created ecological risks, rather than dangers to human health. Here the answer is far less unambiguous. The 2016 report of the National Academies of Sciences, Engineering, and Medicine finds no clear evidence that GM crops cause environmental harm.¹¹⁵ At the same time, the report is written with considerable caution.¹¹⁶ It does acknowledge the importance of continuing monitoring, but pointedly declines to embrace the widespread view that those crops have been responsible for declines in monarch butterfly populations.¹¹⁷ Other studies are less equivocal, finding no special risks to the environment from GM agriculture. The American Medical Association has endorsed this general view.¹¹⁸

It must be acknowledged that in some circles, the prevailing scientific judgments are intensely disputed.¹¹⁹ Some people believe that with respect to both health and the environment, the scientific consensus is influenced by

¹¹⁴ Ioannis Economidis et al., *A Decade of EU-Funded GMO Research (2001-2010)*, in EUROPEAN COMM'N, A DECADE OF EU-FUNDED GMO RESEARCH (2001-2010) 15, 16 (2010), https://ec.europa.eu/research/biosociety/pdf/a_decade_of_eu-funded_gmo_research.pdf [<https://perma.cc/RL8J-AAFK>].

¹¹⁵ See NAT'L ACAD. OF SCIS., GENETICALLY ENGINEERED CROPS: EXPERIENCES AND PROSPECTS 8 (2016), <https://agbiotech.ces.ncsu.edu/wp-content/uploads/2016/05/NAS-Genetically-Engineered-Crops-Summary.pdf?fwfwd=no> [<https://perma.cc/3Q6U-LCM8>] (“Overall, the committee found no conclusive evidence of cause-and-effect relationships between GE crops and environmental problems.”).

¹¹⁶ See *id.* (“However, the complex nature of assessing long-term environmental changes often made it difficult to reach definitive conclusions.”).

¹¹⁷ See *id.* (stating that studies of monarch populations “have not shown that suppression of milkweed by glyphosate is the cause of monarch decline”).

¹¹⁸ See COUNCIL ON SCI. & PUB. HEALTH, LABELING OF BIOENGINEERED FOODS 2 (2012) (“Bioengineered foods have been consumed for close to 20 years, and during that time, no overt consequences on human health have been reported and/or substantiated in the peer-reviewed literature.”).

¹¹⁹ For example, a collaborative study of statisticians, philosophers, and physicists noted,

[GMOs] are categorically and statistically different from [evolutionary modifications to ecological systems]. . . . [Those systems] enabl[e] the push and pull of the ecosystem to locally extinguish harmful mutations. [GMOs] bypass this evolutionary pathway [and] unintentionally manipulate large sets of inter-dependent factors at the same time, with dramatic risks of unintended consequences They thus . . . place a huge risk on the food system as a whole.

Nassim Nicholas Taleb et al., *The Precautionary Principle (with Application to the Genetic Modification of Organisms)* 10 (Extreme Risk Initiative—NYU Sch. of Eng'g Working Paper Series, 2014), <http://www.fooledbyrandomness.com/pp2.pdf> [<https://perma.cc/66NY-972V>].

powerful private interest groups, which have an interest in denying both health and environmental concerns.¹²⁰ In their view, any such consensus is not trustworthy; they do not necessarily disbelieve that scientists are unconcerned, but they offer a second-order reason to discount that lack of concern. With respect to environmental risks in particular, a number of observers point to what they see as a series of ecological risks, including toxicity to nontarget organisms (such as butterflies and bees), invasiveness in natural settings, and threats to biodiversity.¹²¹ Some scientists and regulators have also expressed grave concern that if they are widespread, GMOs will lead to resistance and the loss of a “public good”—susceptibility of insect pests to certain proteins.¹²² It should be acknowledged that some people fear long-term effects, not only ecological in nature, but also cultural and distributional, including the effects of GM products on small farmers. It is hardly impossible that over time, their concerns will be vindicated. For present purposes, the central point is that the prevailing scientific judgment appears to be that the health risks are nonexistent and that the standard environmental concerns are highly conjectural and have not been demonstrated to be serious.

5. Risk–Risk Tradeoffs

It should be clear in this light that if GM labels are effective in changing consumer behavior, there could well be a risk–risk tradeoff. On one view, such labels might help diminish ecological risks. At the same time, they might increase risks to health and to the environment. Longer shelf lives save

¹²⁰ See, e.g., Tim Schwab, *Pro-GMO Database: Monsanto Is the Most Common Funder of GMO Research*, FOOD & WATER WATCH (Sept. 16, 2014), <http://www.foodandwaterwatch.org/insight/pro-gmo-database-monsanto-most-common-funder-gmo-research> [<https://perma.cc/EV6K-FR7Q>] (“The fact that authors [of scientific research showing GMOs are safe] are not disclosing all sources of funding (and conflicts of interest) presents an obvious avenue for biased research to enter the scientific discourse.”).

¹²¹ See, e.g., Emily Glass, *The Environmental Impact of GMOs*, ONE GREEN PLANET (Aug. 2, 2013), <http://www.onegreenplanet.org/animalsandnature/the-environmental-impact-of-gmos/> [<https://perma.cc/K23Z-Y7YD>] (“GMOs may be toxic to non-target organisms, [including] bees and butterflies . . . [T]here is potential for GMO’s . . . to become invasive species in delicate, natural ecosystems. . . . [B]iodiversity . . . is put at risk by GMOS.”). For a good overview of the science on GMOs and the environment, see MCHUGHEN, *supra* note 7, at 137-59. For a deeper look into the risks posed by GMOs to biodiversity, see WORLD CONSERVATION UNION, CURRENT KNOWLEDGE OF THE IMPACTS OF GENETICALLY MODIFIED ORGANISMS ON BIODIVERSITY AND HUMAN HEALTH 22-31 (2007), https://cmsdata.iucn.org/downloads/ip_gmo_09_2007_1_.pdf [<https://perma.cc/YH5P-UEJP>], which discusses habitat change, pollution, invasive alien species, and risk management; and Heather Landry, *Challenging Evolution: How GMOs Can Influence Genetic Diversity*, HARV. U.: SCI. NEWS (Aug. 10, 2015), <http://sitn.hms.harvard.edu/flash/2015/challenging-evolution-how-gmos-can-influence-genetic-diversity/> [<https://perma.cc/6J5R-WV7N>], which notes, “Although there is little evidence that GMOs have impacted genetic diversity in today’s environment, scientists and ecologists are very aware of the potential influence that GMOs have on biodiversity.”

¹²² See Sarah L. Bates et al., *Insect Resistance Management in GM Crops: Past, Present and Future*, 23 NATURE BIOTECHNOLOGY 57, 58 (2005) (discussing mandated monitoring of GMO resistance).

resources, and GM food reduces use of pesticides, which create hazards of their own.¹²³ The point is not to reach a final judgment about the magnitude of these effects, but to signal the fact that risks are not only on one side of the equation.

B. *What People Want, and Why*

1. Labels for Health?

The public opinion evidence is at least as clear as the science: people do not believe that GM food is safe, and they strongly favor mandatory labels. It is not easy to find a domain in which public opinion is so unambiguously at odds with the scientific consensus. A typical survey finds that only 37% of Americans believe that GM food is safe to eat (as compared with 88% of members of the American Association for the Advancement of Science).¹²⁴ According to my own recent survey, 86% of Americans favor labeling of GM food—89% of Democrats, 80% of Republicans, and 87% of independents.¹²⁵

What explains such high levels of support for mandatory labels? The simplest answer is that people favor labels because they think that GM food is harmful, and they believe that consumers should be allowed to make an informed choice about whether to consume it.¹²⁶ To that extent, the judgment in favor of labels for GM food is quite similar to the corresponding judgment with respect to products that contain high levels of salt or that otherwise are taken to create health risks.¹²⁷ Without carefully engaging with questions about costs and benefits, people make an intuitive judgment that government should mandate labels in order to allow consumers to avoid, if they wish, products that might be dangerous.

