



The Failure of Economic Incentives to Encourage Sustainable Community Development

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Some promote the use of economic incentives as a major public policy instrument, if not the only instrument, to encourage consumer and industrial behaviour conducive to sustainability. This paper questions the validity of such a position, and suggests, rather, that economic incentives without concomitant regulatory change and long-term planning and objective-setting may be too weak as a public policy instrument to achieve substantive changes in behavior.

This alternative position is taken following an examination of what economic theory has to say concerning the attainment of consumption targets within time constraints such as those posed in the Stern Report; of how effective the theory is in examining demand for complex consumer products such as suburban housing or family automobiles; and, of the magnitude that price-based incentives need to pose before they are paid attention to. As an example, for years energy savings investments, although typically reducing energy usage in buildings by 25% to 35%, have been stymied in most commercial spaces because payback periods extend well beyond what most investors will contemplate. Why wait eight years with energy investments (which is not unusual for large buildings) when other investments with four year (or even less) paybacks such as enhanced marketing are readily available? An incentive program to enhance energy savings in buildings which ignores such a factor would simply be a waste of time.

The paper concludes that it is doubtful whether economic incentives can be used as a primary, if not the only instrument to encourage behavior conducive to environmental sustainability and climate change, and suggests that, if incentives are to play a role, it must be within the context of regulatory change and long-term planning, especially in the case of limiting or changing the use of complex products. Indeed, the suspicion is there that, within such a context, economic incentives can only play a supportive role. Finally, incentives, if they are to work, must be meaningful within the overall context of consumer budgets and/or industrial capital plans, otherwise they are nothing more than just a give-away.

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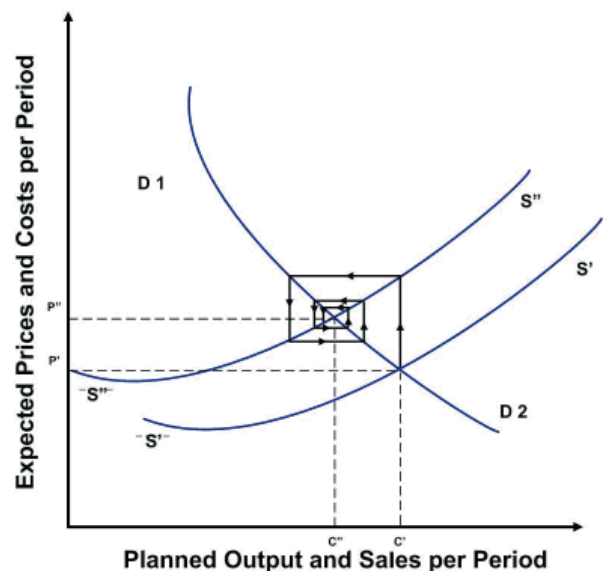
Introduction

Many public policy makers and social scientists suggest the use of economic incentives as a primary, if not the only instrument to encourage behavior conducive to sustainability and climate change. From this position stems proposals for financial and taxation-based initiatives, such as Environment Canada's plans for carbon offset pricing, Natural Resource Canada's subsidies for energy-retrofits of commercial and institutional buildings, and the Ontario government's proposal to the residents of the province to use Natural Resource Canada's on-line personal fuel consumption calculator. Inherent to all of these public policies is the presumption that prices, or, to be more exact, changes in prices possess a critical significance with respect to environmental behavior, and, what is more important, to the achievement of environmental and climate change objectives.

The question is whether such a thesis is valid, both from a theoretical and a practical perspective. While classical micro-economic theory provides the intellectual foundations for the thesis, its continued support appears to need a more prosaic stochastic and operational underpinning to guarantee that pricing-based public policy will indeed attain the objectives initially intended. Whether those intents, however, have been, or even can be attained employing only classical pricing instruments is less than certain, and especially at a theoretical level when the objectives of sustainability and climate change are taken into account. Consider the following perspectives.

The Peculiar Role of Time in Classical Economic Theory

The underlying presumption of public policy makers supporting the use of pricing incentives to attain desired environmental behavior is that market forces, being adjusted with price changes, will re-equilibrate markets at some pre-determined and desired level. The following diagram illustrates a drop in demand from C' to C'' occasioned by a priced-based environmental policy designed to alter the costs of production, thus moving the supply curve from S' to S'' .



The policy could be any of a number of things, such the imposition of a carbon tax or a more a general production tax, the repercussions of a carbon-offset scheme or the cancellation of a government program to subsidize complementary production costs, such as the subsidization of the construction of access roads to support remote suburban locations.

The key is that the operable policy instrument is a shift in price from P' to P'' to cause a reduction in demand. As illustrated in the diagram, classical economics depicts a path towards equilibrium path that typically iterates towards a new and stable intersection of supply and demand at $P'' C''$.

The weakness in this depiction is that economic theory says little, if nothing about the path itself; how long is it; how many iterations are needed; and how much time is required. For the importance of this consider an example.

