BACK TO BASICS: SEARCHING FOR PRINCIPLES TO GUIDE THE ENERGY CONSERVATION POLICY DEBATE

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Blake Johnson

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Terman Engineering Center
Stanford University
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Abstract

The debate over energy conservation policy is presently active, but often muddled by inconsistent references to the theoretical justifications for and against policy intervention in markets. Terms such as failure, friction, barrier and imperfection are used frequently with respect to the markets for energy and energy conservation technologies in this debate, but clear distinctions among these terms are rarely made. In contrast, economic theory points out important differences among the forces these terms reference, and finds that only a small but important subset of these forces justifies market intervention. This paper describes the distinction between market failures and other types of market imperfections which economic theory makes, and explains why policy intervention is considered justified when market failures as so defined are present. The relevance of these general distinctions to the energy conservation debate is then addressed. A few important market failures in the energy markets are identified, while many of the commonly cited grounds for policy intervention are found to fail to meet the appropriate criteria.

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Introduction

At the heart of the energy conservation debate are questions about policy intervention. In what circumstances is it appropriate? How should policy goals be defined, and programs be designed? For example, are "top down", broad based measures such as energy taxes more appropriate, or specific programs tailored to particular technologies or end-uses? When desired energy conservation investments are beyond the budget of lower income groups, should policies address equity issues as well? And for all potential actions, how can levels of policy efficacy, and likely policy costs and benefits, be estimated?

A review of the current discussion of these questions demonstrates that they can be both technically complex and ideologically highly charged. The prospect for timely and effective government involvement in the energy efficiency improvement process may be dim unless some basic principles can be found to guide the consideration of these important, but varied and complex issues.

Fortunately, the serious attempts now being made to draw on important and relevant concepts from economic theory to meet this need appear promising. In addition to the well known "invisible hand" results from economic theory which demonstrate the efficiency of well functioning competitive markets, there are also important results about the conditions under which free markets lead to inefficient results. These theories of "market failure" supply important conceptual insights into what is needed for a market to function well, and how the market process might be weakened in the absence of one or more important factors. Applying these insights to the energy markets immediately reveals that important energy markets have problems that are likely to have broad and diverse consequences. Accordingly, "fixing" these problems could have equally broad benefits. Unfortunately, the best "fixes" which the theory has to offer are often not viable in the real world. While the absence, at least in current theory, of implementable solutions to some energy market failures may be unfortunate, we can still benefit from a better understanding of the problems at hand. In particular, insights gained may make it possible to rule out policies that could otherwise have proved costly and unsuccessful.

In what follows, the basic economic theory of market failures is presented, followed by a brief discussion of the theory's implications for energy markets. The first section, "When Markets Aren't Reliable", describes the basic elements of well functioning competitive markets, and then introduces the most important ways these elements may be distorted, and the conditions under which they may be insufficient. The second section, "Responding to Market Failures", describes the solutions to market failures suggested by economic theory, and also describes why these responses are often not implementable in practice. The third section, "Energy Market Failures and Responses", identifies important

deviations from the perfect competition model in the energy markets, and briefly compares current policy responses to these problems to the idealized responses that economic theory suggests. The fourth section, "The Difference Between Market Failures and Market Frictions and Barriers", differentiates market failures from the factors which affect market performance that are commonly grouped under the heading "market frictions and barriers", and argues that such factors are not the appropriate target of policy intervention. The final section, "Incorporating Market Failure Ideas in the Energy Conservation Debate", differentiates market failures from other sorts of market inefficiencies, and suggests ways that the principles presented in the paper can be used to help structure the energy conservation policy debate.

When Markets Aren't Reliable: The Basic Economics of Externalities, Public Goods, and Increasing Returns to Scale

Probably the most important concept in economic theory is that of a "perfectly competitive" market. In a perfectly competitive market, everyone can buy or sell as much of the good traded as they like, at a constant price. In other words, an individual's purchase decision is assumed to have no impact on others, since it doesn't change the market price or limit available supply. An individual's use of the good after they receive it is also assumed to have no impact on others (which may not be the case for the neighbor's new stereo!). Since market participants, or agents, are isolated in this sense from each other, each person need only consider the cost of the good relative to their own desire for it when they decide how much to buy. Under these circumstances, the price of the good supplies all the information agents need for their decision, since they naturally understand their own desires, or preferences for the good.