¹²³ See WORLD CONSERVATION UNION, *supra* note 121, at 7 (“Proponents for GM claim . . . production can be enhanced while indirectly reducing environmental impacts, for example, through less use of pesticides or fertilizers.”).

¹²⁴ Scott et al., *Evidence for Absolute Moral Opposition to Genetically Modified Food in the United States*, 11 *PERSP. ON PSYCHOL. SCI.* 316, 317 (2016).

¹²⁵ See Sunstein, *supra* note 17, at 12 tbl.3.

¹²⁶ See *Why Label It?*, JUST LABEL IT, <http://www.justlabelit.org/right-to-know-center/right-to-know/> [<http://perma.cc/44BA-M3CP>] (“While our reasons for wanting to know what’s in our food may vary, what unifies us is the belief that it’s our right.”).

¹²⁷ See Sunstein, *supra* note 17, at 189 (finding “strong majority support (73 percent) for a mandatory warning label on products that have unusually high levels of salt”). Similar findings have been made in Europe. See Lucia A. Reisch & Cass R. Sunstein, *Do Europeans Like Nudges?*, 11 *JUDGMENT & DECISION MAKING* 310, 316 fig.2 (2016) (showing 69-90% support for government mandated labels of foods containing high levels of salt across different European countries).

2. Disgust and Naturalness

On the basis of existing research, the simplest answer appears to be correct, but Sydney Scott, Paul Rozin, and Yoel Inbar offer some important and illuminating complications.¹²⁸ Scott et al. asked a representative sample of Americans whether they supported or opposed genetically engineering plants and animals.¹²⁹ The authors also asked respondents to register agreement or disagreement with the statement, “This should be prohibited no matter how great the benefits and minor the risks from allowing it.”¹³⁰

Consistent with previous studies, 64% of participants opposed genetic engineering.¹³¹ In fact, 71% of the opponents—46% of the entire sample—were absolutists: they want to ban genetic engineering *regardless of the benefits and risks*.¹³² To that extent, their opposition to GM foods is not consequentialist or based on an assessment of costs and benefits at all. To explain the psychology behind that apparently puzzling finding, Scott and her coauthors presented their participants with a scenario in which a random person ends up eating GM tomatoes (either knowingly or unknowingly).¹³³ They asked people how angry or disgusted they were when imagining the scenario.¹³⁴ Opponents of genetic modification were angrier and more disgusted than its supporters,¹³⁵ but the absolutists were especially disgusted.¹³⁶ Controlling for demographic and other differences, Scott et al. found that “[d]isgust was the best predictor” of whether people would proclaim absolute opposition to genetic modification.¹³⁷

The authors’ conclusion is simple: People who most strongly oppose genetic modification are not weighing consequences.¹³⁸ Their opposition is a product of the fact that they find the idea disgusting.¹³⁹

That claim requires its own exploration. By itself, the idea of GM food does not seem to be the sort that would trigger disgust; it is not as if we are speaking of bodily fluids or the ordinary sources of something like nausea.¹⁴⁰

¹²⁸ See Scott et al., *supra* note 124, at 316-17 (studying “the roles of disgust and moral absolutism in Americans’ attitudes toward genetically modified food”).

¹²⁹ See *id.* at 17 (describing the questions posed to participants).

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² *Id.*

¹³³ See *id.* at 317-18 (describing the “tomato scenarios”).

¹³⁴ *Id.* at 317.

¹³⁵ See *id.* at 318 (reporting higher levels of disgust and anger among GMO opponents).

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ See *id.* at 317 (noting that most individuals who oppose GM foods are “moral absolutists” because they “would maintain their opposition regardless of consequences”).

¹³⁹ See *id.* at 320 (“GM opponents, especially absolutist opponents, tend to feel heightened disgust, both generally and regarding the consumption of genetically modified foods specifically.”).

¹⁴⁰ See Paul Rozin & April E. Fallon, *A Perspective on Disgust*, 94 *PSYCHOL. REV.* 23, 23 (1987) (“Like other basic emotions, disgust has a characteristic facial expression . . . , an appropriate action

In this context, disgust would seem to be a placeholder for some kind of intense emotion, signaling disapproval. We might speculate that many people have an immediate, intuitive sense that what is healthy is what is “natural,”¹⁴¹ and that efforts to tamper with nature will inevitably unleash serious risks—so-called Frankenfoods.¹⁴²

This speculation raises two puzzles of its own. First, we might question whether and to what extent people really are absolutists about GM food. It is one thing to say, in the abstract, that GM foods should be regulated or banned regardless of the benefits and risks. It is another thing to favor regulation or prohibition after receiving concrete information about benefits and risks. If, for example, people are asked to assume that GM food reduces costs by 20% or promises to save thousands of lives annually, and that it poses no risks to health or to the environment, would they really favor regulation or prohibition? Many of those who purport to be absolutists in the abstract or in response to general questions tend to become more consequentialist, and more amenable to some form of cost–benefit balancing, when they are presented with concrete numbers.¹⁴³

Second, it is not obvious how regulators should respond to regulatory intuitions of the kind that existing surveys seem to capture. If people are using a heuristic (“unnatural is unsafe”), and if that heuristic is producing an error (“GM food is unsafe”), then regulators should correct the error so that consumers can make informed decisions. But if consumers are simply disgusted, then they are registering a taste, not an erroneous judgment. Consider a purer case of disgust: Some people are disgusted by Jello.¹⁴⁴ (I

(distancing of the self from an offensive object), a distinctive physiological manifestation (nausea), and a characteristic feeling state (revulsion).”).

¹⁴¹ See, e.g., DIETER BIRNBACHER, NATURALNESS: IS THE “NATURAL” PREFERABLE TO THE “ARTIFICIAL”? 23 (David Carus trans., 2014) (noting that “as long as [the source of a risk] is nature, risks are more readily tolerated than when they come from anthropogenic sources”); JAMES P. COLLMAN, NATURALLY DANGEROUS: SURPRISING FACTS ABOUT FOOD, HEALTH, AND THE ENVIRONMENT 31 (2001) (noting that Americans are willing to pay more for organic food “because they believe that such food is safer, healthier, and more friendly to the environment”); Fern (Mai Mai) Lin, The Impact of Naturalness on Perceived Risk 1 (Spring 2009) (unpublished manuscript), <http://opim.wharton.upenn.edu/risk/ackoff/Ackoff2009/Lin2009.pdf> [<https://perma.cc/7YK5-XKUY>] (“There are indications, however, that in the Western world, people have begun to associate naturalness with *reduced* risk.”).

¹⁴² See Michelle Schoffro Cook, *Top 20 Frankenfoods to Avoid*, CARE2 (Sept. 12, 2013), <http://www.care2.com/greenliving/top-20-frankenfoods-to-avoid.html> [<https://perma.cc/9NJY-Z53D>] (listing the top twenty “foods and food ingredients [to avoid] to make your body GM-free”).

¹⁴³ See Jonathan Baron & Sarah Leshner, *How Serious Are Expressions of Protected Values?*, 6 J. EXPERIMENTAL PSYCHOL.: APPLIED 183, 192 (2000) (noting that individuals “will accept actions that violate [their protected values] if the probability or amount of the harm is small relative to the probability and magnitude of benefit”).

