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Lunch with Pigou: Externalities and the “Hidden” Cost of Food

Jayson L. Lusk

Social critics have taken aim at modern production agriculture using a common theme: many food, health, and environmental problems are explained by corporate farms, agribusinesses, and fast-food restaurants failing to account for the full costs of their actions. How accurate is this diagnosis? How feasible is the assumption that these externalities are most effectively mitigated via Pigovian taxes and subsidies? Drawing on my experiences at a National Institute of Medicine meeting on the subject, I seek to clarify the definition and nature of externalities and discuss situations in which public policy is most and least effective in efficiently making “hidden” costs of food visible.

Key Words: agricultural policy, externality, food policy, food prices

We believe that the understanding of the concept of external effects held by informed policymakers (and perhaps some members of the academy) remains, at times, fractured and confusing. . . . This confusion has been partly responsible for the use of externalities as a rationale for government intervention into a very wide array of markets. Indeed, it seems that by making externality arguments in an institutional vacuum, economists unwittingly developed a weapon of mass destruction that, in the hands of journalists and popular policy analysts, at times corroded almost to the point of uselessness the beneficial theory of markets and competition. (2009, p. 130–131)

—Barnett and Yandle

Former U.S. President Lyndon Johnson once remarked that “Making a speech on economics is a lot like pissing down your leg. It may seem hot to you, but it never does to anyone else” (Caro 2003, p. 416). In light of such attitudes, it is little wonder that economics has earned the title “dismal science.” Given the disdain with which many in the public apparently hold the economics profession, it is perhaps surprising that the lexicon of economics has been incorporated into a growing and influential body of writings by journalists, food writers, environmentalists, and public health professionals. The economic insight that has been adopted so enthusiastically and applied to food and agriculture is

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not opportunity cost or marginal analysis or the concept of equilibrium. It is externalities.

It is instructive to consider a few examples to demonstrate the extent to which the concept of externality has pervaded popular writing about food. In his acclaimed book, *The Omnivore's Dilemma*, Michael Pollan (2006, p. 63) wrote that corn is “too cheap” and that “cheap food is food dishonestly priced—it is in fact unconscionably expensive.” He later argued (2006, p. 410) that fast food “seems a bargain but fails to cover its true cost, charging it instead to nature, to the public health and purse, and to the future.” Referring to prices of agricultural commodities, *New York Times* columnist Mark Bittman (2011) wrote that “prices for these foods [meat, poultry, sweets, fats and oils, and soda] are unjustifiably low—but at what cost to the environment, our food choices, and our health?” Similarly, nutritionist and author Marion Nestle argued in a 2002 speech to the American Public Health Association that “food is too cheap in this country.” Country music star Willie Nelson, writing with Anna Lappé, was troubled by what he saw as externalities in modern food production, writing that it “has led to . . . the destruction of soil fertility, the pollution of our water, and health epidemics” because “corporations [are] concerned less with protecting our health, our environment, or our jobs than with profit margins and executive bonuses” (Nelson and Lappé 2012 web page). These opinions have influenced academics in a wide array of disciplines. Consider, for example, the following passage from a law journal: “The large food companies’ failure to internalize all the food production costs creates negative externalities and economic deficiencies in the food market. Government regulation to date is insufficient to stop the externalization of costs” (Steier 2011, p. 163).

Such examples are but a few of many expressions of the growing cultural notion that food (at least certain types of food) is underpriced because of environmental, social, and health externalities. The arguments led the Centers for Disease Control and Prevention and the Institute of Medicine (IOM) of the National Academies of Science to hold a planning workshop entitled “Exploring the True Costs of Food.” I was fortunate to be one of the participants in the workshop, which included prominent medical health professionals, nutritionists, epidemiologists, environmental scientists, meat industry representatives, and members of several environmental and food activist groups (IOM and National Research Council (NRC) 2012).

One of the striking observations that emerged from the conference was the wide disconnect between the views held by participating economists and noneconomists about the nature and role of externalities.¹ Among many of the noneconomists, it seemed that any “bad” outcome that resulted from food production and consumption—heart attacks, obesity, the low pay of slaughterhouse workers, soil run-off, animal welfare problems, climate change—was evidence of an externality that required regulation, typically in the form of some sort of tax. I also learned in the process that some of my views about externalities were perhaps a bit unorthodox relative to those of other economists.

That there are externalities resulting from modern food production is hardly a controversial assertion. The much more difficult question is whether the externalities represent efficiency losses that can, in practice, be effectively

¹ The other economists participating were Anna Alberini, John Antle, Jay Bhattacharya, James Hammitt, Helen Jensen, Kitty Smith, and Scott Swinton. Of course, I do not claim to speak for these individuals and the discussion here represents only my views and interpretation of the events.

mitigated with Pigovian taxes or other policies. When skepticism was expressed that "bad" outcomes were not externalities causing efficiency losses or were not the types of externalities particularly conducive to correction via taxation, consternation was expressed by many noneconomists. In a summary of events, the IOM-NRC (2012, p. 6-12) reported that "All four break-out groups struggled to understand exactly what to measure—externalities defined by economists or all external effects regardless of whether they qualify as externalities (e.g., external effects that are internalized)." There was (p. 6-10) "lively debate about whether a full-scale accounting of the food system should even cover external effects that have been internalized." Because of disagreement about which types of effects constitute efficiency-reducing externalities, participants simply (p. 6-10) "decided to identify all potential health effects, regardless of whether those effects qualify as externalities."