Economics provides a very nice theory about the quality of the allocation of goods that results from markets that meet the "perfect competition" criteria. The important first welfare theorem of economics states that perfectly competitive markets lead to allocations of goods that are "Pareto efficient". A Pareto efficient allocation is one in which no one can be made better off without someone else being made worse off. It doesn't guarantee fairness - some people's piece of the pie might be much larger than others - but it does guarantee that there are no other allocations that everyone would agree to and at least one person would strictly prefer. Moreover, this efficient outcome is achieved by simply allowing each agent to decide for themself what makes them better off and what makes them worse off, and to act in their own self-interest to achieve the best outcome available to them, subject to very few restrictions. The first welfare theorem is the basis of Adam Smith's invisible hand, and is perhaps the most fundamental justification of capitalism.

Unfortunately, as you probably noticed, the definition of a perfectly competitive market is quite restrictive, and the markets for many goods can hardly be said to

approximate it. It is to these markets that the economics of market failure applies. The first conclusion in economic theory about "non-perfectly competitive" markets is that the first welfare theorem described above is no longer valid. Not only can't efficient allocations be guaranteed to result from the free market process if the market in question isn't perfectly competitive, but in can often be shown that distinctly inefficient allocations of the good in question will result. You might say these markets look as if at least one invisible hand has been tied behind Adam Smith's back.

To address this problem, it is natural to first consider what it is about perfectly competitive markets that makes them work so well, and then consider the likely effects of the loss of some of these important characteristics. When the definition of a competitive market is considered carefully, it becomes clear that its most salient characteristics are that the market price must encapsulate all value or cost - to the purchaser as well as those around them - associated with the good being traded, and that no agent, through either buying or selling, can alter the prevailing market price. These two qualities ensure that the choices of individuals are indeed independent of each other, since neither their actions in the market, nor their production or consumption of the good in question affect others. These are logical conditions for unrestricted markets to lead to good outcomes; when they prevail, the market price provides a summary for each agent of all they need to know about the impact of their decision on themselves and those around them.

We are all aware of markets in the "real world" that fail one or both of these tests. Some buyers and sellers can affect market prices for their own benefit. And many times, what others do or don't do has a significant impact on the choices and welfare of those around them. The economics of market failure address the causes and implications of these deviations from competitive market conditions. In nearly all cases, market failings can be traced to the presence of one of the following three qualities:

1) *Public Goods* - Public goods are goods which provide benefits to all members of a group of people, whether or not each has contributed toward their purchase. In addition, public goods aren't "used up" when they are used; they remain available to be used again, or even to be used by others at the same time. Examples of public goods include shared resources, such as parks and other public infrastructure and services, basic research and many other types of knowledge and information, and national security. Clearly public goods aren't free; they are just by nature available to all, and use by one doesn't wear them out, or preclude use by others. It is not surprising that free markets don't do a good job of providing public goods. The production and purchase incentives they supply individuals aren't likely to lead to the best outcome for all, or bring out the best in human nature. In particular, individual's who pay for a public good receive only a fraction of its full value, with the remainder enjoyed by the "free riders" which make up the rest of the group with access to its benefits.

2) *Externalities* - The term externality describes side effects, or links, between the producer or user of a good and those around them. The word was probably chosen to reflect the "external" effects, or the effects on others, of an individual's decisions. Not

surprisingly, externalities can be be either positive, if the side-effects are appreciated by others, or negative, if they are bothersome. Examples of positive externalities include synergies of all kinds, such as the adjacent operation of a beekeeping business and an apple orchard. Examples of negative externalities include pollution of all kinds, congestion, and disturbance of others. Public goods can even be viewed as an extreme form of positive externality, since purchase of a public good by one individual supplies the same benefits to all others to whom it is available.

Free markets don't often lead to the efficient allocation of goods with externalities for the same reason they don't work for public goods - they are unable to properly account for the effects of one individual's actions on those around them. As described above, the success of the simple solutions which competitive markets supply depends on the ability of each individual to operate with complete independence of others. In such cases, the price of the good and the individual's own preferences are all that is relevant. The presence of externalities mean that this is no longer the case. In addition to the market price which the agent pays for the good, there are other costs or benefits associated with the good which are involuntarily imposed on others. The market price for the good does not reflect these costs or benefits, since the purchaser does not bear or benefit from them, and free markets have no alternative mechanism to insure that the appropriate compensation to or from those effected is made.