¹⁴⁴ See *Jell-O, Why Are You So Gross?: A Dear John Letter*, HUFFINGTON POST: TASTE (Oct. 1, 2013), http://www.huffingtonpost.com/2013/06/04/gross-jello-hate-jiggle_n_3378066.html [<https://perma>

confess that I am among them.) They can decide to avoid Jello. But should regulators mandate labels in the face of such a taste (“This product contains Jello”)? Even if no health issues are involved? In such circumstances, there would not seem to be a compelling argument for mandatory labeling (to say the least). I will return to these issues shortly.

C. *GMO Labels: Normative Considerations*

1. Market Failure

With respect to GM food, is there a market failure, behavioral or otherwise? Consumers can, of course, refuse to purchase GM food—if they know that that is what it is. And if consumers care, we should see a degree of market sorting, in which some companies label their foods as not containing GMOs; some companies acknowledge that their foods contain GMOs; and some companies are silent.¹⁴⁵ In fact, that is exactly what the American market has observed, with the help of FDA guidance on the matter.¹⁴⁶ Where, then, is the market failure justifying the disclosure mandate? The Department of Agriculture will be required to give some kind of answer to that question.¹⁴⁷

Consistent with the previous discussion, one response points to behavioral science. Even though some people will infer that food without a “GMO-free” label does in fact contain GMOs, many will not. Most consumers are not thinking about GMOs at all when they are purchasing food. And even though most consumers support GMO labeling in surveys,¹⁴⁸ the issue probably lacks much salience when people are making choices at restaurants or grocery stores.¹⁴⁹

An alternative argument for a market failure involves the environmental consequences, which amount to third-party effects.¹⁵⁰ If GM foods pose

cc/4B9L-GFSQ] (“Jell-O is the smelly kid of desserts and the only reason it’s still around is because kids haven’t yet learned any better.”).

¹⁴⁵ See *supra* Section I.A. (describing the process of market unraveling that leads to voluntary disclosure of the relevant ingredient by producers).

¹⁴⁶ See VOLUNTARY GMO LABELING GUIDANCE, *supra* note 106 (“Labeling provided by manufacturers on a wholly voluntary basis regarding whether a food was or was not bioengineered as described in this guidance is acceptable to FDA, provided that such labeling is truthful and not misleading.”).

¹⁴⁷ See *supra* notes 1–2 and accompanying text.

¹⁴⁸ See *supra* text accompanying note 125.

¹⁴⁹ But see Wallace E. Huffman et al., *Consumer Willingness to Pay for Genetically Modified Food Labels in a Market with Diverse Information: Evidence from Experimental Auctions*, 28 J. AGRIC. & RESOURCE ECON. 481, 497 (2003) (concluding that “consumers’ willingness to pay for a food product decreases when the food label indicates the food product is genetically modified”).

¹⁵⁰ See Benoit Morel et al., *Pesticide Resistance, the Precautionary Principle, and the Regulation of Bt Corn: Real Option and Rational Option Approaches to Decisionmaking* (proposing option theory as an analytical framework for the precautionary principle and applying that framework to the issue of commercializing Bt corn), in *BATTLING RESISTANCE TO ANTIBIOTICS AND PESTICIDES* 184, 184–85, 192–202 (Ramanan Laxminarayan ed., 2003); Justus Wesseler, *Resistance Economics of Transgenic Crops*

nontrivial environmental risks, or even if they merely might do so, labeling can be seen as a legitimate way of reducing the relevant risks. A label based on third-party effects would seem unobjectionable in principle, even though, as noted, a disclosure mandate is not the preferred way to counteract such effects.¹⁵¹

2. Costs and Benefits

Some people argue that they have a “right to know” what they are eating.¹⁵² On this view, consumers are entitled to be informed about the ingredients in their food—salt, sugar, fat, or GMOs. The initial answer to this suggestion is that there is no freestanding “right” to mandatory labels, simply because some, or even many, consumers would favor them. Unless there is a market failure of some kind, the market provides the knowledge to which consumers have a right.¹⁵³ We have explored some reasons why there might be a market failure here.¹⁵⁴ The second answer is that even in the face of an actual market failure, whether consumers have a right to know, in the form of a mandatory label, depends on the costs and the benefits.¹⁵⁵

a. Costs

To assess costs, the USDA must begin by projecting the costs of labeling itself. The projection is likely to be disputed,¹⁵⁶ but it does not present serious conceptual difficulties; the only issues are ones of fact. As we have also seen, there are costs as well to consumers who see the label (and are less happy when they do) and also to consumers who, having seen the label, buy goods that are either more costly or inferior (the lost consumer surplus).¹⁵⁷

Under Uncertainty: A Real Option Approach (discussing pest resistance as an irreversible cost of transgenic crops), in *BATTLING RESISTANCE TO ANTIBIOTICS AND PESTICIDES*, *supra*, at 214, 214-18; see also Taleb et al., *supra* note 119, at 9-11 (discussing potential risks of GMOs and exploring reasons to be precautionary with respect to them).

¹⁵¹ For more information about the idea of “mismatch” between market failure and regulatory tools, see BREYER, *supra* note 24, at 195, which explains that “identify[ing] a mismatch . . . involves finding an area where the regulatory process is particularly likely to cause significant anticompetitive harm.”

¹⁵² See, e.g., *Why Label It?*, *supra* note 126 (“While our reasons for wanting to know what’s in our food may vary, what unifies us is the belief that it’s our right.”).

¹⁵³ See *supra* notes 22–23 and accompanying text.

¹⁵⁴ See *supra* subsection II.C.1.

¹⁵⁵ See *supra* notes 1–2 and accompanying text. It follows that the welfarist approach of the “right to know” asks whether mandatory disclosure passes some kind of cost–benefit test. On some of the complexities with the idea of welfare, see generally ADLER, *supra* note 65. Some of those complexities bear on important regulatory problems—as when a regulation that fails cost–benefit analysis has desirable distributional consequences—but for GM foods, important distributional consequences do not seem to arise and so can be fairly bracketed.

¹⁵⁶ See *supra* Section I.B. (discussing the difficulties of quantifying the costs and benefits of labeling requirements).

¹⁵⁷ See *supra* subsection I.B.1.d.

The latter costs will be extremely difficult to specify, and the USDA might be forced to produce some upper or lower bound, or even to say that those costs are not quantifiable. It might also be reasonable for the USDA to conclude that those costs are unlikely to be large. Merely seeing the label would not impose high costs on consumers.¹⁵⁸ To project the lost consumer surplus, agencies would need to project the likely effect of the label on consumer behavior and the monetized loss. Undertaking that projection might well turn out to be daunting, even impossible, and the agency might be unable to produce specific numbers or even a reasonably bounded range.

b. *Millions of Labels, in Search of Benefits*

If we focus, as agencies frequently do, on health benefits from mandatory labels, GM labels would seem to be difficult to defend. As we have seen, the health benefits appear to be zero,¹⁵⁹ and so they are not sufficient to justify even modest costs. We have also seen that, on one view, environmental benefits cannot be ruled out, but on the basis of the existing science, they are probably impossible to quantify.¹⁶⁰ I will return to that issue; for the moment, the simple conclusion is that it would not be so easy to argue that the environmental benefits of labels would justify a significant expenditure.¹⁶¹

In this respect, agencies would have a difficult challenge using their conventional approach to benefit estimates to justify the conclusion that mandatory labeling would survive a cost–benefit test, as required by Executive Orders 12866 and 13563.¹⁶² As compared to the case of calorie labeling, for example, it would be hard to specify health or environmental endpoints, or even ranges, that could make their way into a conventional regulatory impact analysis.

c. *Options*

Confronted with this problem, the USDA has several options. First, it might simply announce that the benefits of GM labels are not quantifiable. As we have seen, agencies have taken that route in the past, and it has survived

¹⁵⁸ See *supra* note 55 and accompanying text.