Because some regulations desired by public health professionals could not be cleanly justified on efficiency grounds related to externalities, the approach soon lost much of its appeal with some. There were (IOM-NRC 2012, p. 6-12) "varying opinions about whether the concept of externality is the best way to frame a full-scale accounting of the 'true costs' of food" and some (p. 7-2) "wondered whether there might be other economic strategies, such as ecological models, that could provide better ways to frame the discussion." Ultimately, a prominent academic, apparently fed up with the economists' arguments, announced that they did not want to constrain their calls for taxation only to issues that could be justified on economic efficiency grounds; yet, there was an apparent unwillingness to adopt or outline another framework (e.g., paternalism based on behavioral economic research) for justifying government action.

The issues at play are, of course, more general than anything that transpires at a single conference. No doubt many respected economists who work with interdisciplinary groups and policymakers have had similar experiences. IOM and NRC have commissioned a follow-up study entitled "A Framework for Assessing the Health, Environment, and Social Effects of the Food System" and some of the same issues are likely to arise.

The purpose of this discussion is threefold. First, I aim to expand our (or at least my) understanding of externalities and consider some of the difficulties in applying textbook remedies. Second, I offer a framework for discussing when and under what circumstances regulations such as Pigovian taxes can effectively mitigate economic inefficiencies caused by externalities. In drawing conclusions, I provide several examples of Pigovian taxes that are relatively more and less likely to satisfy the criteria proposed in the framework. Third, I aim to balance the discussion of this topic by expressing a more reasoned skepticism of the ability of government regulation to effectively mitigate externalities than readers typically find in treatments of this subject. In so doing, I offer a defense of markets and individual liberty and discuss how those forces seek to reduce external effects. Many people are legitimately worried about the negative effects of our modern food production system. However, I urge caution in adopting new taxes and regulations on the premise that they will solve problems associated with externalities. My arguments are multifaceted and relate to the difficulty of accurately discerning the "optimal" tax and of using the regulatory process to implement policy in a way that actually causes the intended effect without also creating unintended consequences (in essence, creating new externalities).

I do not necessarily claim to offer any novel insights that are not already contained in the vast literature on the subject. Indeed, I suspect many readers well versed in environmental and resource economics are more deeply immersed in this literature. Although I lay no claim to novelty, I hope to provide a systematic way of summarizing this literature (via a nine-question “checklist”) to facilitate communication on the topic among economists and between economists and individuals from other disciplinary backgrounds. Indeed, the point of recounting the conference experience is not to disparage noneconomists (we should not expect them to be well-versed in economic theory) but, rather, to argue that economists need to more effectively communicate our disciplinary knowledge about externalities.

What Is an externality?

Defining externality seems a fairly straightforward task, and countless undergraduate textbooks provide an answer. An example from Mankiw (2006, p. 204) should suffice: An externality “arises when a person engages in an activity that influences the well-being of a bystander and yet neither [person] pays or receives any compensation for that effect.”

Under this definition, an upstream firm that pollutes a river and thus degrades public health or the production efficiency of a downstream firm causes an externality. An obese individual whose extra medical costs are borne by other taxpayers via Medicare also fits the definition. So too does the case of an uninformed journal article reviewer recommending rejection of a competent paper that could have been enjoyed by journal readers. As does the consternation I feel when seeing a cousin wearing an ugly sweater at Christmas. Or the angst that many of my liberal friends feel when Sarah Palin appears on Fox News. When the firm decided how much to produce, the obese person how much to eat, the reviewer what to critique, the cousin what sweater to wear, or the producer which politicians to interview, I was not compensated for the effects on my health, wallet, or abused political sensitivities. No matter how disparate the examples, they all fit the conventional textbook definition of externality.

The textbook answer to an externality problem is that something must be done to align private and social costs. Luther Tweeten described the solution rather colorfully: “St. Augustine called for people to ‘Love God and do as you please.’ The economist advises to ‘Price right and do as you please’” (2010, p. 11). His insight suggests that there is little to be done to improve aggregate well-being when markets are working well. As we have seen, however, markets do not internalize all of their effects, and when such a situation arises, the price is not always right. As a result, the economist is typically taught to figure out how to get the price right—often with a Pigovian tax.

I suspect that many (not all) readers would balk at an ugly-sweater tax or a Sarah-Palin-speech tax. Despite the fact that these examples clearly fit the definition of an externality, few would argue that they represent cases in which government should intervene. Why?

Clearly, the case for regulating externalities is more complicated than first meets the eye. Indeed, as the preceding examples illustrate, one is apt to see externalities everywhere. The sheer abundance of examples that fit the definition of “externality” coupled with our unwillingness to tax them all away is suggestive. As Coase put it, “The ubiquitous nature of ‘externalities’ suggests to me that there is a *prima facie* case against intervention” and

"studies on the effects of regulation that have been made in recent years in the United States, ranging from agriculture to zoning, which indicate that regulation has commonly made matters worse, lend support to this view" (1988, p. 26).