3) *Increasing Returns to Scale* - Increasing returns to scale describes activities which demonstrate economies of scale. Economies of scale mean that bigger is better, usually as measured by lower costs per unit of a good or activity. Those who take an early lead in businesses with economies of scale can profitably undercut the prices of their smaller competitors, and eventually dominate or eliminate them. Typically, institutions with this type of ability can also trade in enough quantity to affect prevailing market prices, either as net seller (monopolist) or net buyer (monopsonist). Power over prices is something agents aren't allowed to have in competitive markets, since if they have such power, they are likely to control prices for their own benefit, and to the likely detriment of others. Examples of markets with increasing returns to scale are the electric power and telephone services industries, where monopoly powers are granted and regulated.

In summary, the simple workings of competitive markets fail to produce efficient results when the market price alone does not reliably supply all that an individual decision maker needs to know. This can occur because there are links between one person's actions and the welfare of others which the price of the good does not reflect, as is the case with externalities and public goods. It may also occur because one or more agents have the ability to affect the market price for their own benefit, as is often the case when increasing returns to scale are present.

Responding to Market Failures

General Considerations:

The most important reason why perfectly competitive markets work so well, and also why their range of application is limited, is because they are so simple. One number - the prevailing market price - is all that needs to be communicated, and agents' responses to it are left essentially unrestricted. Competitive markets fail when price, their only mechanism, fails. As noted above, this may be because the nature of the good in question creates links between an individual's actions and the welfare of those around them which aren't accounted for in the good's market price, or because one or more agents have the capacity to distort the market price for their own benefit.

If the side effects which the market price fails to address are significant, or the price distortions which some agents can impose are substantial, the deviation from efficiency of the resulting allocation may also be substantial. If side effects are the problem, additional charges or reimbursements can, at least in theory, be added to account for them. If price distortions are the problem, restrictions on business practices or market activity can, at least in theory, eliminate them. Because market failures result when individual actions affect the welfare of others, government is almost always called on to respond to them, and often does so with special taxes, regulations, licenses or public funding. In general, responses to market failures strive to add incentives equivalent to those found in well functioning competitive markets. These allow agents to reap the full benefit of their own (and only their own) actions, and require them to absorb the full cost of their own (and only their own) actions. Unfortunately, adding such incentives can be difficult and costly, and ideal "substitute" incentives are rarely achieved. In general, the design of substitute incentives requires a reasonable amount of knowledge about the concerns and desires of the individuals involved. This is clearly a tall order, since the true values and concerns of individual decision-makers are hard to elicit, and are likely to vary significantly across the group of people involved.

Due to the difficulties of designing and implementing alternative mechanisms to "fix" market failures, or to augment the price mechanism, many policy attempts have had limited success. Successful policies are naturally more likely where the potential for improvement is significant, and equally important, where alternative mechanisms are available that are likely to be simple, effective, and inexpensive. In other words, a review of the likely effectiveness of the proposed solution is at least as important as the seriousness of the problem. Some of the most painful policy failures have addressed very damaging market failures, including many at the root of important social problems, but have been unable to find alternative mechanisms capable of remedying, rather than simply altering, unproductive incentives.

Theoretical Solutions:

As alluded to above, economic theory suggests that either "price augmenting" payments to account for side-effects or restrictions on price controlling activities can

correct for most market failures. Economic theory's specific recommendations vary by the type of good in question and by the type of market failure. An overview of the primary solution methods for each of the three types of market failures described above follows.

