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Regulatory Subsidies: A Primer

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I. Introduction

Subsidies are a commonplace feature of government programs, and can be found in regulatory programs as well as in budget expenditures and in the tax code. An accurate accounting of regulatory subsidies, accessible to the general public, could improve government regulation by helping to ensure that such subsidies are used only when, and to the degree that, they serve a sound public purpose. This is easier said than done, however. This paper explores the concept of a regulatory subsidy and review some examples. A more technical Appendix examines some of the obstacles to creating a clear accounting of regulatory subsidies, and suggest areas where useful studies might be pursued.

II. The Concept of Regulatory Subsidies

The federal government has subsidized the development of hybrid-powered vehicles by spending money directly on research,² and also by providing tax credits to the purchasers of such vehicles. It has provided still a third type of subsidy that appears neither in the budget nor the tax code: in a number of urban areas that have not attained the Environmental Protection Agency's (EPA) National Ambient Air Quality Standards, hybrid vehicles are permitted to drive in the High Occupancy Vehicle (HOV) lanes on interstate highways, even if they have only one occupant. The subsidy is effective: many more hybrids are sold in those areas (including the

² For example, via a program called the "Partnership for a New Generation of Vehicles" during the Clinton administration.

suburbs of Washington, DC) than in cities where no special driving privileges are available.³ Moreover, while people will sometimes disagree about the relative virtues of hybrids vs. carpooling, there is a clear connection between the effect of the subsidy – more hybrids – and the goal of the regulatory program – cleaner air.⁴

Subsidies embedded within regulatory programs, like their counterparts in the budget and the tax code, can be effective policy tools; they also may be subject to abuse for private gain. Greater transparency about subsidies is a desirable goal; yet regulatory subsidies can be much harder to measure than their counterparts in the budget and tax code, and their effects are not always as obvious as the hybrids in the HOV lanes.

We typically think of government regulations as providing benefits broadly to the general public, while imposing obligations – along with the associated costs – on businesses.⁵ But regulation, like spending and taxation, also can be used to provide a subsidy: it can redirect income to particular parties, or lower the market prices for particular goods and services by shifting costs elsewhere. Sometimes this serves a legitimate public purpose; other times it may persist only because no one but the beneficiaries is fully aware of it.

³ California limited the HOV exemption for hybrids, so that a secondary market developed for vehicles that had the required HOV sticker. Some studies in this market suggest that the implicit value of the HOV subsidy may exceed \$1,000 per vehicle. See <http://articles.latimes.com/2011/jul/02/local/la-me-07-02-carpool-lanes-20110702> and http://www.greencarreports.com/news/1021405_california-hov-lane-stickers-for-hybrids-worth-1200-to-1500.

⁴ EPA gives credit towards meeting the National Ambient Air Quality Standards to jurisdictions that install HOV lanes to encourage carpooling. The special allowance for hybrids is not required, but EPA gives credit to states that allow it because emissions from hybrid vehicles can be many times less than those from conventional vehicles.

⁵ It is helpful to remember that, from a welfare perspective, businesses are simply intermediates. Ultimately, all of the real costs of regulation will be borne by people – whether as consumers (because regulation raises prices), workers (because it lowers wages), investors (because it reduces returns), or property owners (because it reduces economic rents). Ultimately, because they measure changes in human welfare, all benefits as well as costs accrue to people and not to businesses or other institutions.

III. Subsidies and Cross-Subsidies

Lacking an on-budget source of funding, a regulatory subsidy will often be a cross-subsidy: that is, consumers will enjoy a lower price for X only because they are compelled to pay a higher price – effectively, a “regulatory tax” – for Y. For example, in order to meet Corporate Average Fuel Economy Standards (CAFE), auto manufacturers may discount models that have better than average fuel economy, while they charge a premium for large vehicles with poor mileage. Buyers of large vehicles effectively subsidize the purchase of small vehicles so that the overall fleet average can meet the standard.⁶

In the case of CAFE standards the regulatory tax and the regulatory subsidy accrue to different consumers, but that is not always the case. The EPA’s Renewable Fuel Standards require that gasoline producers include a certain fraction of renewable fuel (today, typically ethanol) in the average mixture. This effectively gives a regulatory subsidy to ethanol production, financed by a regulatory tax on gasoline. Because consumers buy a blend, this regulatory tax and regulatory subsidy fall on exactly the same consumers, and to a significant degree cancel each other out. Nonetheless, by changing the relative prices of the different fuel ingredients, this cross-subsidy is an effective way of shifting consumption towards ethanol and away from gasoline.⁷

⁶ Note that upcoming changes to the CAFE program, discussed in the Appendix, will change the character of this cross-subsidy.

⁷ In economic terminology, the income effects of the tax and the subsidy largely cancel each other out, but the technical substitution effect remains. To analyze any subsidy it is helpful to understand the economic concept of price elasticity; the ratio of the percentage change in demand to the percentage change in price. For an accessible public policy discussion of elasticity and cross-subsidies see, Yepes, Guillermo. 1999. “Do Cross-Subsidies Help the Poor to Benefit from Water and Wastewater Services?” Water and Sanitation Program, UNDP-World Bank. Washington, DC. <http://www.bvsde.paho.org/acrobat/subside.pdf>.

To explore regulatory subsidies further, it is helpful to distinguish what economists call “economic regulation” and “social regulation.”

Economic Regulation

In classical ***economic regulation***, a regulatory agency exerts direct control over prices and entry for a particular industry. This includes agencies at the federal, state, and local levels that have regulated providers of electricity and telephone service, cable television systems, taxis, trucking buses, pipelines, regulated airlines.

More broadly, economic regulation is often understood to include miscellaneous programs that govern the terms of trade, including the Federal Trade Commission rules, consumer protection, and securities regulations.

Note that the characterizations and generalizations made in this paper regarding economic regulation are intended to apply only to classical price and entry controls on regulated industries. The broader definition of economic regulation is too heterogeneous to accommodate such generalizations.

Because they have direct control over prices, it is common for economic regulatory agencies to create cross-subsidies within a regulated industry, maintaining a reasonable overall rate of return for regulated firms, but pushing one price higher, and another lower, than would otherwise be the case for the various services the firms provide. Indeed, there is a long tradition of such cross-subsidization, but it would not be accurate to characterize all of it as unintended or improper. Our legal notions of “common carrier” and “public utility,” which apply to many regulated industries, have embedded within them some public expectations for “universal service” and “nondiscriminatory rates.” So, for example, the Postal Service⁸ will deliver a first-class letter to any address in the country for the same price,⁹ effectively subsidizing remote rural residences; it would likely face a public backlash if it did not. Indeed, the Postal Service has

⁸ The U.S. Postal Service is protected from competition by the Private Express Statutes; its rates are regulated by the Postal Regulatory Commission.