In 1974 in one of his lesser known papers, Coase pointed out inconsistency in economists' perspectives toward regulating externalities in markets for goods versus markets for ideas, the latter including "activities covered by the First Amendment—speech, writing, and the exercise of religious beliefs" (1974, p. 384). Government regulation is seen by many economists as desirable in the market for goods but "in the market for ideas, government regulation is undesirable and should be strictly limited" (Coase 1974, p. 384). Coase argued that the distinction often drawn between markets for goods and ideas is not based on any rationally compelling difference or distinguishing characteristic; rather, academics are unwilling to apply the same economic logic to ideas. He advocated a consistent view of government intervention in all domains. It is not simply a case of whether one can identify a textbook example of a Pigovian tax offsetting an externality; it is a matter of how an actual policy is enacted. As Coase noted, it requires that we "come to some conclusion about how the government will perform whatever functions are assigned to it" (1974, p. 390).

Thus we begin to realize that there are situations that precisely fit the textbook definition of externality that we still may not wish to regulate. Not all externalities are created equal.

Morey (2004) noted a particularly relevant distinction. Textbook definitions fail to distinguish between "external effects" and "externalities." He argued that "external effects are a necessary but not sufficient condition for the existence of an externality" (p. 4) and defined an externality as a type of market failure. According to Morey, "Many others define an externality as what I am calling an external effect, in which case it might or might not be inefficient" (p. 4). Morey then provided a nuanced definition of externality that differed from definitions by Mankiw and almost all undergraduate textbooks by including only actions in which an external effect causes an inefficiency.

I personally am not very optimistic that either Morey or I can change the way people use the term externality to include only efficiency-reducing external effects. Rather, I pragmatically adopt the linguistic norm that all external effects will be called externalities and instead suggest, based on the preceding arguments and those that follow, that not all externalities reduce efficiency or justify regulation. That there are different types of externalities and not all are "Pareto relevant" has been noted by many previous authors, including Barnett and Yandle (2009) and Buchanan and Stubblebine (1962).

When Is a Pigovian Tax Justified?

I have argued that the mere presence of an externality is insufficient cause for government action, but that does not, of course, mean that externalities never justify regulation. Thus, it seems that some systematic approach to thinking about externalities might help. I organize my thinking on the issue around the set of questions (or checklist) shown in Figure 1, and each subsection that follows addresses one of the questions. The checklist is designed to be used to determine whether an issue is an externality in an economic sense and whether it represents a type of externality amenable to correction via taxation or other regulation. The

Figure 1. Questions to Be Answered in the Affirmative for Pigovian Taxes to “Optimally” Resolve Externalities

	Question	Comment
1	Does a transaction create a cost or benefit on a third party uninvolved in the initial transaction (i.e., is there an externality)?	Not all bad outcomes are efficiency-reducing externalities.
2	Is the externality nonpecuniary?	Pecuniary costs that occur through the price system are not efficiency-reducing.
3	Does the externality represent more than just transfers among individuals in an insurance pool?	Transfers are not efficiency-reducing unless they create moral hazard.
4	Is the third party unable to insure against costs imposed by the externality?	Opportunities for insurance can reduce or eliminate inefficiency.
5	Is the third party unable to litigate to recoup costs imposed by the externality?	Opportunities for litigation can reduce or eliminate inefficiency.
6	Is the transaction cost of negotiating over external effects high?	Opportunities to negotiate can reduce or eliminate inefficiency.
6a	Are a large number of actors affected?	A smaller number of actors creates fewer coordination problems.
6b	Does the asset in question have public-good characteristics (nonrival and nonexcludable)?	Free-riding opportunities limit effectiveness of efficiency-enhancing negotiation.
6c	Are there other social or governmental constraints that prevent bargaining?	Existing regulations sometimes prevent the assignment of property rights or limit negotiation.
7	Can the external effects be readily and robustly estimated? Are they stable?	Inaccurate estimates of external effects (or effects that are sensitive to economic conditions) can make Pigovian taxes inefficient.
8	Is the political and market environment as simple as assumed in textbook descriptions of Pigovian taxes?	Pigovian taxes can produce larger inefficiencies in the presence of existing regulations, corruption, monopoly, and other imperfections.
9	Is the externality “Pareto relevant?” Does the cost of regulating the externality exceed the benefit?	The cost associated with correcting an externality can exceed the benefit of equating social and private costs.

questions are phrased so that the default position is one of classic liberalism (freedom of transaction will yield the highest efficiency) and the presumption is that a certain bar must be reached to justify government interference with private transactions. Agreement with a larger number of the questions indicates stronger economic justification for something like a Pigovian tax.

No doubt there will be others who would argue for the opposite framing—that the default should be that government regulates outcomes to ensure a “fair” playing field and that a bar must be reached to justify unregulated, unplanned outcomes that occur from private transactions. A difference of opinion on the starting premises is likely driven more by ideological and philosophical considerations than by economics *per se*. Nevertheless, whatever one’s initial premises, the structure provided in Figure 1 should provide a useful platform for guiding discussion about the regulation of externalities.