¹⁵⁹ See *supra* subsection II.A.3.

¹⁶⁰ See *supra* subsection II.A.4.

¹⁶¹ *But see* Taleb et al., *supra* note 119, at 9–11 (arguing that GMOs pose risks that are worth taking quite seriously).

¹⁶² See *supra* notes 1–2 and 11. Of course, the existing requirements apply only “to the extent permitted by law,” meaning that, under a mandatory labeling law, agencies would be required to proceed even if the benefits did not justify the costs. See *supra* note 15. Nonetheless, it is awkward for an agency to announce that it is proceeding in the face of costs that greatly exceed benefits—though it has happened. See SUNSTEIN, *supra* note 71, at 201 n.27 (2014) (noting that it is “exceedingly rare . . . for an agency to proceed when the monetized costs exceed the monetized benefits”).

judicial scrutiny, at least under statutes that require agencies to act.¹⁶³ The problem with this approach is that when agencies have previously imposed disclosure mandates without quantifying benefits, they could usually say that they expect significant benefits (in terms of money or health), but could only speculate about their magnitude.¹⁶⁴ If the expectation of significant benefits is reasonable, a failure to quantify may not be objectionable, at least if quantification is not feasible.

In this context, by contrast, the problem is that there would seem to be no benefits at all (bracketing the question of environmental harm, to which I will return). When benefits are in the general range of zero, it is not enough, or even reasonable, to say that they are speculative. Because the statute requires the USDA to act,¹⁶⁵ the inability to project benefits is unlikely to be objectionable purely as a matter of law, but it does require serious challenges for the agency when it attempts to produce a regulatory impact analysis and to survive scrutiny within the executive branch.

The closest analogy may well be the conflict minerals controversy, where the SEC was not able to project benefits and candidly confessed to that fact.¹⁶⁶ Because GM labels are required by law, such a confession would likely be enough to survive judicial review, but it would encounter hard questions under the process of OIRA review.

Faced with that problem, the USDA might engage in some form of breakeven analysis, especially if the costs of mandatory GM labels can be described as low.¹⁶⁷ We can easily imagine creative efforts in this vein, asking (for example) about whether it would be worthwhile to charge the average American $\$X$ annually (where $\$X$ is very little) in return for GM labels.¹⁶⁸ Suppose, for example, that the cost of a label is \$2.30 per person per year.¹⁶⁹

¹⁶³ See *supra* note 47.

¹⁶⁴ *Id.*

¹⁶⁵ See *supra* note 10.

¹⁶⁶ See *supra* note 47.

¹⁶⁷ For one estimate, see JOHN DUNHAM, COST IMPACT OF VERMONT'S GMO LABELING LAW ON CONSUMERS NATIONWIDE 2 (2016), <http://corn.org/wp-content/uploads/2016/02/Cost-Impact-of-Vermont's-GMO-Labeling-Law-on-Consumers-Nationwide.pdf> [<https://perma.cc/6NBC-4MVV>], which "conclude[d] that the one-time cost to consumers as a result of the [Vermont GMO] labeling requirement w[ould] be as high as \$3.8 billion."

¹⁶⁸ The Department of Justice used a similar approach to justify renovations in the context of building accessibility. See Sunstein, *supra* note 48, at 1401-02 (describing the Department's method of using a breakeven analysis to frame \$32.6 million in costs to replace bathroom doors as only \$0.05-\$2.20 per use).

¹⁶⁹ See Memorandum from Andrew Dyke & Robert Whelan, ECONorthwest, to Consumers Union 1 (Sept. 12, 2014), https://consumersunion.org/wp-content/uploads/2014/09/GMO_labeling_cost_findings_Exe_Summ.pdf [<https://perma.cc/3ZLS-YAQA>] (finding that the median estimated cost of mandatory labeling is \$2.30 per person per year). With the flexibility of the national law permitting compliance with the use of bar codes, see *supra* note 5, the costs should be significantly lower than they would otherwise be. However, the \$2.30 figure, produced by an interested party, might not be credible.

It might well be suggested that the mandate obviously survives breakeven analysis. *Isn't that modest cost worth incurring, given widespread consumer preference for labels and good-faith concerns about ecological risks?* Perhaps so. But one problem is that on the assumption about the per person cost, the aggregate cost is over \$700 million—hardly a trivial amount.¹⁷⁰ It would be easy, and misleading, to say that *any* annual \$700 million expenditure is justified because, for all Americans, the annual per person cost is merely \$2.30. The real question is what people are obtaining for that \$700 million.

As an independent method of valuation, or as part of some breakeven analysis, it might seem reasonable to put a spotlight on consumers' willingness-to-pay for GM labels. On the basis of survey evidence suggesting that consumers favor such labels,¹⁷¹ it would not be implausible to think that the amount would be significant population-wide—and per person, at least \$2.30 per year. Ideally, regulators would have some evidence of people's willingness-to-pay, which they could compare with some estimate of costs. In the absence of such evidence, they might nonetheless engage in breakeven analysis.

Would an approach of that kind be sufficient to ground a reasonable cost-benefit analysis under prevailing executive orders? At first glance, it should be, but as we shall now see, any approach of that kind turns out to raise some quite fundamental questions about regulatory policy.

d. *What Consumers Want*

We can easily imagine cases in which the law should not mandate labels even if consumers would be willing to pay for them. Suppose, for example, that consumers want to know whether African-Americans or Jews were involved in the production of some commodity. To the extent that the consumer demand reflected racism or prejudice, it should not be honored. But the call for GM labels does not run afoul of this principle, because no invidious discrimination is involved.

Consider a more relevant comparison: Suppose that consumers are alarmed about some ingredient in food—call it Omega P—even though there is no reason for alarm. Suppose that there is an online health scare about Omega P and that people at least want to know whether the food they are eating contains it. In principle, a label is not a good idea. It would cater to public ignorance, and it would have no benefits. For government, the right response is to inform people that Omega P is, in fact, safe. Note that in this case, the standard argument for use of willingness-to-pay is decisively undermined. People might be willing to pay *something*—perhaps even a great

¹⁷⁰ This figure was obtained by multiplying a rounded estimate of the population of the United States by the \$2.30 estimate.

¹⁷¹ See *supra* text accompanying note 125.

deal—for Omega P labels, but because such labels would not promote their welfare, there is no sufficient reason to mandate them. Note in this regard that 80% of Americans have been found to favor a label for foods that contain DNA (!).¹⁷² The challenge for the USDA will be to show that labels for GM food are relevantly different from labels for Omega P; perhaps uncertainty and irreversibility can help the agency to show relevant distinctions.¹⁷³

3. But Morality?

For some people, arguments about health and the environment miss the central points. On one view, the objection to GM foods is theological: GMOs tamper with God's creation.¹⁷⁴ On another view, it is moral: there is something wrong with treating nature in this way.¹⁷⁵ On a third view, GM food benefits large corporations and the wealthy at the expense of small farmers, poor nations, and the poor in general.¹⁷⁶ The third view can easily be translated into an argument about adverse effects on third parties. Under all three views, GM labels are a modest step in the right direction insofar as they allow consumers to know what they are buying and to register their preferences, their values, and their commitments.

At the very least, we should be willing to agree that if labels do have some kind of moral motivation, they might be well-justified, even if quantitative cost-benefit analysis turns out to be challenging, impossible, or beside the point.¹⁷⁷ We have seen analogies, in the form of labels designed to prevent cruelty to animals. Could GM labels be defended on some similar grounds? It should not be sufficient merely to point to the *fact* of moral concern; the question is whether the moral concern has some plausible basis. In the

¹⁷² See JAYSON LUSK & SUSAN MURRAY, OKLA. ST. U., FOOD DEMAND SURVEY 4 (2015), <http://agecon.okstate.edu/faculty/publications/4975.pdf> [<https://perma.cc/HUF3-BXAQ>] (reporting that 80% of survey respondents support mandatory labeling of foods that contain DNA).