Assume a pricing based environmental policy to downsize over-built houses in a typical modern suburb. Also assume it is a 10% price increase, and that 20% of consumers pay attention to the incentive at any one time. This means that at least five iterations are required before the sought consumption reduction is achieved. But the catch is that modern houses often go 30 to 40 years before a major upgrade is required, and this implies that the policy objective will only come to full fruition in 150 to 200 years.

Using a similar analysis, and assuming a modern automobile is good for at least 8 years, a pricing based environmental policy to upgrade automotive fleets could take 40 years. While these estimates are rough at best, as a forecast of the timeliness of policy objective attainments, they are indeed troubling when they are compared to the 10 to 20 year investment horizon called for in the Stern Review. The implication is that pricing-based economic incentives are somehow not enough.

A Need for Multi-dimensional Analysis

The above analysis is that it presumes that products such as houses or communities or automobiles are somehow homogenous. The micro-economic theory used in applications such as environmental analysis likes to silo products to their simplest definition.

Consider potatoes; micro-economic theory would have a separate analysis for baking potatoes, boilers and new potatoes. This sort of deconstruction may be well and good for potatoes, but for a house in a modern suburb or an automobile, product decomposition as an analytical tool seems somehow to miss the point. It simplifies where complexity is the real state of affairs.

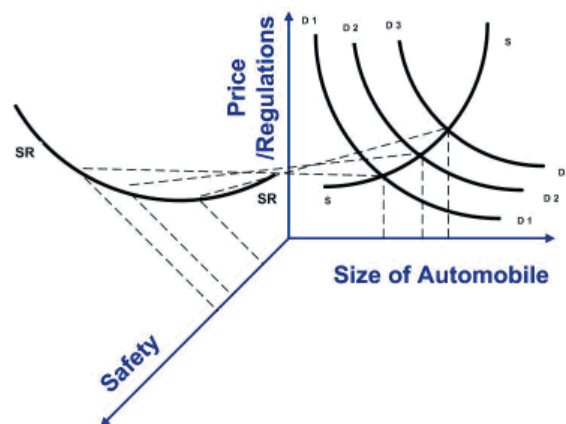
When someone purchases a house, they don't just purchase shelter as a separate commodity; they purchase a package: some combination of shelter, security and safety, location, proximity to schools, availability of parks, co-location with a similar social class etc. They then compare that package with other packages just as complex but with varying combinations of shelter, security, location etc.

With a car, it is rarely just transportation that is at question; it is also degrees of safety (especially if children are involved), reliability, appearance etc. In short we have become, or maybe have always been, exceedingly good at comparing packages of functionalities, and not just simple products, despite what theory suggests.¹

This implies that a simple, but traditional two-dimensional portrayal of economic decision making (price versus quantity) is insufficient. A multi-dimensional modeling is required to even begin approximating what economic decision makers (consumers, business people, public policy managers) do every day.

The following approximates such a modeling when it depicts a probable demand/supply relationship for auto-

mobiles that takes into account safety. In this note that the coinage for a larger automobile is price; for safety it is enhanced regulations and research. The modeling depicts an inverse relationship between safety and size, suggesting that enhanced safety will generally be required to entice the wide-spread purchase of smaller vehicles. After all, common sense says larger is better in an accident.



When looked at from a multi-dimensional viewpoint, the implication in our example is that enhanced regulations leading to automotive safety will, more than likely, shift the demand curve for automobiles to smaller vehicles. What is more relevant from a public policy perspective is that multi-dimensional analysis suggest that all aspects of consumer packages will have to be addressed if behavioral patterns in purchasing are to change.

With automobiles, a climate change initiative to encourage the use of smaller vehicles will have to address not only price as suggested by traditional micro-economic theory but also the availability of fuel and safety as well as other socially-determined matters because people trade all of these factors off in a multi-dimensional fashion. If not, then the policy in time is bound to fail, or at best maintain the status quo.

¹ Automotive analysts note that the Honda Motor Company is well aware that 60% of its CRV SUV is purchased by women under 30 with toddlers. <http://blogs.edmunds.com/strategies/2006/09/2007-honda-cr-v-just-for-women.html>

Incentives and Thresholds

Even presuming that financial incentives can work fast enough and are supported with relevant regulatory adjustments, a serious consideration has to be given to the magnitude of price based incentives. Put differently, how much of an incentive is required?

This analysis requires a context. The Canadian federal ecoAUTO Rebate Program offered rebates of between \$1000 and \$2000 to those purchasing fuel-efficient automobiles during the period April 1, 2006 through to March 31, 2009. The question is whether such an incentive was or is sufficient to secure the targeted consumer behavior.

During the same period, 2006 to be exact, the average new car price was \$32,210. The average family income in that year was \$67,600, while the average income for unattached individuals was \$28,500.00. The incentive consequently came to, on average, 3 to 6 per cent before GST/PST. On an income basis, it came to 1.5 to 3 per cent for families and 3.5 to 7 per cent for unattached individuals. But for most people, automobile purchases represent a capital investment, and therefore comparisons should be made on some sort of amortized basis.

Take a simple, but conservative assumption that a new automobile is

good for five years. The value of the incentive then drops to \$200 to \$400 per year, or to three tenths to six tenths of one per cent of an average family's income. Similar calculations for unattached individuals are seven tenths to fourteen tenths of one per cent.