It is important to note that the questions focus primarily on the issue of efficiency. Although some economists have argued that “fairness” and equity issues should also factor into policy recommendations related to externalities (e.g., Mishan 1971), conventional economic welfare analysis relies on the Pareto principle or derivatives thereof. Thus, the discussion that follows focuses primarily on the issue of whether an externality reduces efficiency—the size of the economic pie—as a basis for whether public policy is justified.

Q1. Does a transaction create a cost or benefit on a third party uninvolved in the initial transaction?

This initial question simply asks whether there is an externality (or an external effect if we use Morey’s (2004) definition). The question admittedly may seem a bit trivial. However, it has been my experience that some noneconomists have adopted a definition only slightly more advanced than the following: an externality is anything I do not like. The forthcoming justification for regulation, then, amounts to the existence of those things they dislike. As a result, issues that are put forth as “plainly” externalities often do not actually fit the bill. Let me offer a few examples that came up during the small-group breakout sessions at the IOM conference to illustrate this point.

Suppose a restaurant sells a meal to a patron who subsequently suffers from a food-borne illness. Did the restaurant impose an externality on the diner? Hard to say. When the diner was deciding which restaurant to patronize, did he adjust his willingness-to-pay for cleanliness and perceived safety or health risk? If so, the health risks were internalized (at least probabilistically) during the transaction and are implicitly reflected in the food prices. What about consumers’ purchases of meat from large packing plants that employ immigrant laborers who are at high risk of suffering a workplace injury? Is the line-worker’s cut finger an externality caused by the packer or the consumer? Again, it is hard to say. Workers likely accepted the job with some notion of its riskiness, and research consistently shows that workers employed in riskier jobs demand and receive greater compensation (Viscusi and Aldy 2003). In such cases, workers’ wages and the price of meat already reflect the health and safety risks. As these examples illustrate, market prices and outcomes often reflect a wide range of potential outcomes that, at first blush, appear to represent external effects. If consumers, workers, or producers consider such effects at the time of consumption, employment, or production, they are not externalities.

Q2. Is the externality nonpecuniary?

My decision to purchase a box of cereal reduces the quantity of cereal available to others. That reduction in the quantity available drives up the price paid by others (even if by a very small amount). Have I imposed an externality on future cereal buyers?

Suppose you put your house on the market, and I come to the open house and fall in love with it. But before I can secure financing, you sell the home to someone else and deprive me of the house I wanted. Have you imposed an externality on me?

In both cases, the answer is “yes”: an externality was created. But, it was a particular kind of externality—a pecuniary externality. The externality is one that occurs through the function of the market and the allocation of goods. Originally, Pigou (1920) was concerned with pecuniary *and* nonpecuniary externalities and found both to be a cause for concern and potential motivation for taxation and intervention. It was not long before other scholars, such as Knight (1924), began to question some of Pigou’s interpretations, and it is now widely understood that pecuniary externalities are not efficiency-reducing (see Barnett and Yandle (2009) and Holcombe and Sobel (2001) for recent discussions of the issue). Instead, these are questions of distribution (who gets the good) and not of efficiency. My lost ability to buy your house is exactly offset by some other home shopper’s gain in securing it.

The trouble, as noted by Holcombe and Sobel (2001), is that politicians and others rarely discriminate between pecuniary and nonpecuniary (or technological) externalities and use the language of economics to argue for regulation of both. As Holcombe and Sobel (2001) argued,

The political system also does not differentiate between them and stands equally ready to compensate for the effects of both pecuniary and technological externalities. This becomes apparent when one recognizes the role that interest groups play in determining the direction of public policy and when one recognizes that an interest group petitioning the legislature to remedy the harm the group suffers from an externality is harmed just as much from a pecuniary externality as a technological one. In the same way that technological externalities create a market failure because market participants treat technological and pecuniary externalities the same, pecuniary externalities create a government failure because the public policy process treats both types of externalities the same way. (p. 323)

From an efficiency perspective, pecuniary externalities are not a cause for government interference with private transactions because there is no deadweight loss that can be alleviated with a tax or subsidy. As will be seen in the next question, pecuniary externalities are not the only type of externality that corresponds to welfare-irrelevant zero-sum transfers.

Q3. Does the externality represent more than just transfers among individuals in an insurance pool?

One of the most common motivations cited by public health professionals who urge public action in relation to obesity is the cost of obesity—particularly the cost paid by taxpayers through public insurance systems such as Medicare and

Medicaid. If individuals on Medicare or Medicaid incur higher medical costs because they are obese, they impose an externality on me because my taxes rise to cover the additional cost. It is a potential slippery slope to use one government intervention (Medicare), the stated underlying cause of the externality, as justification for another intervention (a fat tax), but putting that issue aside, there are other reasons to question whether the "obesity externality" and others like it are Pareto-relevant, efficiency-reducing conditions.

It is true that obesity and other dietary-related diseases can be costly to an individual (Bhattacharya and Sood 2011). But, buying a Mercedes is costly to an individual too. The public policy issue is not that an outcome is costly but whether an individual's actions fail to internalize the cost. Citing the total additional cost of public health care arising from obesity or other dietary-related diseases, therefore, provides the mistaken impression that the cost results from a market failure.