¹⁷³ See *supra* note 150.

¹⁷⁴ See, e.g., Gena, Comment to *Why Did Chobani Change Its Mind on GMOs?*, FARMER'S DAUGHTER USA (Oct. 16, 2015, 7:28 PM), <http://www.thefarmersdaughterusa.com/2014/10/why-did-chobani-change-its-mind-on-gmos.html> [<https://perma.cc/NV9V-BSPN>] (“HE is always watching and HE will not take kindly to the adulteration of the food HE blessed upon us with.”).

¹⁷⁵ See Amy Harmon, *A Lonely Quest for Facts on Genetically Modified Crops*, N.Y. TIMES (Jan. 4, 2014), <https://www.nytimes.com/2014/01/05/us/on-hawaii-a-lonely-quest-for-facts-about-gmos.html> [<https://perma.cc/759E-4DCM>] (reporting that one proponent of a bill banning GMO crops from being grown in Hawaii “took the microphone ‘on behalf of Mother Earth and all sentient beings’”).

¹⁷⁶ See Opinion, *Genetically Modified Food and the Poor*, N.Y. TIMES (Oct. 13, 2003), <http://www.nytimes.com/2003/10/13/opinion/genetically-modified-food-and-the-poor.html> [<https://perma.cc/B8WK-929R>] (noting that the “[GMO] industry is tightly controlled by five conglomerates” and that “the real problem is that genetic engineering is hurting the poor”).

¹⁷⁷ See *supra* text accompanying note 4; see also Posner & Sunstein, *supra* note 27, at 4.

abstract, an affirmative answer can hardly be ruled out; many people hold moral concerns about GM food in good faith.¹⁷⁸

The difficulty is to specify some intelligible moral principle that does in fact call for labels. It is not at all clear that there is a plausible religious objection to GM foods (and if there were, it could not easily be invoked by the Department of Agriculture without raising First Amendment issues). It is hard to make sense of the argument that GM foods are “mistreating nature.”¹⁷⁹ Nor is it clear that GM labels can be plausibly defended on distributional grounds in light of the considerable difficulty in demonstrating that GM foods are objectionable on such grounds and in showing that even if they are, labels are helpful in meeting that challenge.¹⁸⁰ But I do not mean to reach a judgment on the particulars here—only to suggest the form of a possible justification and the serious challenges that the USDA, or anyone else, might face in offering it.

4. Drawing False Inferences

There is an additional concern: the signal contained in the mandatory label might affirmatively mislead consumers.¹⁸¹ If the government requires Omega P labels, many consumers will infer that public officials are worried about Omega P and believe that consumers should think carefully before consuming food that contains it. Whatever the government is seeking to convey, the disclosure might well contain this signal: “Omega P is a legitimate cause for concern.” To the extent that public officials provide such a signal, they are affirmatively misleading people. Whether the mandate is heard to offer that signal is, of course, an empirical question.

The FDA is plainly concerned with the risk that consumers might be misled in this context. In 2015, it noted that

a statement may be false or misleading if, when considered in the context of the entire label or labeling . . . it suggests or implies that a food product or

¹⁷⁸ See *supra* text accompanying note 124.

¹⁷⁹ See MCHUGHEN, *supra* note 7, at 143 (discussing the moral and ethical concerns some people have regarding GMOs).

¹⁸⁰ See *id.* at 143-44, 213 (discussing socioeconomic concerns related to GMOs and the limitations of mandatory labels to remedy those concerns). One possible defense would point to consumers’ willingness-to-pay for labels to promote distributional concerns. But as before, the question remains whether that fact is sufficient, independent of its basis. Recall also that a distributional argument rests on its own; it need not be defended in terms of consumers’ willingness-to-pay. See *supra* note 53.

¹⁸¹ See *supra* note 14; see also Colin A. Carter & Guillaume P. Gruère, *Mandatory Labeling of Genetically Modified Foods: Does It Really Provide Consumer Choice?*, 6 J. AGROBIOTECHNOLOGY MGMT. & ECON. 68, 70 (2003) (“Mandatory labeling provides food processors and retailers a choice, but it does not facilitate consumer choice. Because of rational food processor decisions, mandatory labeling acts as a market barrier, and GM products do not appear at the retail level.”); cf. Charles Noussair et al., *Do Consumers Really Refuse to Buy Genetically Modified Food?*, 114 ECON. J. 102, 113 (2004) (conducting an experiment and finding “that the ‘average’ consumer values the absence of GMOs”).

ingredient is safer, more nutritious, or otherwise has different attributes than other comparable foods because the food was not genetically engineered. For example, the labeling of a bag of specific type of frozen vegetables that states that they were “not produced through modern biotechnology” could be misleading if, in addition to this statement, the labeling contains statements or vignettes that suggest or imply that, as a result of not being produced through modern biotechnology, such vegetables are safer, more nutritious, or have different attributes than other foods solely because the food was not produced using modern biotechnology.¹⁸²

Some evidence suggests that consumers would indeed draw an inference, from a label, that the government believes that GM food is unhealthy.¹⁸³ In one study, “respondents consistently believed that foods labeled GMO are less healthy, safe and environmentally-friendly compared to all other labels,” suggesting that “a disconnect [may exist] between respondent attitudes [toward the label] and the scientific consensus” on GM food.¹⁸⁴ Nor is it irrational for consumers to infer, from a label, that public officials believe that GM foods pose some kind of risk. Ordinarily, labels are required for that reason; they are essentially warnings and taken as such.

In the implementation of the new GM labeling law, we could imagine creative responses by the private or public sector. The government might allow or require the warnings to be accompanied by a disclaimer: “The FDA has determined that GM foods do not pose a health risk of any kind.” Or more gently: “The FDA has not determined that GM foods pose a health risk of any kind.” Producers of GM foods might be allowed or encouraged to embark on an educational campaign offering exactly that message. For fully rational consumers, clarifying steps of this kind should correct any misimpression.

But for many consumers, such steps might not work. On the contrary, they might even backfire. In view of public opposition to GM foods, a statement to the effect that GM foods “do not carry a health risk” might instead focus public attention on the possible association between GM foods and the whole idea of health risks. Many consumers might think, “Where there is smoke, there is fire; why not buy something else?” Of course, the existence and extent of this reaction present empirical questions, but existing evidence suggests that many consumers will make a false inference and that it will not be easy to correct that inference.

¹⁸² VOLUNTARY GMO LABELING GUIDANCE, *supra* note 106, at 7.

¹⁸³ See Bar-Gill et al., *supra* note 14, at 21 (reporting that survey respondents believed GMO disclosure was the product of research finding GM food to be harmful); Joanna K. Sax & Neal Doran, *Food Labeling and Consumer Associations with Health, Safety and Environment*, 44 J.L. MED. & ETHICS 630, 631 (2016) (discussing consumer perceptions of mandatory food labels).

¹⁸⁴ *Id.* at 636.

If labels mislead (some or many) people, the issue is not at an end. It is necessary to ask what kind of welfare loss that imposes. A key question is whether consumers will end up purchasing GMO-free food that is inferior along some dimension—say, it is more expensive or less nutritious. If they do so, that is a welfare loss, and it may be substantial.

5. A Summary

I have covered numerous issues here, and a summary may be useful. With respect to costs, the USDA must calculate the expense of producing the labels themselves. The calculation will undoubtedly produce some dispute, but the analysis should be reasonably straightforward. There are costs to consumers who see the label (and are less happy when they do) and also to consumers who, having seen the label, buy goods that are more costly or (in their view) inferior. The latter costs are more important but will be extremely difficult to specify; the USDA might do best simply to say that they are not quantifiable. It might be reasonable for the agency to conclude that the costs are unlikely to be large, though informed conjecture or (better) evidence would of course be necessary to support that conclusion.