⁹ Unless the sender is a member of Congress acting on official business; then it’s free because of the “franking privilege.”

argued that allowing competitors to deliver mail would undermine its ability to provide this cross-subsidy. Whether the subsidy is a good deal for consumers can be debated, but it is a deliberate policy choice.¹⁰

A **common carrier** (in contrast to a contract carrier) offers transportation services broadly to the general public on a nondiscriminatory basis. Scheduled rail and bus service, for example, are typically treated as common carriers.

A **public utility** maintains an extensive fixed infrastructure to provide a public service, such as electric power, natural gas, water, and sewer service. Because such infrastructure tends to have a declining average cost as more customers are added, public utilities are often considered natural monopolies; hence the need for economic regulation.

The details of how economic regulatory agencies set prices vary from industry to industry, and evolve as circumstances demand. Many counties historically provided taxpayer-supported trash pickup, for example, then later began to charge user fees, and still later adopted systems to make fees proportional to trash volume. These changing strategies for setting prices reflect, in part, changing judgments about what kind of activities should be subsidized (recycling) and what should not (waste generation).

As a general matter, price-and-entry economic regulation (with the possible exception of the financial and health care sectors) has fallen into disfavor in recent decades.¹¹ A bipartisan

¹⁰ Other USPS cross-subsidies, such as the substantial discount for junk mail (also referred to as Standard or Advertising Mail), are probably much more popular with the senders than with the recipients.

¹¹ See, e.g., the Economic Analysis of Federal Regulations Under Executive Order 12866 (President Clinton), (http://www.whitehouse.gov/omb/inforeg_riaguide#i), January 11, 1996: “Government action may have unintentional harmful effects on the efficiency of market outcomes. For this reason there should be a presumption against the need for regulatory actions that, on conceptual grounds, are not expected to generate net benefits, except in special circumstances. In light of actual experience, a particularly demanding burden of proof is required to demonstrate the need for any of the following types of regulations:

- price controls in competitive markets;
- production or sales quotas in competitive markets;
- mandatory uniform quality standards for goods or services, unless they have hidden safety hazards or . . .

consensus had emerged,¹² grounded in economic and antitrust theory, that economic regulation often fails to protect consumers' interests, and indeed often harms consumers by keeping prices artificially high. However it is intended, economic regulation has a strong tendency to aggravate the problem of market power (monopoly pricing) by blocking entry and suppressing competition, rather than ameliorate the problem by restraining prices. From about 1974 to 1984, the federal government deregulated most forms of transportation (airlines, buses, trucking, railroads), ultimately abolishing the Civil Aeronautics Board and the Interstate Commerce Commission. Over a longer time span, it has made significant progress in introducing more competition to markets for electricity and for telecommunications.

This general movement towards market prices and economic deregulation has eliminated many regulatory subsidies—even some that we didn't know existed. For example, after airline deregulation, the hub-and-spoke route system emerged as the efficient model for organizing airline routes, so that fewer city pairs have direct connecting flights. When airlines were deregulated it was generally understood that regulation had been subsidizing uneconomical flights to small towns; it came as a surprise that regulation had also been subsidizing so many direct intercity flights.¹³

Within those industries that remain subject to economic regulation, many hidden cross-subsidies undoubtedly persist. It is worthwhile to examine these periodically to see whether they continue to serve a legitimate public purpose. An analysis should try to identify examples where

- controls on entry into employment or production, except (a) where indispensable to protect health and safety (e.g., FAA tests for commercial pilots) or (b) to manage the use of common property resources (e.g., fisheries, airwaves, Federal lands, and offshore areas)."

¹² See, e.g., Martha Derthick and Paul Quirk, *The Politics of Deregulation*, Brookings, 1985.

¹³ Asked what a deregulated airline industry was going to look like, Alfred Kahn, the father of airline deregulation, responded: "If I knew what was the most efficient outcome, I'd continue to regulate!" Personal communication, July 2010.

a subsidy is particularly large, where the thing being subsidized bears a tenuous relationship to the thing being taxed to pay for it, where the public purpose is absent or is incommensurate with the size of the subsidy, or where technological change may have rendered a subsidy obsolete by altering the factual premise on which it originally was based.

Social Regulation

Social Regulation evolved from the common law of public nuisance – it constrains behavior that is regarded as socially obnoxious or objectionable. It encompasses a wide range of health, safety, and environmental regulation. More broadly, it can include rules that bar discrimination in employment, promote homeland security, mandate accessibility standards, or enforce similar public objectives.

The distinction between economic and social regulation is common practice; it was originally made by economist Murray Weidenbaum.¹⁴

Social regulation, which includes health, safety, and environmental regulation, can include costly mandates. It can also create subsidies; probably the most common mechanism by which it does this is to disadvantage rivals. Government approval of a drug, or a medical device, or a food additive, or a pesticide for a particular use may, in effect, give the manufacturer an exclusive license to sell into that market, until some rival is able to overcome the entry barrier. Although the motivation may be health and safety, the effect of such an approval can be to give one company a profitable franchise, very similar to the monopolies that are sometimes protected by economic regulatory agencies. Even when no individual product is singled out, an environmental standard may favor one technology over another, or may set different requirements for different entities, or may otherwise raise costs for some rivals more than for

¹⁴ Weidenbaum, Murray L. and Robert DeFina, “The Cost of Federal Regulation of Economic Activity,” (Washington D.C.: American Enterprise Institute, 1978).

others. The effect is similar to a tax expenditure: if my compliance costs are substantially lower than my competitors', I will profit from the advantage.

The extent to which social regulations can benefit certain manufacturers is demonstrated by one business leader's response to EPA's recent expansion of fuel economy standards to cover larger trucks. As the *Wall Street Journal* reported:

“Executives frequently grumble about government regulations, but some figure out ways to profit from them. That's likely to be the case with the nation's first fuel-economy rules for trucks and buses disclosed by the Obama administration on Monday. Cummins Inc., a maker of truck engines, expects the new rules will help bolster its market position in the U.S. and abroad. The efficiency rules . . . will require heavy spending on research and development. But that's a "barrier to entry" for potential competitors, Tim Solso, chief executive of Columbus, Ind., -based Cummins, said in an interview.”¹⁵

Of course, rewarding companies that excel at building efficient engines—especially those whose advantage is derived from innovative R&D—is properly one of the objectives of such a regulation.¹⁶ If the market becomes too concentrated (as it sometimes does), incumbents will enjoy monopoly profits and the public will suffer as a result. As long as the market remains competitive, however, the process of competitors seeking advantage can help lower the cost of achieving the regulatory program's objective. Profits, adjusted for risk, should remain in the normal range (what economists often call “zero profit,” meaning only enough to attract the needed capital investment). Some companies may fare better than others—as they would if there were a sudden increase in the price of oil—but there is little reason to classify every such regulatory advantage as a subsidy.