Much of the "externality" cost of Medicare and Medicaid consists simply of transfers from one person to another—reallocations of slices of a pie that do not necessarily make the pie any smaller. Moreover, these reallocations (though largely efficiency-neutral) may actually be desirable from an equity standpoint since they represent dollars flowing from the healthy to the sick, from the nonobese to the obese, and, particularly for Medicaid, from the richer to the poorer. As Bhattacharya and Sood (2011) put it, "a pooled insurance contract is a lump sum transfer from what thin people in the pool pay to what obese people in the pool receive. However, standard welfare economics suggests that this lump sum transfer has no social cost unless it induces a change in behavior" (p. 148).

Where economic analysis suggests that a problem might arise is, as Bhattacharya and Sood (2011) suggested, when people change their behavior *because* of public health care. The moral hazard that arises if people begin to eat unhealthily *because* they know their costs are covered does indeed represent inefficiency. But the extent of that inefficiency is likely much smaller than oft-cited changes in the total cost of public health care resulting from obesity. Brunello, Michaud, and Sanz-de-Galdeano (2009) showed that the "externality" resulting from the presence of public health insurance is related to the [marginal utility of consumption] \times [additional health expenditures due to weight gain] \times [weight gain due to insurance subsidy]. Much of the literature on public health focuses on the middle term, the additional health care cost associated with obesity, but from a public policy perspective, the latter term is the one of primary relevance and the size of that behavioral-response variable is likely much less than one. Bhattacharya and Sood (2011) reviewed the literature and concluded that "the evidence on the extent to which this obesity subsidy influences obesity is mixed" (p. 153). In their review, Brunello, Michaud, and Sanz-de-Galdeano (2009) concluded that "even if there is a large health insurance subsidy (nonobese effectively subsidizing obese individuals), the size of the health insurance externality is likely to be small because the behavioral response to the subsidy appears to be limited. We conclude that both reasons [lack of information and behavioral response to public health care] cannot serve as a basis for policy intervention on efficiency grounds" (p. 556). To bolster their argument that moral hazard is not terribly problematic in this case, they noted that obesity rates are lower in Europe despite the fact that public funds pay a larger share of Europeans' medical expenses.

On the topic of obesity, some argue that the full cost of food is hidden, that low food prices cause people to eat too much (or to eat the wrong kinds of food), and that one of the “hidden” external costs is obesity. However, there is a good deal of evidence to suggest that such costs are hardly hidden. The obese earn lower wages than thinner individuals (Cawley 2004), particularly when they are employed by firms that provide health insurance (Bhattacharya and Bundorf 2009). They also pay higher insurance rates under insurance programs that are not required to offer uniform premiums (Pauly and Herring 2007), and extremely obese individuals die sooner than people of normal weight (Flegal et al. 2013). These are all *private* costs borne directly by obese individuals. Any costs that are “hidden” via public health insurance consist mainly of transfers among people in the insurance pool.

Bhattacharya and Sood (2011) concluded that “the classic Pigovian case for intervention—that social welfare can be improved if those who impose externalities on others are required to internalize the social costs—does not apply especially well to obesity” (p. 153). I would go a step farther to say that the applicability of externality as a motivation for government intervention is, for the same reasons, weak for almost all dietary-related diseases.

As was the case with question 2, question 3 argues against public intervention when the externality is a zero- or near-zero-sum transfer.

Q4. Is the third party unable to insure against costs imposed by the externality?

The U.S. food supply system transports millions of tons of food on roadways each year, and more trucks on the road lead to more auto accidents. Thus, the current “food system” imposes an externality on drivers. But is it an efficiency-reducing externality? Not necessarily if the potentially injured (or injuring) party can insure against the potential cost.

When an individual can purchase insurance against potential harm from other drivers, weather, health problems, and/or occupational risks, there is a mechanism by which the individual can receive compensation for external harm. Such insurance requires people to pay premiums against possible future losses, so insurance does not completely mitigate the externality. The larger corrective comes when those who do the injuring (e.g., the truck driver or the owner of an unsafe workplace) must buy insurance with risk-adjusted premiums. In such cases, the external effects are at least partially priced into insurance rates.

In short, opportunities to insure against harm caused by a third party can reduce the costliness of external effects when they occur. Moreover, individuals and firms carrying insurance for which the premium adjusts in response to harm done have an economic incentive to consider the effects of their actions on others.

Q5. Is the third party unable to litigate to recoup costs imposed by the externality?

In much the same way that insurance markets can internalize some external effects, the opportunity to litigate (and thus the threat of litigation) can do the same. If, for example, fishers and households are damaged by chicken litter that drains into the water supply, damages can be recovered by litigation against the poultry producer (the State of Oklahoma is currently pursuing a lawsuit against

Tyson and other poultry companies concerning run-off in the Illinois River watershed). On the flip side, poultry companies facing the threat of litigation and lost reputation are likely to invest (pay a cost) in practices and technologies that reduce run-off.

The issue of legal liability for one's actions and the implications for externality regulation were the topic of one of Coase's (1960) most famous works. Because his work is so well known, there is little point in elaborating much here. The overall implication is that opportunities to litigate and recoup the cost of harm caused by a third party can help alleviate adverse effects of an externality and that recognition of potential lawsuits by individuals and firms is an incentive to consider the effect of their actions on others.