The benefits issue is far more challenging. It is not possible to identify health endpoints that would justify mandatory labels. Nor is it simple to specify environmental risks or to connect a disclosure mandate to reduction of those risks. In principle, the willingness-to-pay figure is the right one, but it is highly doubtful that the USDA could produce reliable estimates. Even if it did, the numbers might well be a product of consumer errors in the form of a mistaken belief that GM foods produce health risks.

In these circumstances, the USDA will not have an easy time in demonstrating that the benefits of mandatory labels justify the costs. As I have noted, the law requires the agency to proceed even if it cannot make that demonstration, but under prevailing executive orders, no agency likes to proceed when costs plainly exceed benefits, and the process of scrutiny within the executive branch will produce a serious demand for some kind of plausible cost-benefit justification. For the USDA, the best option is probably to offer a breakeven analysis, invoking consumers' wishes, the risk of irreversible environmental harm (perhaps with special attention to biodiversity¹⁸⁵), or both. If the per person cost of labels is indeed very low, a breakeven analysis might turn out to be plausible. That claim brings us to our final topic.

¹⁸⁵ See MCHUGHEN, *supra* note 7, at 137-59 (discussing the science on GMOs and the environment).

III. PRECAUTIONS, IRREVERSIBILITY, AND UNCERTAINTY

When a product or activity creates some kind of risk, even a small one, many people argue in favor of precautions, and, in particular, in favor of the precautionary principle.¹⁸⁶ Some of the central claims on behalf of that principle involve uncertainty, learning over time, irreversibility, and the need for epistemic humility on the part of scientists. Any consensus might turn out to be wrong; today's assurance might be tomorrow's red alert.¹⁸⁷ In particular, GMOs are often thought to trigger the precautionary principle, with special emphasis on the need for continued monitoring, residual uncertainty, and potentially irreversible¹⁸⁸ or catastrophic environmental risks.¹⁸⁹ This is no mere theoretical point. As one commentator explains, European "legislation that governed GMOs used a precautionary approach, and precaution was one basis for the de facto moratorium on authorizations of GM varieties."¹⁹⁰

A. Worst Cases

Whatever we think about the particular application, the precautionary principle has deep roots in international law.¹⁹¹ As long ago as 1982, for example, the United Nations World Charter for Nature gave international

¹⁸⁶ For general discussion, see Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. Pa. L. Rev. 1003 (2003).

¹⁸⁷ See generally THE PRECAUTIONARY PRINCIPLE IN THE 20TH CENTURY: LATE LESSONS FROM EARLY WARNINGS (Poul Harremoës et al. eds., 2002) [hereinafter THE PRECAUTIONARY PRINCIPLE] (providing an overview of the precautionary principle and its application to real world problems, including DDT, GMOs, and global warming).

¹⁸⁸ See Morel et al., *supra* note 150, at 184-85, 192-202 (proposing option theory as an analytical framework for the precautionary principle and applying that framework to the issue of commercializing *Bt* corn); Wesseler, *supra* note 150, at 215-18 (discussing pest resistance as an irreversible cost of transgenic crops). For information about irreversibility more broadly, see Kenneth J. Arrow & Anthony C. Fischer, *Environmental Preservation, Uncertainty and Irreversibility*, 88 Q.J. ECON. 312, 313-14 (1974), which discusses the costs of irreversible harm to the environment; Scott Farrow, *Using Risk Assessment, Benefit-Cost Analysis, and Real Options to Implement a Precautionary Principle*, 24 RISK ANALYSIS 727, 728 (2004), which applies real-options analysis to public policy and the precautionary principle; and Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY, & RISK 227, 227 (2010), which discusses irreversibility as an element of social problems.

¹⁸⁹ See Grossman, *supra* note 6, at 35-36 (noting that early European legislation was triggered by the perceived risk of GMOs as biotechnologies that posed risks to the environment); see also Anthony C. Fisher, *Uncertainty, Irreversibility, and the Timing of Climate Policy* 9 (Oct. 2001), http://stephenschneider.stanford.edu/Publications/PDF_Papers/timingFfisher.pdf [<https://perma.cc/B49V-L97M>] (describing the option value of postponing decisions that could have potentially irreversible effects on the environment).

¹⁹⁰ Grossman, *supra* note 6, at 36.

¹⁹¹ See Caroline E. Foster, *Science and the Precautionary Principle in International Courts and Tribunals: Expert Evidence, Burden of Proof and Finality* 19-20 (2013) (describing the history of the precautionary principles and its flourishing in international agreements since the early 1980s); Grossman, *supra* note 6, at 35 ("The precautionary principle . . . has become part of international law, particularly in measures that protect the environment").

recognition to the principle, suggesting that “where potential adverse effects are not fully understood, the activities should not proceed.”¹⁹² The 1992 *Rio Declaration on Environment and Development* asserts, “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”¹⁹³ The widely publicized *Wingspread Declaration*, from a meeting of environmentalists in 1998, goes further still: “When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof.”¹⁹⁴

In its various forms, the precautionary principle has been subject to a great deal of analysis, some of it quite skeptical¹⁹⁵ and some of it highly supportive.¹⁹⁶ A central question involves the appropriate approach to “worst-case” thinking. This is not the place for a full analysis, which would require investigation of some complex issues in decision theory,¹⁹⁷ but three points seem clear (bracketing hard questions about quantification). *First*, if a product or activity has modest or no benefits, the argument for taking precautions is

¹⁹² G.A. Res. 37/7, annex, World Charter for Nature (Oct. 28, 1982).

¹⁹³ U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/5/Rev.1, princ. 15 (June 13, 1992) [hereinafter *Rio Declaration*], reprinted in 31 I.L.M. 876, 879.

¹⁹⁴ See *Lessons from Wingspread*, in PROTECTING PUBLIC HEALTH & THE ENVIRONMENT: IMPLEMENTING THE PRECAUTIONARY PRINCIPLE, app. A at 353-54 (Carolyn Raffensperger & Joel A. Tickner eds., 1999) (quoting the Wingspread Statement on the Precautionary Principle). The Wingspread Declaration was issued by a group of international scientists, government officials, lawyers, labor activist, and grassroots environmental activists following a meeting at Wingspread in Racine, Wisconsin to discuss the precautionary principle. See *id.* at 349.

¹⁹⁵ See INDUR M. GOKLANY, THE PRECAUTIONARY PRINCIPLE: A CRITICAL APPRAISAL OF ENVIRONMENTAL RISK ASSESSMENT 7 (2001) (observing that a “one-sided application of the precautionary principle itself provides no guidance . . . in situations where an action . . . could simultaneously lead to uncertain benefits and uncertain harms (internal citation omitted)); CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE 14 (2005) (concluding that “the Precautionary Principle in its strongest forms is that it is incoherent” because “it purports to give guidance, but it fails to do so”).

¹⁹⁶ See THE PRECAUTIONARY PRINCIPLE, *supra* note 187, at 1 (collecting the “histories of a selection of hazards” and how the precautionary principle was applied to them to “try[] to reduce current and future risks”); Nabil I. Al-Najjar, *A Bayesian Framework for the Precautionary Principle*, 44 J. LEGAL STUD. S337, S361 (2016) (concluding that the precautionary principle is a means of correcting human and societal biases); see also Foster, *supra* note 191, at 20 (arguing that the precautionary principle has allowed “states to take action in response to the early warnings signs of [serious environmental] threats”).