When looked at with a five year perspective, the ecoAUTO Rebate does appear minimal. Compare this to the highly successful German initiative to rebate new car purchases by as much as 2500 Euros or approximately \$3,300 Canadian if the purchase is tied to the retirement of a nine year old or more 'clunker'. In Canada, a nine year old automobile typically re-sales at 21 per cent of its initial price. This implies a 50% savings to the consumer.

The rejoinder to this is that the eco-AUTO Rebate is at least something, and something is better than nothing. This sort of reasoning follows directly from theories of mathematical continuity as applied to economics that tend to mask the reality behind things. What really happens is that an incentive is simply not heeded until some sort of threshold is touched. The assumption is that an incentive structure will operate on all aspects of demand curve. But this is hardly the case. Incentives need to have a certain magnitude before they are heeded. This is only common sense. Incentives can only

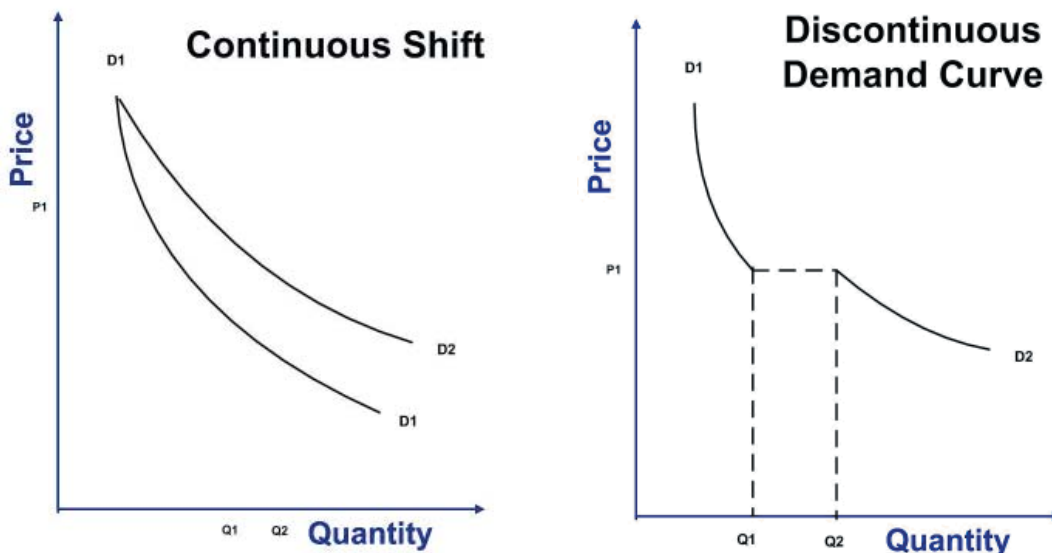
have a meaning when they touch some sort of threshold. The effect of a threshold is depicted below in the Discontinuous Demand Curve diagram.

The demand curve, so-to-speak, with an incentive structure jumps from D1 to D2 at P1 because it is at P1 that consumers begin to pay attention. Classical theory with continuity (see Continuous Shift Diagram below) presumes that consumers will pay attention at any level of incentive.

Why is this important? Consider the ecoAUTO Rebate Program. For the purchase of small cars by labour force entrants or young families, the incentives are most likely meaningless. These people will be purchasing what they can afford, and for the most part that will include small cars. The incentive is simply a gift with little to no demand impact, thus little to no additional environmental or energy savings.

The D1 portion of the Discontinuous Demand Curve best describes their demand behavior. That same portion of the demand curve more than likely describes the demand behavior for most other buyers for the simple reason that the incentive is too meager.

The D2 portion of the Discontinuous Demand Curve, on the other hand, most likely describes the German experience referred to above.



What this theoretical difference demonstrates is that there is a critical need in any environmental initiative to clearly research and identify thresholds in the design of financial incentives.

As an example, for years energy savings investments, although typically reducing energy usage in buildings by 25% to 35%, have been stymied in most commercial spaces because payback periods extend beyond what most investors will contemplate. Why wait eight years with energy investments (which is not unusual for large buildings) when other investments with four year (or even less) paybacks such as enhanced marketing are readily available. An incentive program to enhance energy savings in buildings which ignores such a factor would simply be a waste of time.

Conclusion

This CRC discussion paper began with questioning whether economic incentives can be used as a primary, if not *the* only instrument to encourage behavior conducive to environmental sustainability and climate change.

The paper concludes, first, that it is doubtful whether price-based incentives can serve such a role. Their use depends critically on the application of classical micro-economic theory, which provides a weak analytical base when public policy has to deal with matters such as how fast environmental initiatives have to be implemented.

In addition, the theory wants to deconstruct complex products and consumer demands, when it is that very complexity that public policy

has to address, if complex systems such as fully functional, but 1950's based suburban structures have to be modified.

Second, the paper strongly suggests that, if incentives are to play a role, it must be within the context of regulatory change and long-term planning, especially in the case of limiting or changing the use of complex products. Indeed, the suspicion is there that, within such a context, economic incentives can only play a supportive role.

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