¹⁵ Hagerty, James R. and Bob Tita, “Fuel-Economy Rules Raise Bar for Engine Makers.” *Wall Street Journal*. October 27, 2010.

¹⁶ In this case, there is also an on-budget subsidy in the mix. The *Journal* notes: “Cummins should be able to meet the new standards by budgeting research and development spending at around . . . \$500 million annually. Uncle Sam is helping: In January, the U.S. Department of Energy granted Cummins \$54 million to help pay for research on fuel efficiency and pollution controls.” *ibid*.

On the other hand, sometimes those who find advantage under a regulatory system are not those that the regulator might wish to be encouraging. Bruce Yandle, Professor Emeritus at Clemson University, advanced an interesting thesis he has dubbed the “Bootleggers and Baptists” theory.

Here is the essence of the theory: durable social regulation evolves when it is demanded by both of two distinctly different groups. “Baptists” point to the moral high ground and give vital and vocal endorsement of laudable public benefits promised by a desired regulation. Baptists flourish when their moral message forms a visible foundation for political action. “Bootleggers” are much less visible but no less vital. Bootleggers, who expect to profit from the very regulatory restrictions desired by Baptists, grease the political machinery with some of their expected proceeds. They are simply in it for the money.

The theory’s name draws on colorful tales of states’ efforts to regulate alcoholic beverages by banning Sunday sales at legal outlets. Baptists fervently endorsed such actions on moral grounds. Bootleggers tolerated the actions gleefully because their effect was to limit competition.¹⁷

Some find it discouragingly cynical, but as an explanation of the political economy of social regulation Yandle’s theory has had notable success. One extreme example of Bootleggers and Baptists can be seen in arguments about our national drug policy: Does our enforcement of drug laws effectively create a regulatory subsidy to the international drug cartels, with tragic consequences in places like Mexico and Colombia, as well as here in the U.S.? Advocates of drug legalization argue that they do; Yandle’s theory would predict that the drug cartels, as Bootleggers, would be more likely to weigh in on the side of continued enforcement.

Sometimes it can be difficult to tell whether the Bootleggers are advancing a legitimate public objective or are profiting by undermining that objective. When Congress enacted the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act

¹⁷ Bruce Yandle. “Bootleggers and Baptists in Retrospect.” Regulation 22, no. 3 (Cato: 1999). Also see, Bruce Yandle. “Bootleggers and Baptists: The Education of a Regulatory Economist.” Regulation 7, no. 3 (AEI: 1983).

it included a “land ban” provision that banned virtually all disposal of hazardous waste in landfills. The only alternative is to burn such wastes in incinerators; chief among the advocates for the land ban was a coalition of hazardous waste incinerators. Such incinerators must have operating permits from the EPA which are very difficult to obtain and, at least for several years after the land ban took effect, they could expect to earn substantial profits from their now captive market. Neither land disposal nor incineration can be regarded as a “perfect” method of waste disposal. Without doing a thorough analysis of costs and risks, we can’t really be sure if the incinerators are the Bootleggers at the hazardous waste party, simply seeking to profit from it, or are among the Baptists, offering a real solution to an environmental problem.

IV. Illustrative example: Where did all the refineries go?

Oil refineries process crude oil into usable products: gasoline, heating oil, jet fuel, boiler fuel, lubricants, etc.

In 1982 there were 301 oil refineries in the United States; today there are only 148.¹⁸ Sometimes this fact is cited in support of the proposition that oil refineries are suffering from overregulation. On its face, it is a plausible claim: oil refineries face a daunting array of regulations. The need to modify refineries to accommodate ever-changing supply and demand conditions makes it particularly difficult to comply with the EPA’s “New Source Review”¹⁹ requirements, which can be triggered by such modifications. In 2009, EPA’s Office of Enforcement and Compliance Assurance supervised 88 percent of all refining capacity in the

¹⁸ Year-by-year refinery count available at: www.eia.doe.gov.

¹⁹ EPA emissions standards typically do not apply retroactively to existing sources, but if an existing source is substantially modified it can be treated as if it were new – requiring an upgrade to the latest emissions standards.

United States under court orders or consent orders,²⁰ because refiners generally are unable to comply with the letter of the regulatory requirements and instead operate in a continuous state of supervised noncompliance.

Faced with such a challenging regulatory environment, it is not hard to imagine that many smaller refineries would be unable to cope, and would exit the industry. But on closer examination, the disappearance of the small refiners tells another story entirely: generally it was not regulation that did them in, but deregulation. Until 1981-82, there were regulatory subsidies that had kept small refineries operating, even though many of them appeared to serve no economic purpose other than to collect the subsidies.

During the years that domestic oil prices were regulated, 1973 to 1981, the Department of Energy (DOE)²¹ ran a crude-oil “entitlements” program that redistributed money among U.S. refiners. The general intent was to equalize the cost of crude oil among refineries that, because of their location, were dependent upon imported (and thus unregulated) crude oil, with those that relied on much cheaper regulated domestic oil. DOE had statutory authority to reallocate the regulated crude oil among refineries, but it did not make sense to physically move the oil. DOE found it much more practical simply to assign domestic crude oil entitlements on paper, calculate the value of those entitlements (the difference between the market price of oil and its regulated price), and then redistribute the money. This DOE did by publishing a monthly “entitlements list” that showed which refiners had to pay money into the system, and which ones received it.

²⁰ “With today’s settlements, 99 refineries operating in 29 states, or 88 percent of the nation’s refining capacity, are required to reduce emissions under company-wide enforcement agreements.” EPA Press Release, February 10, 2009. (<http://www.epa.gov/compliance/resources/cases/civil/caa/wyomingrefining.html>).

²¹ Initially the Federal Energy Administration issued these regulations; in 1978 FEA was incorporated into the newly created Department of Energy as the Economic Regulatory Administration.

Over time, the oil entitlements program became much more complex, and a number of ancillary subsidies were built into the monthly entitlements list. The largest of these was the “small refiner bias,” an extra measure of entitlements doled out to refineries that were small. In the late seventies more than \$1 billion per month²² in entitlements was being redistributed, all off-budget, with up to 40 percent of the total going to small refineries. This created a strong incentive to keep refineries in operation that otherwise might not be economical.²³

Small refiners enjoyed other subsidies; perhaps the second most important came from the EPA. In 1980 leaded gasoline still made up about half of the gasoline market, and small refiners were allowed to put in more tetraethyl lead (an octane booster, and a source of toxic emissions) than large refiners were—as much as 5 times more.²⁴ In order to take advantage of this, small blending operations—sometimes with just a storage tank, and no actual refining equipment—would incorporate as refiners to make the high-lead product.²⁵

Both of these subsidies disappeared in the early 1980s. President Reagan terminated the entitlements program when he deregulated oil prices by Executive Order in January 1981. At about the same time he initiated a review of EPA’s lead phasedown regulations, resulting in a 1982 rule that put all refineries on the same standard: 1.1 grams of lead per gallon of leaded gasoline. The rule allowed trading, so that any refinery needing additional lead could purchase the right to use it on an open market from another refiner who could get by with less lead—the

²² More than \$2 billion per month in today’s dollars (using estimated GDP deflator, 1980-2010). The value of the oil entitlements corresponded roughly to the difference between the regulated price of domestic oil and its market value – the world price. By 1980 this difference amounted to more than \$9 per barrel, on average, for domestic production of 8.6 million barrels per day. See DOE’s Annual Energy Review at www.eia.gov/aer.