¹⁹⁷ For an especially good discussion of this point, see generally Al-Najjar, *supra* note 196. Also valuable is DANIEL STEEL, PHILOSOPHY AND THE PRECAUTIONARY PRINCIPLE: SCIENCE, EVIDENCE, AND ENVIRONMENTAL POLICY (2014).

far stronger than if the benefits are significant. *Second*, if a product or activity creates a trivially small risk (taking account of both the probability and the magnitude of a bad outcome), then the product or activity should not be banned or regulated (including through labels) if it promises significant benefits. *Third*: if a product creates a small (but not trivial) risk of catastrophe, there is a strong argument for banning or regulating it (including through labels) if the benefits are very modest and so do not justify running that risk. Some of the most difficult cases arise when (1) a product or activity has significant benefits and (2) (a) the probability of a bad outcome is difficult or impossible to specify (creating a situation of “uncertainty,” rather than risk¹⁹⁸), and (b) the bad outcome is catastrophic or (c) the harms associated with the bad outcome cannot be identified (creating a situation of “ignorance”¹⁹⁹). In such difficult cases, it is not simple to balance the two sides of the ledger, and there is a real argument for eliminating the worst-case scenario.²⁰⁰

Let us bracket the most complicated questions here and simply note that in this light, a precautionary argument for labeling GM foods (or otherwise for regulating them) depends in large part²⁰¹ on answers to questions of fact. Is this a difficult case or an easy one? The answer turns largely on two further questions. Do such foods promise modest benefits, or instead large ones? With

¹⁹⁸ See FRANK H. KNIGHT, RISK, UNCERTAINTY, AND PROFIT 19-20 (Midway Reprint ed., Univ. of Chi. Press 1985) (1921) (distinguishing measurable uncertainties, or “risk” proper, from unknowable uncertainties, called uncertainty); Paul Davidson, *Is Probability Theory Relevant for Uncertainty? A Post Keynesian Perspective*, 5 J. ECON. PERSP. 129, 129-31 (1991) (describing the difference between true uncertainty and risk); Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841, 848 (2006) (noting that for risk, “probabilities can be assigned to various outcomes,” while for uncertainty, “no such probabilities can be assigned”). For a technical treatment of the possible rationality of maximin, see generally Kenneth J. Arrow & Leonid Hurwicz, *An Optimality Criterion for Decision-Making Under Ignorance*, in UNCERTAINTY AND EXPECTATIONS IN ECONOMICS: ESSAYS IN HONOUR OF G.L.S. SHACKLE 1 (C.F. Carter & J.L. Ford eds., 1972). For a nontechnical overview, see JON ELSTER, EXPLAINING TECHNICAL CHANGE app. 1 at 185-207 (1983).

¹⁹⁹ See THE PRECAUTIONARY PRINCIPLE, *supra* note 187, at 217 tbl.17.1 (defining ignorance as “[u]nknown” impacts and therefore “unknown” probabilities”).

²⁰⁰ For a discussion of maximin, see JOHN RAWLS, A THEORY OF JUSTICE 152-57 (1971). For information about complications in “[a]cting as if the worst will happen,” see ELSTER, *supra* note 198, at app. 1. at 203-04. See also Adrian Vermeule, *Rationally Arbitrary Decisions in Administrative Law*, 44 J. LEGAL STUD. S475, S478 (2015) (“[I]n the face of uncertainty a rational decision maker may set the α -value—the parameter that captures pessimism or optimism—anywhere within a range defined by the worst-case and best-case scenarios . . .”). Relevant discussion can also be found in Martin L. Weitzman, *Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change*, 5 REV. ENVTL. ECON. & POL’Y 275, 276 (2011), which discusses “structural uncertainties in the economics of extreme climate change.”

²⁰¹ It also depends partly on concepts. For a discussion on some of these issues, see ELSTER, *supra* note 198, at app. 1; CASS R. SUNSTEIN, WORST-CASE SCENARIOS 127-28 (2007), which argues that regulation to avoid worst-case scenarios can sometimes result in “worst-case scenarios of [their] own”; and Vermeule, *supra* note 200, at S481, which discusses the “conceptual mistakes about what counts as rational decision making under uncertainty.”

respect to harm, are we speaking of risk, uncertainty, or ignorance? The scientific consensus appears to be risk—and that the underlying danger is very low.²⁰² The consensus may or may not prove correct, but however important, its correctness raises no interesting conceptual questions for our purposes. At the same time, it is true that those who favor a kind of epistemic humility, even for scientific consensus, will be drawn to a precautionary approach.

It should be added that if GM foods really do create a potentially catastrophic risk, and if a sensible version of the precautionary principle is therefore triggered, GM labels are hardly an obvious response. In the abstract, they seem far too weak and modest. Indeed, GM labels might do no good at all. The counterargument is that they might be able to diminish the risk, on certain assumptions about the likely consumer response, and so might count as one reasonable step. I have raised a question about whether the science justifies invocation of precautionary thinking here, but if it does, labeling might be a justified, if partial, response.

A distinctive argument, ventured by Nassim Nicholas Taleb et al., is that GM crops pose a “ruin” problem, involving a low probability of catastrophically high costs.²⁰³ Taleb et al. contend that for such problems, it is best to take strong precautions—in this case, placing “severe limits” on GM food.²⁰⁴ The discussion has some technical features, but let us suppose that it is correct. If so, the question is whether GM crops really do create ruin problems. Perhaps they do, but it is certainly possible to read the most recent science to suggest that they do not, and if the probability of catastrophic harm is vanishingly low (essentially zero), rather than merely very low, we can fairly ask whether Taleb et al.’s argument applies.

B. Precautions and Democracy

On one view, the precautionary principle is not only, or even fundamentally, about irreversibility, catastrophe, and decision theory.²⁰⁵ It has an insistent democratic foundation. Its goal is to assert popular control over risks that concern the public.²⁰⁶ It is about values, not facts. If members of the public are concerned about GMOs, nuclear power, or nanotechnology, then the precautionary

²⁰² See *supra* notes 106–21 and accompanying text.

²⁰³ See Taleb et al., *supra* note 119, at 10 (arguing that by “manipulat[ing] large sets of interdependent factors at the same time,” GMOs have the potential to upset the entire food system).

²⁰⁴ *Id.* at 1.

²⁰⁵ See *supra* note 187.

²⁰⁶ See, e.g., David Gee & Morris Greenberg, *Asbestos: From ‘Magic’ to Malevolent Mineral*, in THE PRECAUTIONARY PRINCIPLE, *supra* note 187, at 47, 59 (discussing how regulation of asbestos resulted, in large part, from public pressure for the government to regulate).

principle provides them with a space for them to assert those concerns. It ensures democratic legitimation of the process of risk regulation.

For those who embrace the precautionary principle on this ground, efforts to speak of costs and benefits will fall on deaf ears. And for those who believe that in this domain or others, scientists are in the grip of powerful private interests, and that the “system is rigged,” a precautionary approach will seem especially appealing—not least for democratic reasons.²⁰⁷ If the science is compromised, and hence unreliable, it should hardly be decisive. For those who believe that popular concerns often turn out to be justified even if scientists discount them, the democratic justification for the precautionary principle might even turn out to be appealing on epistemic grounds.

No abstract argument can rule out the possibility that scientists are mistaken or that they have been compromised. It is correct to emphasize that a scientific consensus in favor of safety²⁰⁸ can be wrong; the same is the case for a scientific consensus in favor of danger.²⁰⁹ For those who favor the precautionary principle on democratic grounds—and believe that popular concerns about GM foods are a legitimate basis for invocation of the principle—the arguments offered here cannot be decisive. The only response is that some form of welfarism, embodied in the executive branch’s self-conscious efforts to catalogue the human consequences of regulation,²¹⁰ should not be trumped by baseless fear—and that cost–benefit analysis, understood as a form of applied welfarism,²¹¹ should not be abandoned merely because people are needlessly worried.