Q6. Is the transaction cost of negotiating over external effects high?

Another of Coase's (1960) primary insights was that the opportunity to negotiate over damages caused (whether in court or otherwise) can mitigate the efficiency-reducing effects of externalities regardless of how the initial property rights were allocated (so long as they were allocated to someone). For example, an apple producer who benefits from bees kept by a neighboring honey producer has an incentive to make side payments to the beekeeper up to an amount equal to the benefit of the pollination received. Thus, when property rights are assigned and negotiation is possible, inefficiencies from externalities dissipate.

The important caveat to this claim, and the main thrust of Coase (1960) it seems, is that transaction costs can impede beneficial negotiation opportunities. Question 6 therefore poses three subsidiary questions that relate to the size of the transaction cost. First, if a large number of actors are affected by an externality, coordination problems are likely to arise and the ability to effectively negotiate is likely to diminish. Of course, as the aforementioned case of the State of Oklahoma versus poultry producers illustrates, a large number of affected people does not always prevent negotiation or litigation. Second, to the extent that the good (or effect) in question has public-good characteristics (characteristics that are nonrival and nonexcludable), there will be incentives to free-ride and the chance of efficiency-improving negotiation will diminish. Third, government rules or social norms may prevent the assignment of property rights and/or negotiation (or trade in certain commodities). The government may prohibit private ownership of certain lands or streams or sales of certain items (e.g., internal organs or certain pharmaceuticals); as a result, associated externalities cannot always be traded away. In some cases, the necessary corrective action may be to remove existing barriers to trade and negotiation rather than imposing a tax on the negative externality.

Q7. Can the external effects be readily and robustly estimated? Are they stable?

Baumol (1972) reasserted the theoretical principle that a single Pigovian tax applied to a polluting firm can lead to a socially optimal outcome. However, he also noted several difficulties associated with a Pigovian tax solution. Baumol's first concern was similar to ones expressed by Mises (1935) and Hayek (1945) in the socialist calculation debate:

Despite the validity of the principle of the tax-subsidy approach of the Pigovian tradition, in practice it suffers from serious practical difficulties.

For we do not know how to estimate the magnitudes of the social costs, the data needed to implement the Pigovian tax-subsidy proposals. For example, a very substantial portion of the cost of pollution is psychic; and even if we knew how to evaluate the psychic costs to some one individual, we seem to have little hope of dealing with effects so widely diffused through the population. (Baumol 1972, p. 316)

Coase described a similar concern (quoted in footnote 11 on page 316 in Baumol): “The view I expressed . . . was not that such an optimum tax system . . . was inconceivable but that I could not see how the data on which it would have to be based could be assembled.” Thus, even if a Pigovian tax can be shown to be optimal in theory, it is unclear whether we know enough to actually implement the “optimal” tax in reality. Even a casual look at changes in corn or soybean prices over the past decade, for example, reveals substantial variation and abrupt price swings; if regular commodity prices are so volatile, it is naive to assume that a single, static Pigovian tax will in any way be efficient.

Baumol (1972) went on to express further concerns about the actual practice of Pigovian taxation. In particular, he argued that, in the presence of “strong” externalities, multiple equilibria can arise. Technically speaking, if the marginal damage of one firm’s output on another firm becomes great enough, the concavity condition breaks down (i.e., the production possibility frontier is no longer concave) and can lead to a situation in which, according to Baumol, “an ‘improvement’ may merely represent a move toward some minor peak in the social welfare function and it can, therefore, impose serious opportunity losses in society. All in all, we are left with little reason for confidence in the applicability of the Pigovian approach, literally interpreted. We do not know how to calculate the required taxes and subsidies and we do not know how to approximate them by trial and error” (p. 318).

Baumol’s (1972) proposed solution to this problem was to follow a “satisficing rather than a maximizing approach” (p. 319) and to implement a minimum standard of acceptability while using taxes to try to achieve the standard. For example, one might determine some maximum amount of nitrogen run-off that is acceptable and implement trial-and-error taxes on fertilizer until one achieves a level of nitrogen run-off that falls below the standard. Despite the pragmatism of the proposal, such an approach offers little guidance on how to set the standard, ignores the public-choice economics that would surely arise in repeatedly setting standards and taxes, and provides no mechanism for assessing the general equilibrium effects of the standard/taxation regime in the presence of existing taxes and standards and multifaceted agricultural outputs. Moreover, as was the case with the Pigovian tax, the “optimal” tax required to achieve the minimum standard would not be static; it would vary with the supply and demand conditions. Nevertheless, Baumol (1972) argued that such an approach could (in principle) achieve a given standard at a minimal cost to society. He admits that “Even with pollution reduced to acceptable levels, there will remain the possibility of [an] (undiscovered) global optimum” that would offer “a world far better than what we have managed to achieve—if only we knew how to attain it” (p. 320). At the same time, however, he asserts that “if we permit ourselves to be paralyzed by councils of perfection we may have still greater cause for regret” (p. 320). My concern with the proposal is not that we may somehow fall short of the global optimum but that, by discarding the

welfare function altogether, we would have no way of knowing whether the standard-and-tax approach is even making us better off than the status quo.