Public Goods:

Individuals are inclined to underinvest in public goods because they do not receive the full benefit associated with their investment, and because they can "free ride" on the investments of others. As a result, they only invest (if they invest at all) up to the level at which their personal benefit equals their marginal cost of investment, rather than to the level at which the marginal cost of the good is equal to the full benefit the good provides to themself as well as all others who have access to it. Graphically, economists represent this problem by drawing two different demand curves. One is based on an individual's personal benefits only, and intersects the market supply curve at Q_p. The other represents all the benefits from the public good - including those received by the individual in question, and by all others who will also benefit from it - which intersects the supply curve at Q_t, with $Q_t > Q_p$. The obvious solution is to somehow compel or require each person to contribute in proportion to their individual demand for the good. For instance, people who are most enthusiastic about having a new park in the area and are likely to use it most often would be asked to make a larger personal contribution toward its establishment. Demand curves are appropriate for this purpose since they chart how much an individual would choose to buy for each possible price, and therefore reflect both an individual's willingness and ability to pay. In the end result, if the proposed solution was implemented, individuals would still make up their own minds about how much they are willing to purchase, but would now contribute this amount to a common fund with confidence that all others would do the same.

The flaw with this simple solution is that it is likely to be difficult to implement. Demand curves are idealized concepts, and are usually difficult to estimate. The solution described above requires access to demand curves for *each* individual. In addition, even if each person could provide their own demand curves, they would have an incentive to under report their personal demand in order to minimize their share of overall cost.

Externalities:

The analysis for externalities is similar to that for public goods. For positive externalities individuals are inclined to under-invest in the good because they receive only a portion of its total benefits, just as was the case for public goods. In this case, the good in question is not available for use by others (as is a public good) but instead has positive "side-effects" which benefit others. Therefore, instead of coordinating aggregate investment in the good, the idealized solution is to have those receiving indirect benefits from the good compensate its purchaser accordingly. The "net" price the purchaser pays then reflects only the benefit *they themselves* receive, which is the essential characteristic of perfectly competitive markets identified above. By including the monetary value of their purchase to others, the link between their decision and the welfare of others is removed, and an efficient allocation can be expected to result from competitive behavior

based on this new, all-inclusive price.

The analysis of negative externalities is just the mirror image of the analysis of positive externalities described above. Individuals are inclined to overinvest in goods that have external costs, since they do not bear the full cost of these goods. The solution is to compel or require purchasers to pay the full cost of the good by paying its market purchase price as well as appropriate compensation to those who bear its negative side-effects. This "full" cost substitutes for the welfare links between agents. As a result, a competitive market process based on it will now lead to an efficient allocation.

Unfortunately, these simple solutions are likely to be hard to implement. In particular, the monetary value of the costs or benefits of a good's side-effects must be known for the "appropriate" payments described above to be made. The whole scheme only works if payments can be worked out that make those subject to side-effects indifferent between the payment and the side-effect. Individual preferences of this type are by nature personal, and their monetary equivalent - if those involved are able to supply one - will depend on an individual's relative level of wealth. Clearly, these amounts aren't likely to be consistent across groups of people. However, making different payments to different people in compensation for the same thing is unlikely to seem fair. In addition, these payments aren't likely to be consistent with what the purchasers of the good might feel is appropriate. Incentive problems are likely also, since those being reimbursed will have an incentive to overstate their costs, and those making the reimbursement will have an incentive to argue the opposite.

Increasing Returns to Scale:

Producers or consumers taking advantage of the market power that results from increasing returns to scale will move prices toward a level which maximizes their gains. A classic example is a producer with monopoly power. By economies of scale, their large size allows them to produce at a lower cost than their smaller competitors. As a result, they can charge any price between the cost level of their nearest competitor and their own cost and be assured of both sales and profits. In contrast, in perfectly competitive markets, producers must set their price equal to their marginal cost or risk being undercut by a competitor, who will share the same cost structure. This ensures that goods will be made available in the market at a price equal to their marginal cost of production, and therefore that no demand will be left unfilled that can be economically supplied. This suggests a remedy to the problems caused when increasing returns to scale are present; simply compel producers to move their price to their marginal cost. This simple solution is hard to implement, like those above, because it requires knowledge of the producer's actual costs, which may be difficult to estimate, and because producers will have an incentive to distort the cost data they supply.