CONCLUSION

My goals in this Article have been twofold. First, I have attempted to make progress in understanding the distinctive challenges, both conceptual and empirical, that agencies face in cataloguing the costs and (especially) the benefits of mandatory labels, and in demonstrating that the benefits of such

²⁰⁷ As one commentator noted in response to an argument against mandatory labels, “So God is wrong and Monsanto is right?”

²⁰⁸ See *supra* subsection II.A.3.

²⁰⁹ See ALLAN MAZUR, TRUE WARNINGS AND FALSE ALARMS: EVALUATING FEARS ABOUT THE HEALTH RISKS OF TECHNOLOGY, 1948–1971, at 4 (2004) (“No scientific judgment is absolute. Objections or qualifications can be raised for every risk assessment.”).

²¹⁰ See ADLER, *supra* note 65, at 165–66 (discussing the perspective that “government should orient policy around producing individual well-being” while also acknowledging that there exist different approaches to measuring well-being).

²¹¹ See MATTHEW D. ADLER & ERIC A. POSNER, NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS 12 (2006) (explaining cost–benefit analysis in terms of welfare economics, and stating that “welfare economics assumes that a person is better off when his preferences are respected”); SUNSTEIN, *supra* note 71, at 145–47 (describing cost–benefit analysis in the context of the risk of human death).

labels justify the costs. Second, I have tried to show that those challenges are especially acute in the context of labels for GM foods.

In the abstract, the argument for labeling GM food seems appealing, perhaps even irresistible. Many people are concerned about what they see as the associated risks of GM food.²¹² It might appear obvious that they should have a right to know what they are eating. Partly in response to these claims, there has been a growing movement in favor of mandatory labeling; the movement has now resulted in federal legislation.²¹³ That legislation requires implementing regulations from the USDA,²¹⁴ and hence some kind of cost–benefit analysis.²¹⁵

I have suggested that it will not be easy for the USDA to show that the benefits of GM labels justify the costs. To the extent that the health risks are nonexistent,²¹⁶ and the environmental risks are highly speculative,²¹⁷ the benefits might fail to support regulatory action, even if the costs are relatively low. To be sure, consumers do appear to support labeling, at least in surveys.²¹⁸ But in their actual behavior, most consumers do not show much evidence that they care, as reflected in the fact that the countless foods without a “GM free” label have not exactly been losing market shares.

Moreover, consumer concerns about GM foods appear to be rooted in some combination of baseless fears of health risks and generalized disgust²¹⁹—hardly a sufficient basis for mandatory labels. There is also a risk that GM labels will, for a significant part of the population, end up producing a misleading signal, to the effect that the government believes that GM foods impose significant health risks.²²⁰

Some regulatory initiatives are justified as precautions in the face of either risk or uncertainty. There are good reasons to consider regulation of products that impose a small risk of imposing irreversible or catastrophic harm, and if the risk cannot be quantified, it might make sense to eliminate the worst-case scenarios.²²¹ On one view of the science, precautions are justified against GM food because of the environmental risks, and those precautions might include labels (and possibly more). The best response is that the scientific consensus

²¹² See *supra* notes 6–7.

²¹³ See *supra* note 9 and accompanying text.

²¹⁴ See *supra* note 10 and accompanying text.

²¹⁵ See *supra* note 11.

²¹⁶ See *supra* subsection II.A.3.

²¹⁷ See *supra* subsection II.A.4.

²¹⁸ See *supra* text accompanying note 125.

²¹⁹ See *supra* text accompanying notes 124, 133–39.

²²⁰ See *supra* text accompanying notes 182–85.

²²¹ See *supra* notes 203–05 and accompanying text.

does not justify that conclusion. If so, the argument for a precautionary approach is difficult to defend—at least if GM food promises significant benefits.²²²

In these circumstances, the USDA will face difficulty in demonstrating that the benefits of implementing regulations justify their costs. To be sure, the law requires labels,²²³ and hence the agency's inability to make such a demonstration will not prevent implementing regulations from being issued. But within the executive branch, there will be a substantial effort to explore costs and benefits, and to show, if at all possible, that the benefits provide a sufficient justification. The USDA's best (or least bad) option may be to emphasize that the costs of labels are quite low and to use breakeven analysis, either invoking consumers' desire to have labels or pointing to the existence of potentially serious or even catastrophic environmental risks that cannot be ruled out of bounds. If the per person cost is very low—say, \$2 per year—then a breakeven analysis would not be implausible.²²⁴

My focus throughout has been on mandatory labels for GM foods, but my real topic has been far broader. In numerous contexts, Congress requires or authorizes federal agencies to impose disclosure requirements.²²⁵ In all those contexts, executive agencies are required, by executive order, to catalogue the benefits and costs of disclosure requirements, and to demonstrate that the benefits justify the costs.²²⁶ As we have seen, agencies face persistent challenges in projecting benefits, and they use four different approaches, including a refusal to do so on the ground that quantification is not feasible; breakeven

²²² See, e.g., Graham Brookes & Peter Barfoot, *GM Crops: The Global Economic and Environmental Impact—The First Nine Years 1996–2004*, 8 *AGBIOFORUM* 187, 194–95 (2005) (quantifying the economic and environmental benefits associated with GM technology and finding “substantial economic benefits at the farm level,” “less pesticide use,” and “a significant contribution to reducing greenhouse gas emissions”); K.-H. Engel et al., *Current and Future Benefits from the Use of GM Technology in Food Production*, 127 *TOXICOLOGY LETTERS* 329, 330–32 (2002) (listing beneficial applications of GM technology, including improving plants' herbicide tolerance, insect resistance, and nutritional properties); Randall Lutter & Katherine Tucker, *Unacknowledged Health Benefits of Genetically Modified Food: Salmon and Heart Disease Deaths*, 5 *AGBIOFORUM* 59, 59 (2002) (proposing that “[l]ower production costs [of GM salmon] would lower prices, increase salmon consumption, and boost intake” of heart-healthy nutrients).

²²³ See *supra* text accompanying note 9.

²²⁴ See *supra* text accompanying notes 167–70.

²²⁵ For a detailed catalogue and a highly skeptical account, see BEN-SHAHAR & SCHNEIDER, *supra* note 44.

²²⁶ See *supra* notes 1–2 and 11. Note that current executive orders do not apply to the so-called “independent” agencies, though those agencies sometimes produce cost–benefit analyses under statutory compulsion or on their own. See, e.g., *Bus. Roundtable v. SEC*, 647 F.3d 1144, 1149–50 (D.C. Cir. 2011) (finding that the SEC acted arbitrarily and capriciously in that it “inconsistently and opportunistically framed the costs and benefits of the rule” and “failed adequately to quantify the certain costs”). Recall once more that whenever the law requires agencies to proceed, they must do so even if benefits do not justify costs; the requirements in relevant executive orders are imposed “to the extent permitted by law.” See *supra* note 15.

analysis; projection of end-states, such as economic savings or health outcomes; and estimates of willingness-to-pay for the relevant information.

Each of these approaches raises serious questions and runs into strong objections. In principle, the right question involves willingness-to-pay²²⁷; but in practice, agencies face formidable problems in trying to answer that question. If answers are unavailable, a breakeven analysis is the very least that should be required, and it is sometimes the most that agencies can do. If it is accompanied by some account of potential outcomes, acknowledging uncertainties, a breakeven analysis will often show that mandatory disclosure is justified on welfare grounds—and often that it is not.

²²⁷ This is subject to qualifications. *See supra* note 53.

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