The knowledge problem extends beyond the setting of a tax or standard for a particular commodity. Markets are interlinked in ways that are often difficult to anticipate. A Pigovian tax in one sector of the economy can have unintentional adverse consequences in another sector. Just to give one example, consider the effects of a tax on beef aimed at reducing external environmental impacts. Certain greenhouse gas emissions might well be cut with a Pigovian meat tax, but what about unintended consequences? Lakdawalla, Philipson, and Bhattacharya (2005) demonstrated that the prevalence of anemia in people is strongly related to the price of ground beef and estimated that "a 10-percentage-point increase in relative ground beef prices is associated with a 1.1-percentage-point increase in anemia prevalence" (p. 257). Does the cost from an increase in anemia (occurring mainly in children) outweigh the benefit of reduced greenhouse gas emissions? What other markets would be affected that have not been considered?

Indeed, much of the discussion so far about the precise nature of the Pigovian tax has been vague because critics of modern agriculture are also vague, stating only that some foods (the entire list typically is not given) are "too cheap" because of external effects (which are also imprecisely defined). Thus, we could consider a Pigovian tax on ounces of sugared soda (in general or only for certain drinks), grams of fat (either added or natural), number of calories (total or only from certain foods), fast-food hamburgers, pounds of red meat, or some production input such as fertilizer, herbicides, or antibiotics. These taxes would have different effects and would likely achieve different degrees of success in actually reducing external effects, whatever they may be. Thus, there are questions not only about the size of the optimal tax on a good but about which good(s) to target and which external outcomes will be affected. The less uncertainty there is about these issues, the more effective a Pigovian tax is likely to be. Likewise, the closer the link between a taxed good and the external effect of interest (e.g., the causal relationship between water quality and confined animal feeding operations or between body weight and consumption of Big Macs), the more likely it is that a tax will achieve its intended goal.

Q8. Is the political and market environment as simple as assumed in textbook descriptions of Pigovian taxes?

Theories about Pigovian taxes derived in an institutional vacuum are vacuous insofar as telling us what will happen when we try to actually implement such taxes. In essence, our blackboard models omit important details (related to dynamics involved in bargaining, property-right assignment, lawsuits, and the like) that can alter the claim that the taxes are welfare-enhancing. Most textbook descriptions of the efficiency-enhancing benefits of a Pigovian tax rely on a number of assumptions that are unlikely to hold. The preceding question dealt with one: the precise size of the externality may be unknowable and unstable. In this question, several other assumptions of the textbook model are questioned—assumptions related to political economy, imperfect competition, and pre-existing market distortions caused by other policies.

First, consider issues related to political economy. Politicians could use the externality argument to advance a policy as a cover for other motivations at play. As Barnett and Yandle (2009) put it, "The concept of externality has

been to microeconomics what Keynesian economics was to macroeconomics. Specifically, it provides a rationale for virtually unlimited government intervention into private transactions” (p. 134). Even Pigou (1920) recognized that academically designed policies are enacted by flawed politicians.

In any industry, where there is reason to believe that the free play of self-interest will cause an amount of resources to be invested different from the amount that is required in the best interest of the national dividend, there is a *prima facie* case for public intervention. The case, however, cannot become more than a *prima facie* one until we have considered the qualifications which governmental agencies may be expected to possess for intervening advantageously. It is not sufficient to contrast the imperfect adjustments of unfettered private enterprise with the best adjustment that economists in their studies can imagine. For we cannot expect that any public authority will attain, or will even whole-heartedly seek, that ideal. Such authorities are liable alike to ignorance, to sectional pressure, and to personal corruption by private interest. A loud-voiced part of their constituents, if organized for votes, may easily outweigh the whole. This objection to public intervention in industry applies both to intervention through control of private companies and to intervention through direct public operation. (Pigou, II.XX.4§4)

A related but slightly different aspect of the problem was recently noted by Acemoglu and Robinson (2013). In particular, they argued that the textbook solution for dealing with externalities and other market failures ignores larger political equilibria that can break down and lead to a reduction in welfare in the absence of market failure. “There is a broad—even if not always explicitly articulated—consensus amongst economists that, if possible, public policy should always seek ways of reducing or removing market failures and policy distortions. In this essay, we have argued that this conclusion is often incorrect because it ignores politics” (p. 189).

Friedman and Friedman (1980) noted related concerns. They acknowledged that “almost everything we do has some third-party effects, however small and however remote . . . But there is a fallacy. Government measures have third-party effects” (p. 31). It is particularly difficult for government to identify winners and losers from all of the actions it takes. Friedman and Friedman concluded that “As a result a government attempt to rectify the situation may very well end up making matters worse rather than better—imposing costs on innocent third parties or conferring benefits on lucky bystanders” (p. 32).

In addition, an “optimal” Pigovian tax also ignores imperfect markets. The issue was studied by Buchanan (1969), who found that “Only when the industry generating the external diseconomy is competitively organized can the corrective tax be unambiguously hailed as welfare improving, even in the presence of all of the other required conditions. Under monopolistic organization, the corrective tax may well lead to a reduction in welfare rather than an increase” (p. 175).