Given the difficulties of implementing the solutions to market failures which economic theory suggests, it is little surprise that few policies enacted even attempt such "first best" solutions. In reality, public goods are usually funded by flat user fees, as in the case of some parks and public infrastructure and services, or by general taxes for most others. Externalities are usually addressed indirectly, if at all. Negative externalities

attract more attention than positive ones, and are usually addressed with legal restrictions and settlement by litigation. In cases where taxes or fees are levied to discourage the use of goods with negative externalities, the proceeds are rarely transferred directly to those bearing the associated costs. In extreme cases of increasing returns to scale, such as those of some public utilities, monopoly licenses are granted in exchange for some level of regulatory control. Because utility cost structures are difficult to assess, regulation of overall return on investment levels is much more common than are regulatory attempts to require utilities to set their price equal to their marginal cost.

Energy Market Failures and Responses

There is no shortage of examples of market failures in the markets for energy and related goods. Unfortunately, each of the major forms of market failure described above are present in the energy industries. It is therefore little surprise that there is much controversy surrounding, and much policy intervention in, many energy markets. Examples of energy market failures, and of current responses to them, follow.

Public Goods:

Energy Security: The oil crises of the 1970's, as well as the more recent Persian Gulf war, make it clear that energy security is an important public good, due to its implications for U.S. economic security and national security. Because economic and national security dangers are threats to the nation as a whole, and are addressed through international relations and national level planning, there is little private agents can or would be inclined to do to address the problem individually. Policy intervention in energy security has been limited, since both the definition of an "ideal solution" and the quantification of its benefits are complex and controversial.

Basic R&D and Energy Technologies: Basic R&D produces fundamental advances in knowledge that can then be levered by many practical applications. Its results cannot, however, be licensed or patented, nor its contributions to practical (and profitable) applications appropriated in any other way, at least at present. The energy industries are R&D intensive, ranging from nuclear engineering to design of photovoltaic cells and advanced batteries, the creation of alternative liquid fuels, and advanced end-use technologies. The products of basic research are hard to predict, and their eventual real world uses, along with those likely to benefit from such uses, are even harder to predict. As a result, little effort has been made to allocate basic R&D costs to corporations or individuals based on their likely demands for its potential products.

Information About New Energy Technologies: Energy technologies are evolving rapidly and are becoming more varied and complex. Wide spread familiarity with these technologies, including knowledge of their performance characteristics, cost, and reliability, often lags well behind their development. Since this information could be used by all without being diminished, it is a public good. Some labelling and product

information services have been developed to meet this need, but no broad and coordinated dissemination program for energy technology information has yet been proposed.

Externalities:

Pollution: Most forms of energy production and consumption produce significant amounts of pollutants, and energy is the primary source of many important forms of pollution. While the full short and long-term costs of most forms of pollution are unclear, it is clear that consumers of energy at present shift much of the full cost of the pollution they produce to other agents in their vicinity. In the case of nuclear power and waste disposal, the risk of an accident and the contingent costs of long-term storage are also properly considered externalities. Progress is being made in assessing these costs, and in developing methods to charge them back to their producers. Tradable permits and other similar mechanisms, found in recent legislation such as the Clean Air Act, approach the theoretical solution of appropriately augmenting the price of a good for its associated external costs, and letting individual consumers decide how to react. However, no legislation yet attempts to use fees and other proceeds to compensate those who suffer the side-effects of negative externalities.

It can also be argued that clean air, water and natural environment are public goods, and that they should be the focus of policy, rather than the pollution that can detract from them. The substance of this approach is almost the same, but the perspective is different. Should we focus on providing the "right level" of clean air, water and environment, however that can best be done, or should we try to charge polluters for the costs they impose on others by detracting from what was previously a clean, or "cleaner", environment?

Increasing Returns to Scale:

Generation and Transmission of Electricity: The construction of power plants and of power transmission and delivery systems requires very large investments which demonstrate significant economies of scale. In transmission and delivery of power in particular, there is little economic basis for multiple suppliers, and therefore, for competitive pressures. Because a utility's cost structure is difficult to accurately observe, regulatory policy toward utilities has most commonly attempted to substitute return on investment regulation for "operating at marginal cost equals price" regulation. The "second best" nature of this approach is clear, and many recent policy modifications have sought to offset the incentives it creates for utilities to encourage energy consumption.