²³ DOE’s count of U.S. refineries (see http://www.eia.gov/dnav/pet/pet_pnp_cap1_dcu_nus_a.htm) shows the steep decline in the number of refineries following the removal of the small refiner subsidies in 1981 and 1982.

²⁴ See Newell, Richard G. and Kristian Rogers. “The Market-based Lead Phasedown.” *Resources for the Future*. November 2003. <http://www.rff.org/documents/RFF-DP-03-37.pdf>

²⁵ For the purposes of this rule, EPA’s definition of a refinery included any operation that produced gasoline; no actual refining (oil distillation) had to take place. Simply blending ingredients in a tank and calling the mixture gasoline qualified for a subsidy.

first such national market for emissions trading in the United States. Under this system small refiners could still use as much lead as they needed, but they had to pay for the right to do so; it would no longer be given to them for free.

The small refiner bias in DOE's oil entitlements program was a good example of a questionable cross-subsidy embedded within a system of economic regulation; the tiered standards of the lead phasedown were an illustration of how social regulation can create counterproductive subsidies. Other subsidies for small refiners remained;²⁶ but without these two major regulatory subsidies, many small refiners found that it was no longer profitable to continue operating: at market prices, the products coming out of them were often worth less than the crude oil and other inputs going in.²⁷ In subsequent years approximately 150 refineries closed.

In 1984 EPA issued another regulation that tightened the lead rules further, phasing leaded gasoline out altogether by 1987.²⁸ There was little opposition, in part because by that time many of the small refiners had disappeared; those who were still around had little reason to oppose changes in a rule that no longer provided them with a subsidy.

²⁶ For example, Defense Department procurement rules had a strong preference for purchasing fuel from small refiners, an example of an on-budget subsidy.

²⁷ In addition to the oil price regulations, through 1981 the Council on Wage and Price Stability administered President Carter's voluntary wage and price guidelines. CWPS monitored the "gross margin" of refiners, which measured the value of output less the value of input. For small refineries these margins were frequently negative, a tolerable situation for an integrated oil company with complementary upstream and downstream operations, but not for an independent refinery.

²⁸ The Environmental Protection Agency's (EPA) 1984 rule lowered the permissible amounts of lead in gasoline at a faster rate, but it allowed refiners to "bank" their lead credits and continue to use them until the end of 1987 calendar year. Following that date, "leaded" gasoline remained available for some specialized engines, but there was no banking or trading and the maximum lead content was 0.1 grams per leaded gallon—not enough to boost octane. For more information, see, Newell, Richard G. and Kristian Rogers. "The Market-based Lead Phasedown." *Resources for the Future*. November 2003. <http://www.rff.org/documents/RFF-DP-03-37.pdf>

V. Conclusion

Subsidies, both intended and unintended, are commonplace in regulatory programs, but without a detailed analysis it can be difficult to tell whether they represent a desirable incentive to achieve a program's objectives, or a wasteful abuse of a public program for private gain. Any analysis of such subsidies needs to confront some difficult challenges – including ambiguities about how a subsidy should be defined in the regulatory context. A more technical Appendix to this paper explores some of these analytical challenges.

Appendix: Conceptual challenges of regulatory subsidies

Any analysis of regulatory subsidies must confront some difficult questions. A subsidy that appears in the budget or in the tax code, even when its effects may be ambiguous, can usually be quantified with some precision simply by identifying the cash flow devoted to it or diverted by it. A regulatory subsidy typically (though not always) lacks such a cash flow. Monetary values can be imputed to a regulatory provision, using many of the same techniques that are used in benefit-cost analysis. But there is much more room for disagreement about how to quantify such imputed values, and about which ones can properly be labeled a subsidy. Indeed, the first challenge the analyst must confront is that no single definition of “subsidy” appears to capture the sorts of subsidies we see in regulations.

The *Frequently Asked Questions*²⁹ on the website of the Pew Charitable Trusts’ Subsidyscope project cites a definition from the Government Accountability Office:

Generally, a payment or benefit made by the federal government where the benefit exceeds the cost to the beneficiary. Subsidies are designed to support the conduct of an economic enterprise or activity.

Not surprisingly, this is an “accounting” definition of a subsidy: easy to apply in a system of cash flow accounts, like the federal budget; less easily applied to benefits and costs that do not correspond to cash flows. Subsidyscope’s Framing paper³⁰ cites another, more general definition:

A typical textbook definition of a subsidy is a transfer of economic resources by the Government to the buyer or seller of a good or service that has the effect of reducing the price paid, increasing the price received, or reducing the cost of production of the good or service.

²⁹ For more information, see: <http://subsidyscope.org/faq/>.

³⁰ The entire framing paper is available at: <http://subsidyscope.org/framing-paper/html/>.

Here again, though, the emphasis on a “transfer” suggests that money, or something of monetary value, visibly changes hands. In regulatory subsidies that may or may not be the case.

While definitions of a regulatory subsidy that require a payment or a transfer are too narrow, it also would be a mistake to adopt a definition that was too broad. If private parties benefit from a regulation—well, isn’t that the point? We wouldn’t want regulations that have no benefits to anyone. When the public enjoys cleaner air as a result of regulation, few people would argue that the public (or breathing) is thereby being subsidized. Which sorts of benefits should be considered subsidies? Broadly distributed environmental benefits like clean air are probably not good candidates. The common understanding of “subsidy” suggests that it should be limited to benefits conferred by regulation that are pecuniary in character, and that are directed towards an identifiable subset of the affected population or an identifiable subset of economic activities.

Even then, the characterization of a regulatory subsidy requires careful judgment. Generally the analysis will need to look at both the benefits and costs of the rule in question. If the rule distorts a market price, for example, is that an intended effect, and is it correcting a known market failure, or is it creating one? If the rule gives an advantage in the marketplace to a subset of competitors, does that help advance the rule’s objective, or is it simply a case of private gain? There are several conceptual challenges that make these difficult questions to answer. They are not necessarily completely intractable, but they require some careful thought.

A Subsidy To Whom? Or, For What?

Allocation refers to the relative quantity of economic resources (labor, capital, fuel, etc.) that are devoted to producing the various goods and services that an economy produces.