Under question 7, I described how a Pigovian tax can have unintended consequences because of the inter-relatedness of markets. Similarly, a Pigovian tax can have unintended effects because of the inter-relatedness of policy effects. In particular, Bovenberg and Goulder (1996) demonstrated that there are tax-interaction effects. Introduction of a new Pigovian tax can amplify

deadweight loss distortions caused by existing taxes on income and sales. As a result, even a "revenue neutral" Pigovian tax (in which the revenue gained from introduction of the Pigovian tax is used to offset taxes lost by reductions in existing income tax rates) may well generate a greater deadweight loss overall.

Pigovian taxes will be relatively more attractive the more likely it is that politicians can and will actually implement the tax as designed without unduly affecting a successful political equilibrium, the structure of the actual market is similar to the one in the model, and the tax-interaction effects are small.

Q9. Is the externality "Pareto relevant?" Does the cost of regulating the externality exceed the benefit?

That an externality exists—even one that can demonstrably be shown to reduce efficiency—does not necessarily imply that a new regulation will improve economic efficiency overall because regulation entails cost. The cost is related in part to the issues mentioned in previous sections but also is related to oversight and enforcement functions and the transaction cost associated with adding new layers of bureaucracy. As Coase (1988) put it, "The fact that governmental intervention also has its costs makes it very likely that most 'externalities' should be allowed to continue if the value of production is to be maximized" (p. 25).

By way of illustration, let us return to one of my initial examples. Cousins and colleagues who wear ugly holiday sweaters impose an externality on me. It is an efficiency-reducing externality—there would be fewer ugly sweaters made and sold if my psychic cost was included in the calculation. Yet it is hard to imagine a policy that could be realistically implemented that would impose a cost on ugly-sweater wearers and the government that would be smaller than the tiny benefit I would derive from the policy. I suppose I will just have to live with it.

Conclusion

This essay arose from my failed attempts to explain externalities to noneconomists and my desire to challenge fellow economists to think more seriously about the real-world implications of policy advice derived from simple textbook models. In popular writing about food and agriculture, there seems to be a lack of appreciation for the types of externalities that reduce welfare and of the difficulty associated with crafting corrective actions that actually increase the size of the pie. Moreover, the concept of externality is often used to advance a particular cause or point of view. There is a lot of talk about the "hidden costs" of our modern food production system. What about the "hidden benefits?" Failing even to mention, let alone seriously address, that question suggests that one is not willing to think seriously about externalities as anything more than academic-sounding justifications designed to garner enough power and support to enact a faction's preferred policy.

Although I caution against overzealous advocacy of Pigovian taxation, my discussion of the framework outlined in Figure 1 is not intended as an anti-regulation screed. This is not the place to attempt a full cost-benefit analysis of various food and agriculture regulations. Indeed, much of my concern about previous policy proposals (e.g., Lusk 2013) has been the almost knee-jerk advocacy of public policy actions before there is any rigorous evidence that they will work. Those caveats aside, it is useful to consider examples that are

likely to fail and examples that are likely to pass the gauntlet of questions raised in Figure 1. One example is taxes on sugared soda, which I have discussed in detail elsewhere (Lusk, *forthcoming*). My reading of the evidence is that most of the effects of consumption of such sodas do not qualify as efficiency-reducing externalities, that such taxes will be difficult to implement in an efficiency-enhancing manner, and that soda taxes are unlikely to have a substantive effect on obesity. However, I am relatively more persuaded by taxes applied to other issues, such as nonpoint source pollution. Scientists often have a reasonably good understanding of the inputs (e.g., nitrogen or phosphate fertilizer) responsible for the negative effects of run-off (e.g., eutrophication). The inability to clearly link negative effects of run-off to specific parties limits the ability of negotiation and litigation to alleviate the harm incurred by third parties. Such a situation strikes me as more amenable to correction via Pigovian taxation, although careful consideration of market conditions, politics, and unintended effects is required. Moreover, market-based mechanisms such as pollution trading and technological innovations that identify polluters could arise and be more effective correctives than a static tax.

In the process of writing this essay, I came across a blog post by Arnold Kling (2007) in which he described how the philosophy and outlook on market failures in his economics department at George Mason University differed from stereotypes associated with the two most prominent alternatives, University of Chicago and Massachusetts Institute of Technology (MIT). The Chicago school, Kling said, believed that “Markets work well. Use the market.” The MIT school believed that “Markets fail. Use the government.” Kling identified a third point of view, one with which I largely agree: “Markets fail. Use the market.”

Market failures (including externalities) are often signs of unexploited arbitrage opportunities and motivate entrepreneurship. Government has a role to play in ensuring protection of property rights, enforcement of contracts, maintenance of a healthy legal system, and reductions in transaction costs associated with trade and negotiation. And at times, market failures will be large enough and certain enough that government can effectively intervene. But we should always keep in mind that it isn't only markets that fail. Government fails too. My perspective is that market failures are more prone than government failures to (eventually) correct via the dynamics of competition and entrepreneurship. I have no doubt that others will disagree. Either way, a serious scholar should consider both possibilities in policy analysis.

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