The Difference Between Market Failures and Market Frictions and Barriers

Much of the discussion about the appropriate role for policy in energy markets addresses the role of market "frictions" and "barriers" as well as market failures. These terms are rarely defined, and instead are used as informal references to aspects of markets in the real world which inhibit their functioning in the smooth and simple way which they

are idealized in theory. While less disruptive than market failures, these market "frictions" and "barriers" often lead to allocations which, on the surface at least, appear easy to improve on. Careful consideration of the origins and nature of these "frictions and barriers", however, suggests they generally represent unfortunate but real economic costs and limitiations. Rather than failures of the market mechanism, they represent aspects of real world economic processes which are often glossed over or assumed away for simplicity in economic theory. Examples, discussed more fully below, include transaction costs of all kinds, the different levels of resources available to different individuals, and principal-agent problems such as buyer vs. user conflicts of interest.

What Are Market Frictions and Barriers?

Market frictions, as the name suggests, typically describe things which inhibit the smooth flow of market activity. They might also be called transactions costs, broadly defined. They begin with the costs, in time and money, of information gathering and planning, and then can include shipping, distribution and installation costs, bulk vs. small quantity pricing differentials, and finally adjustment and training costs. For most goods, of course, only a subset of this complete list of costs is applicable. Evidence of the significance of transaction costs can be found in the percentage of the population employed in performing the functions described. Transaction costs are also reflected by the range in levels of awareness, in selling price, and in frequency of use that can often be observed for the same product at the same time in different settings and different locations.

If the description of market frictions or transaction costs given above is allowed to expand to include the time and training requirements of supplying or utilizing certain goods, it begins to encompass a large segment of what are often referred to as market "barriers". In particular, the apparent slow or uneven diffusion of new technologies and innovations is often attributed to the presence of market barriers. On a closer look, these slow rates can often be understood to stem from the time required to develop both the necessary physical and "informational" infrastructure - meaning producer and supplier product expertise, and purchaser awareness - to allow widespread adoption. Rather than reflecting underlying market failure, widespread infrastructure development is usually just a process that takes time. In this case, a better term might be market "hurdle", which reflects the delay these factors cause, rather than barrier, which suggests something insurmountable.

It is important to note that the market frictions and the segment of market barriers described above result from the nature of the good in question; they represent real costs which must be incurred before the general universe of potential producers and purchasers of the good are ready to supply it and use it. As a result, they are very different from market failures as outlined above, which occurred because the market price failed to reflect some aspect of the real economic cost or benefit of the good being traded. Accordingly, they fall outside the range of justified policy intervention - and for good

reason, since it is unclear what could be done to alleviate them.

Some of the "frictions and barriers" described above may, however, be aggravated by the presence of related market failures, and attention to any such aggravating market failures may reduce the impact of these frictions and barriers. The type of market failure most likely to contribute to market frictions or barriers is information. As mentioned above, certain types of information are usually considered public goods. This status is usually reserved for information such as that flowing from basic R&D, and to a lesser extent, information about public health and safety. Deciding what areas of knowledge or information should fairly be awarded "full or partial public good status" appears to be a very grey area. In the energy area, appliance labeling, car fuel efficiency disclosure requirements, and certain utility information programs are now generally acknowledged as reasonable policies, since the cost of providing the information is low, the likelihood of consumers attaining the information otherwise is almost nil, and the benefits appear to be measurable. Developing more general standards for information programs based on these principles will, however, require substantial thought.

Finally, there are two other types of problems which are often classed as market barriers. These are problems that result either from differences in the level of resources available to different individuals, or from the conflicting incentives of several individuals which are party to one decision. An example of the first type of problem is the limited access to capital of lower income familes, and the limited ability to invest in "cost-effective" energy-efficient technologies which it implies. Rather than a problem with market function, however, this is clearly a symptom of a larger problem of equity, and is appropriately addressed as such more directly. Examples of the second type of problem are "principal-agent" problems, such as buyer vs. user questions. For instance, builders are often argued to have the incentive to install cheap but inefficient energy using equipment in new buildings because they won't be paying future utility bills, and because they can't be sure that prospective buyers will fairly compensate them for their equipment investment if they do otherwise. Landlords are similarly argued to lack the incentive to invest in energy-efficient equipment to be used by their tenants. While the extent of these problems is debated, the conflicting incentives present are clear. Rather than problems with markets, however, these, like most incentive problems, are problems of monitoring and measurement. Almost any buyer vs. user conflict can be resolved by careful design of cost-sharing agreements, or by implementation of accurate measurement and verification techniques. Of course, it isn't clear why these solutions aren't commonly adopted, but it seems likely that the associated costs might out-weigh the benefits, at least until more efficient measurement and monitoring methods are developed.