Distribution refers to the relative share of wealth or income among consumers.

Strictly speaking, a **subsidy** alters prices and thereby causes a change in the allocation of resources to different economic activities: more farming, or less pollution, for example.

In contrast, a **transfer** redistributes wealth or income from one group to another, without altering prices and without directly changing the level of any particular economic activity.

One obstacle we confront is the difference between the common understanding of the word “subsidy,” and the meaning economists assign to it. Do we subsidize farming? Or farmers? Economists distinguish between the *allocation* of resources to various productive activities in the economy, and the *distribution* of the associated wealth and income. Strictly speaking a *subsidy* effectively alters prices and thereby causes a different allocation of resources: we subsidize activities, like farming. In contrast, a *transfer* causes a redistribution of wealth or income: many payments to farmers would be classified as transfers rather than subsidies.

In practice, however, it can be difficult to disentangle the two. If you want a program to transfer income to farmers, you need to define them somehow. This is especially true if, as is so often the case, the government wants to pay them *not* to farm; lots of people don’t farm, and we can’t afford to pay all of them. Typically, therefore, farmers need to show some history of farming before they can receive payments. It is impossible to change farmers’ incomes without having any effect on the incentive to farm. Similarly, if you want to subsidize the production of milk, this will naturally, because of higher prices and/or volumes, cause more revenue to flow to dairy farmers. This is likely, at least temporarily, to make them wealthier. A pure subsidy (free

of transfers) and a pure transfer (free of subsidies) may be, like perfectly competitive markets or optimal regulation, useful theoretical constructs that don't exist by themselves in the real world.

In shining a light on government policy, the analyst will naturally be interested in both types of effects: the reallocation of resources and the redistribution of income. The Subsidyscope report on the Export-Import bank shows why: many people know that the bank subsidizes exports, but the observation that more than 60 percent of its loan guarantees are for sales from a single company, the Boeing Corporation, adds important information.³¹ It is useful to have that information if we want to understand the political economy of how the bank functions and how it is funded. Legislators and other policy makers who make decisions about subsidies clearly think about *to whom* as well as *for what*. There are good reasons to try to answer both of these questions in an analysis of regulatory subsidies.

The technical distinction between subsidies and transfers is not unique to regulation; it applies to budget expenditures and tax expenditures too. But the problem is confounded in the case of regulation, where there may be no obvious cash flow to follow. Did the land ban on hazardous waste disposal subsidize incineration, inducing investment that expanded the number and capacity of licensed incinerators? Or was its main effect to transfer income to incinerator owners by raising the cost of disposal while capacity effectively was fixed by rigid permitting requirements? The answer to these questions might determine whether we think the cost of the land ban really advanced a public objective. Such ambiguities are everywhere in regulation.

³¹ The full analysis is available at: <http://subsidyscope.org/transportation/risk-transfers/exim/>.

Cash Flow vs. Benefit-Cost Analysis

Cash-flow analysis uses accounting methods to tally and array actual monetary payments. The federal budget is a list of cash flows, as are the National Income and Product Accounts.

Benefit-cost analysis, in contrast, aims at summarizing changes in welfare, using hypothetical cash payments (“compensating variations”) to assign a monetary value to those welfare changes. For example, how much might the average person be willing to pay to have clean air?

While benefit-cost analysis often uses actual cash flows to make inferences about welfare changes, the relationship is more complex than many people assume. For example, if I rent a DVD for \$1 that gives me \$5 worth of enjoyment, this would count as only \$1 in the GDP. But the benefit-cost analyst would exclude that \$1 and count only the \$4 consumer surplus as the net welfare change.

“Follow the Money” is good advice when solving crimes; it also is good advice for understanding the federal budget, the tax code and related subsidies. When analyzing regulations, however, following the money can be very difficult to do, because it never passes through a budget where an accounting can be found. The traditional tool for analyzing regulation is benefit-cost analysis, which tries to summarize the net welfare changes of everyone affected by a policy change. Benefit-cost analysts measure welfare changes using imaginary monetary side-payments (“compensating variations”), which would in theory allow the winners to compensate the losers for a change in policy. But because the compensation doesn’t actually take place there is no money to follow, and inferences about the magnitude of benefits and costs are much more uncertain.

This is particularly true if we are interested in the benefits to particular parties; broad generalizations about the public’s willingness to pay for, say, clearer vistas from National Parks cannot be imputed to individuals. Even if we are fairly confident we can assign a monetary value to such intangible benefits, it would be a stretch to call that a subsidy.

Ongoing Policy vs. Policy Change

There are some other sharp differences between benefit-cost analysis and cash flow analysis. One is that benefit-cost analysis is designed to measure the effects of *changes* in policy—it estimates the welfare effects of one alternative compared to another. Sometimes the alternative is a different policy option that is being evaluated, sometimes it is the status quo that prevails before a policy change is made, and sometimes it is an arbitrarily chosen baseline against which several policy options may be measured. The point to remember is that any quantitative estimate of benefits and costs is bound, not only to the particular policy scenario that is being evaluated, but also to its counterfactual—the alternative scenario the analyst has chosen to compare it to.

The result is that, while we can add and subtract on-budget subsidies in a straightforward way, we cannot do the same with the welfare changes derived from a benefit-cost analysis. They cannot be added and subtracted the way budget dollars can be, because each program's benefits and costs will be estimated using a different counterfactual.³² To illustrate the problem, consider three hypothetical programs in the table below. The on-budget costs for administering each program will be easy to add up; but the net welfare changes experienced by the public, because they represent a difference between the estimated effects of the program and its hypothetical counterfactual, will not be so easy to add.³³

³² In 1997 this was dubbed the “apples and oranges problem” in the first edition of the annual Office of Management and Budget's Report to Congress on the Costs and Benefits of Federal Regulation. Available at: http://www.whitehouse.gov/omb/inforeg_rcongress/.

³³ In contemplating the table, remember that “a” and “ α ” are not themselves known quantities; benefit-cost analysis tells us “ $a - \alpha$ ”, the estimated net welfare change between two alternatives.

A related difference between benefit-cost analysis and cash flow analysis is the potential interaction between the programs. If you are only looking at a handful of programs, and if their welfare effects are independent of one another, the addition of net benefits is relatively straightforward. The more programs you add, however, the more likely it is that the independence assumption will fail, and that the activities of one program will influence the results of another. The more programs added together, the more incomprehensible the sum of benefits and costs becomes.³⁴ This is one of the reasons why proposals to construct a regulatory budget have not been successful despite a good deal of effort.³⁵

Program:	Budget Cost	Net benefits (relative to an alternative program)
Apple inspections	A	$a - \alpha$
Banana quarantines	B	$b - \beta$
Grape fumigation	G	$g - \gamma$
Total	A + B + G	$a + b + g - \alpha - \beta - \gamma = ???$

Finding Zero

A further consequence of working in the world of welfare changes, as opposed to cash flows, is that because everything is relative, there is no absolute zero welfare and no all-encompassing total. Consider health care, for example. If we are looking at cash-flows, we can say with some confidence that health care expenditures amounted to 16 percent of Gross Domestic Product (GDP) in 2007.³⁶ The GDP, a part of the National Income and Product Accounts, is a cash flow analysis of the entire economy. We can also, with considerably more effort, do benefit-cost analysis to evaluate the relative welfare effects of various health-care

³⁴ See, for example, Anthony Boardman et al, Cost-Benefit Analysis: Concepts and Practices, 4th ed , (2010), Chapter 2.

³⁵ See, e.g., Christopher C. DeMuth, Constraining Regulatory Costs: The Regulatory Budget, *Regulation*, AEI, March/April 1980.

³⁶ See, for example, <http://www.cbo.gov/ftpdocs/87xx/doc8758/MainText.3.1.shtml>.

policy options. But we cannot answer the question, what are the total benefits of health care? Nor can we say what fraction of all the welfare we enjoy should be attributed to health care. We cannot construct a counterfactual in which there is *no* health care at all; and, even if we could, it would not be useful because it does not represent a policy choice that anyone would advocate. In a cash flow budget we can look at a subsidy as a fraction of a larger program, the program as a fraction of the budget, and the budget as a fraction of GDP. We can calculate all of these fractions without ever having to imagine what a world without a federal budget would look like (or, for that matter, a world without GDP). In contrast, we cannot get a sense of the magnitude of the benefits and costs of all regulatory programs without specifying in some detail what the world would look like without any regulations—an exercise that might be entertaining, but is not particularly meaningful.

The Problem of Rent Exhaustion

One puzzle that an analysis of subsidies may confront is the observation that subsidized industries typically do not have supra-normal profits. Where does the subsidy go? In a classic 1967 paper, economist Gordon Tullock pointed out that the recipients of government subsidies cannot rely on them simply falling from the sky; they must compete for subsidies by trying to influence government policy. And those upon whom the costs may fall will also try to influence policy in order to avoid the costs. The result is that a substantial fraction of the value of the subsidy—perhaps all of it—will be lost in the competition to secure it and defend it.³⁷ A later

³⁷ Gordon Tullock, “The Welfare Costs of Tariffs, Monopolies, and Theft,” *Western Economic Journal* 5 (3) (1967): pp. 224–232. Available at: <http://cameroneconomics.com/tullock%201967.pdf>.

paper by Ann Krueger³⁸ named this phenomenon “rent-seeking,”³⁹ and found that such losses in 1964 amounted to 7.3 percent of the national income of India, and a staggering 15 percent of the national income of Turkey, as rent-seekers sought favors from customs officials. Because of Tullock’s work, we tend to think of rent-seeking as almost synonymous with lobbying; because of Krueger’s we also include outright bribery. But in reality there are a wide range of mechanisms by which the value of subsidies can be dissipated. When policies are poorly designed, competition for rents or subsidies can cause waste by channeling valuable resources into all sorts of unproductive activities. In economic regulation, this is sometimes called “nonprice competition,” as rivals, legally unable to compete on price, try other means of attracting customers. Prior to deregulation, you could find in-flight piano bars with live entertainment on commercial airlines, a conspicuous example of waste induced by a misdirected subsidy.

Possibly the most tragic illustration of rent exhaustion is the regulation of commercial fishing through fishery management plans. These lie on the border between social and economic regulation. Overfishing is a classic “tragedy of the commons,” made more acute by modern technology. At one time it might have made sense for communities to treat fisheries as common property, but today many fisheries would be certain to collapse without some form of restraint.

If, through regulation, we hold the catch at the level of sustainable yield, the market price for the product will be much higher than the cost of efficiently producing that yield. The difference is the “rent on the resource”—the economic value of the fishery.⁴⁰ Yet in many cases

³⁸ Krueger, Anne O. (1974) “The Political Economy of the Rent-Seeking Society” *American Economic Review*, 64, pp. 291-303.

³⁹ “Rent,” or “quasi-rent,” is the economist’s term for a valuable stream of payments generated by an asset.

⁴⁰ In this example, the economic value of the fishery refers only to the market value of the catch; it does not include any ecological value. The point is that the “tragedy of the commons” is a market failure that causes real economic losses, even in the absence of any ecological damages or concerns.

no one is enjoying that value. Consumers are not, because they pay the market-clearing price for the catch that is for sale—a price that fully reflects the scarcity value of the fish. There are examples of middlemen (Alaskan canneries, for example) capturing some rents, but these appear to be the exception. And certainly the fishers themselves do not appear to be particularly wealthy, nor do they lavishly lobby Congress for favors. What happened to the fishery rents?

Unfortunately, the economic value of many fisheries is dissipated because of the misguided structure of regulation. By using short seasons to limit the catch, for example, we effectively subsidize the “race to fish.” Participants will buy bigger nets and faster boats, but then are forced to leave them idle much of the year. We redirect resources away from the most efficient means of catching fish, and instead towards unproductive investments and practices. Competition under such a regulatory regime will raise the cost of catching the sustainable yield of fish to the point where the market clears—i.e., it just isn’t worth it anymore. Alternative regulatory structures have been developed that avoid this problem by creating property rights in the yield of the fishery (ITQs, or Individual Tradable Quotas). These can be complicated to set up, but where they have been tried they have been effective at eliminating the inadvertent subsidization of inefficient fishing practices.⁴¹

The tendency of rent-seeking to dissipate the value of a subsidy is not unique to regulation. But where there is an initial cash outlay, it is easier to see whether it is being captured as wealth, dissipated as waste, or is contributing to some public objective. In the case of regulatory subsidies without a cash expenditure, the subsidy, even though large, may be dissipated before it can be measured.

⁴¹ For numerous examples, see the Environmental Defense Fund’s blog: <http://blogs.edf.org/edfish/>.

One example of a rent-dissipating regulatory subsidy may be just getting started. Recent revisions to the CAFE standards have changed the way they are calculated.⁴² The old CAFE standards effectively subsidized more fuel-efficient vehicles, and imposed a “tax” on less efficient vehicles; this cross-subsidy allowed manufacturers to meet the standards for their fleet as a whole. The new standards modify this cross-subsidy by adjusting the standard to compensate for the size of the vehicle, where size is measured by the area under the wheels (the vehicle’s “footprint,” equal to the wheelbase times the average track width). As a result, some of the effect of the new CAFE standards will henceforth be to subsidize larger vehicle footprints. The original cross-subsidy for high-mileage cars conformed to the purpose of the regulation: cars were subsidized only because, and to the extent that, they were more fuel efficient. The problem is that the new subsidy for the size of the vehicle footprint does nothing to advance the regulatory objective, and promises to make the whole program less efficient by diverting resources in an unproductive direction.⁴³

The new “footprint” method of calculating CAFE standards was adopted at the urging of a subset of vehicle manufacturers, thinking it would give them an advantage over other, mostly foreign, manufacturers. But any such advantages, and the incentives created by the footprint method, do not help to achieve the objectives of the CAFE program. This illustrates some of the complex ways that regulatory subsidies may be misdirected and dissipated.