In summary, market frictions and barriers, in their present loose usage, generally refer to perhaps unfortunate, but very real aspects of the economic landscape. They are most often omited in the idealized world of theory for the same reason that we often feel the inclination to try and eliminate them in the real world - they muck up the efficiency of the allocation process. Because they most often represent real costs, there is little hope that

any such effort would be cost effective. Instead, we are best served by looking for instances when market failures (most likely informational failures) aggravate existing frictions and barriers, and then acting to address these failures directly.

Incorporating Market Failure Ideas in the Energy Conservation Debate

What can we take away from the discussion above as we return to the energy conservation policy debate? First, that some markets left to operate on their own can fail to be efficient. This happens most commonly when the actions of individuals are linked in important ways during the production or use of the good being traded. The good may be a public good, which links individuals because they can all draw on it, and must share in its creation as well its use. Or the good in question might have externalities, either positive or negative, which create links between one individual's decision and the welfare of those around them. In either of these cases, competitive markets fail because the prices they offer don't account for these links. Finally, competitive markets also fail when some agents have the capacity to manipulate them.

Second, it is clear that when markets fail because of links between individuals, or because of the special powers of certain agents, the opportunity to improve their results by correcting for these factors presents itself. Since the need to resolve conflicts among individuals or to coordinate their action is called for, addressing market failures most naturally falls in the realm of government policy or the court system.

Third, the unfortunate truth is that the solutions economic theory suggests to most market failures are difficult to implement. Perfectly competitive markets work well because individual decisions are isolated from each other, and therefore each person only needs to make the best decision for themself in order for the overall result to be efficient for all. When markets fail, it is because individual decisions aren't isolated, and therefore can't be made optimally in isolation. This means someone will have to learn something about what each person involved wants, and then mediate among them or coordinate their actions. This difficult task makes "first best" solutions hard to achieve. It is also possible that poorly planned intervention may only create an expensive transformation of the problem, rather than a solution to it.

Fourth, there are important failures in the energy markets. These include pollution externalities, energy supply security, basic energy R&D, information about energy end-use technologies, and electricity supply. As market failures, they merit policy intervention *if appropriate responses are feasible, and are likely to be justified on a cost-benefit basis.* Because failures of important markets also distort other markets they interact with, they merit serious attention *before* action is taken to correct for distortions in the related markets. Following the effects of important market failures through to their impact on the multitude of other markets they affect makes it clear that treating them directly - the disease rather than its symptoms - may be vastly more practical and

effective. For instance, reducing the energy price uncertainty created by energy security risks could vastly improve planning for energy production and use. Similarly, imposing appropriate fees for pollution externalities could eliminate the need for regulation addressing everything from the use of barbeque lighter fluid to mitigation strategies for possible greenhouse effects.

Finally, when returning to the energy conservation policy debate, it is important to remember what market failures are not. They are not market frictions or barriers, meaning transactions costs as broadly defined above, new product diffusion delays, problems stemming from the different level of resources available to different agents, and buyer vs. user conflicts or other types of principal-agent problems. Such frictions and barriers reflect real costs that are present in various forms in all markets, and for which there are economic incentives to eliminate where possible. Positive net gains from policies which affect market frictions or barriers can only be expected if they address underlying market failures which aggravate the frictions or barriers. Indeed, these aggravating effects provide further evidence of the diverse and otherwise hard to address effects which commonly flow from important market failures.

Conclusions

The debate over the appropriate targets of energy conservation policy intervention is presently active, but often muddled by inconsistent references to the theoretical justifications for or against policy intervention. A step back to the basic principles underlying such analysis would help order this debate. Working from general principles down toward specific questions makes distinctions more clear and underlying problems more recognizable than working upward. Working toward establishing a set of principles, based on market failure concepts, by which issues in energy efficiency and conservation could be considered for policy action would significantly enhance overall policy coherence and effectiveness. The broad framework which market failure analysis provides could therefore improve the design of new policy initiatives, as well as the coordination and re-evaluation of existing initiatives.

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