The Value of a Market for Pricing the Regulatory Constraint

Because of the difficulty of assigning monetary values to regulatory subsidies, it can be helpful to focus on those regulatory programs for which a market exists whose prices are a good

⁴² See <http://www.nhtsa.gov/fuel-economy>.

⁴³ There may be some compensating benefit to the larger footprint, in that cars will be less likely to roll over.

proxy for regulatory costs and/or benefits. It is possible to derive a price for taxi medallions, for example, from the price at which taxi companies are traded. Because the FCC auctions *some* electromagnetic spectrum, it is possible, with reasonable confidence, to estimate a value to spectrum that is given away as part of a license.

In the case of environmental regulation, the advent of emissions trading has made it easier to attach a monetary value to a regulatory privilege. We know from observing the market the economic value of the right to emit a ton of sulfur dioxide; therefore we use that value to calculate the subsidy implicit in a rule that assigns such rights for free. In this example, the market does more than just provide information about the marginal cost of reducing emissions; it also equalizes that marginal cost across all the market participants. This makes it easier to talk in quantitative terms about a regulatory subsidy. Absent trading, an emissions limit is likely to have a different effect on different firms: some may have no trouble complying, while others are struggling, simply because circumstances vary widely. With such variable effects on firms, it is misleading to assign a uniform monetary value to a subsidy that may be built into an emissions standard. If an emissions market is equalizing marginal costs across firms, however, one can calculate the value of a subsidy and be confident that it is realistic not just for the industry on average, but for particular firms within it.

There are two broad flavors of emissions trading: “cap & trade,” and “offset” trading. These are not always carefully distinguished, even in the professional literature, and the terminology is not always consistently used. But they are very different in the way that subsidies may be embedded within them.

Cap and Trade

A cap and trade system allows regulated firms to trade allowances for which the regulator has set a fixed cap. Multiplying the market price of the allowances by the size of the cap provides the value of all allowances outstanding. If the cap is set in emissions allowances per year, then that value will be in dollars per year. The regulator makes an initial allocation (distribution, if we want to be strictly correct) of the cap, or may auction it off. An auction can produce substantial revenue for the government; if instead the allowances are given away, those revenues disappear and become a subsidy for the lucky recipients. It is not always appreciated that, in a cap and trade system, the value of the emissions allowances can be many times larger than the real-resource cost of complying with the cap. That is, the regulatory subsidies under cap and trade can be much larger than what we think of as the regulatory costs.⁴⁴ Moreover, these subsidies may be structured in such a way that they do not reach consumers. If allowances are distributed to firms in proportion to historical emissions in some base year, for example, the value of the allowances will be captured by the owners of the firms. There is no plausible mechanism by which competition in product markets will cause the subsidy to be passed through to consumers.⁴⁵

One benefit of the multi-year debate in Congress about greenhouse gas legislation is that members appear to have become much more educated about the choices before them, and the implications of those choices. They are generally aware that auctioning carbon allowances will bring in substantial revenue (although they may differ about what should happen to that

⁴⁴ See, for example, Stavins, Robert N. "Experience with Market-Based Environmental Policy Instruments." In *Handbook of Environmental Economics*, vol. I, ed. Karl-Göran Mäler and Jeffrey Vincent, 2003. 355-435. Amsterdam: Elsevier Science. Available at:

http://www.hks.harvard.edu/fs/rstavins/Papers/Handbook_Chapter_on_MBI.pdf.

⁴⁵ To see this, consider the case where there is no overlap between firms in the base year and firms operating today. All of the firms receiving allowances for free will sell them; all of the firms who use allowances to make products will have to buy them at the market price. The subsidy will be retained by the initial recipients, and relaxing the "no overlap" assumption should not change that outcome. Note that in the case of utilities subject to economic regulation, however, there is a regulatory mechanism that can force the subsidy to be disgorged.

revenue), and they recognize that giving it to particular industries without charge, whatever the merits of that, carries an opportunity cost to the federal Treasury. Congress has been presented with an array of choices, including hybrid systems and phase-ins that may wean industries gradually from subsidized carbon allowances to full market pricing.⁴⁶

Because it presents such a vast opportunity for regulatory subsidies, the politics of greenhouse gas regulation, both in Congress and in international policy making forums, has been something of a Bootleggers and Baptists convention. Whatever it might do for the climate, a treaty on greenhouse gases has the potential to be a vehicle for regulatory subsidies on an international scale, with large transfers of wealth in contention as an international cap on carbon emissions is divided among nations. Even more than the science and the debate about the costs and benefits of climate control, this argument about which countries should be subsidizing others, and how much, has preoccupied diplomatic meetings on climate policy.

Offset Trading

Offset trading allows regulated firms to trade emissions allowances above or below some average emissions rate required by a standard. The standard does not take the form of a fixed cap, but is instead a ratio of emissions to output. Allowances are generated when a regulated entity beats the standard, and consumed when another entity falls short. In the 1982 lead trading rule, for example, anyone who produced or imported gasoline had to show that it met a standard of 1.1 grams per gallon. If gasoline had more lead than that, the producer would have to buy the right to use extra grams of lead from some other producer whose gasoline had a lead content

⁴⁶ For papers discussing a range of options, see http://www.rff.org/Focus_Areas/Pages/Energy_and_Climate.aspx.

lower than 1.1 grams per gallon. On average, the nation's gasoline supply would meet that standard, despite some variation from producer to producer or from batch to batch.

Note that under this system the total quantity of lead used depends on total output of gasoline. Because lead allowances are tied to the level of output, the market value of the lead allowances effectively subsidizes output. That is, in contrast with a cap and trade system, the competition to produce and sell gasoline causes the subsidy to be passed through to consumers.⁴⁷ Under an offset trading system, there is no initial allocation of emissions allowances: they are produced, as well as consumed, as gasoline is manufactured and sold.

By setting the regulatory constraint as a ratio, an offset trading system effectively imposes a shadow tax on the numerator and a shadow subsidy on the denominator. The right to use lead in gasoline traded for about 2 cents per gram which effectively is the level of the "shadow tax" (shadow because it did not actually produce any revenue, but did affect behavior) on lead. But a refiner could earn the right to use 1.1 grams of lead by producing another gallon of leaded gasoline, so we can calculate that the shadow subsidy on gasoline was 2.2 cents per gallon. The "revenues" from the shadow tax on lead exactly covered the "expenditures" on the shadow subsidy on gasoline output, and consumers bore both the burden of the tax and the benefit of the subsidy. But it was not without consequence: the shadow tax on lead caused refiners to substitute away from lead just as effectively as a real tax would have.⁴⁸

Other examples of offset trading include the new CAFE standards: in addition to averaging fuel economy within a firm, auto manufacturers will be able to trade offsets across

⁴⁷ This difference is subtle, but critical. In allowance trading, permissible lead use is proportional to current gasoline production; in a cap-and-trade system permissible lead use might be proportional to a base year's gasoline production. But while current gasoline production has a price elasticity of supply and demand, a base year's production has none – it is past, and it is fixed. That is why subsidies in offset trading reach consumers, but in cap-and-trade systems they do not.

⁴⁸ That is, the income effects of the tax and the subsidy largely cancel each other out, but the technical substitution effect remains.

firms. EPA's Renewable Fuel Standards are another example: refiners are obligated to buy an amount of renewable fuels that is proportionate to their output of gasoline; they may trade these obligations in an offset market.

Conclusion: Where to Look

Those searching out subsidies will find regulatory policy a target-rich environment; unfortunately many of the largest regulatory subsidies will likely prove to be elusive targets. The most promising cases to pursue will be those where regulations compel actual cash payments, or the transfer of something for which a market provides reasonably accurate price information.

In economic regulation, cross-subsidies are routine. A useful analysis should try to identify examples where a subsidy is particularly large, where the thing being subsidized bears a tenuous relationship to the thing being taxed to pay for it, where the public purpose is absent or is incommensurate with the size of the subsidy, or where technological change may have rendered a subsidy obsolete by altering the factual premise on which it originally was based.

In social regulation, it will be easiest to measure subsidies where some form of emissions trading (broadly defined to include energy efficiency and renewable energy targets, as well as emissions standards) provides price information. Generally such trading programs improve the economic efficiency of regulatory programs by improving resource allocation; the fact that trading yields price information, allowing the public to make better judgments about whether the subsidy makes sense, is an additional advantage. CAFE standards, Renewable Fuel Standards, and renewable "portfolio" standards for electric power producers are all good examples of this.

The subsidy component of an allowance trading system may be the intended mechanism by which the program achieves its objectives. Often, however, there will be Bootleggers hiding

in the bushes. A thorough analysis will be needed to sort through the arguments and determine whether any particular subsidy is being used to subsidize groups or activities in a way that may not be aligned with public objectives.

References

Boardman, Anthony et al, *Cost-Benefit Analysis: Concepts and Practices*, 4th ed , (2010), Chapter 2.

Center for Energy Economics, The University of Texas at Austin. “The Small Refiner Bias in the U.S.”

Congressional Budget Office. “The Long-Term Outlook for Health Care Spending.”
<http://www.cbo.gov/ftpdocs/87xx/doc8758/MainText.3.1.shtml>

Derthick, Martha and Paul Quirk, *The Politics of Deregulation*. Brookings Institution Press. 1985. <http://www.brookings.edu/press/Books/1985/politicsofderegulation.aspx>

DeMuth, Christopher C. “Constraining Regulatory Costs: The Regulatory Budget.” *Regulation*. Volume 4. No. 2. March/April 1980. <https://www.cato.org/pubs/regulation/regv4n2/v4n2-6.pdf>

Environmental Defense Fund. <http://blogs.edf.org/edfish/>

Hagerty, James R. and Bob Tita, “Fuel-Economy Rules Raise Bar for Engine Makers.” *Wall Street Journal*. October 27, 2010.
<http://online.wsj.com/article/SB10001424052702303891804575576570268041664.html>

Kahn, Alfred. Personal communication. 2010.

Krueger, Anne O. “The Political Economy of the Rent-Seeking Society” *American Economic Review*. Volume 64. No. 3. June 1974. pp. 291-303. <http://www.jstor.org/stable/1808883>

National Highway Traffic Safety Administration. Corporate Average Fuel Economy Standards.
<http://www.nhtsa.gov/cars/rules/cafe/overview.htm>

National Highway Traffic Safety Administration. Corporate Average Fuel Economy.
<http://www.nhtsa.gov/fuel-economy>

Newell, Richard G. and Kristian Rogers. “The Market-based Lead Phasedown.” *Resources for the Future*. November 2003. <http://www.rff.org/documents/RFF-DP-03-37.pdf>

Office of Management and Budget. Report to Congress on the Costs and Benefits of Federal Regulation, September 30, 1997. http://www.whitehouse.gov/omb/inforeg_rcongress/

Partnership for a New Generation of Vehicles Organization. <http://www.pngv.org/main/>

Postal Regulatory Commission. <http://www.prc.gov/prc-pages/default.aspx>

Resources for the Future. http://www.rff.org/Focus_Areas/Pages/Energy_and_Climate.aspx

Subsidyscope. <http://subsidyscope.org/>

Stavins, Robert N. "Experience with Market-Based Environmental Policy Instruments." In *Handbook of Environmental Economics*, vol. I, ed. Karl-Göran Mäler and Jeffrey Vincent, 2003. 355-435. Amsterdam: Elsevier Science.

Tullock, Gordon. "The Welfare Costs of Tariffs, Monopolies, and Theft." *Western Economic Journal* 5 (3). 1967. pp. 224–232. <http://cameroneconomics.com/tullock%201967.pdf>

U.S. Energy Information Administration. <http://www.eia.gov/>

U. S. Environmental Protection Agency. National Ambient Air Quality Standards. <http://www.epa.gov/air/criteria.html>

U. S. Environmental Protection Agency. Renewable Fuel Standards. <http://www.epa.gov/otaq/fuels/renewablefuels/index.htm>

U. S. Environmental Protection Agency. New Source Review. <http://www.epa.gov/NSR/>

U. S. Environmental Protection Agency. Press Release, February 10, 2009. <http://www.epa.gov/compliance/resources/cases/civil/caa/wyomingrefining.html>

U.S. Office of Management and Budget. Economic Analysis of Federal Regulations Under Executive Order 12866. http://www.whitehouse.gov/omb/inforeg_riaguide#i

Weidenbaum, Murray L. and Robert DeFina, "The Cost of Federal Regulation of Economic Activity," (Washington D.C.: American Enterprise Institute, 1978).

Yandle, Bruce. "Bootleggers and Baptists in Retrospect." *Regulation*. Volume 22, No. 3. Fall 1999. <http://www.cato.org/pubs/regulation/regv22n3/bootleggers.pdf>

Yandle, Bruce. "Bootleggers and Baptists: The Education of a Regulatory Economist." *AEI Journal On Government And Society. Regulation*. Volume 7. No. 3. May/June 1983. <http://www.cato.org/pubs/regulation/regv7n3/v7n3-3.pdf>