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The Politics and Psychology of Gasoline Taxes: an Empirical Study

Shi-Ling Hsu

THE POLITICS AND PSYCHOLOGY OF GASOLINE TAXES: AN EMPIRICAL STUDY

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ABSTRACT

Economists are beginning to form a consensus that a carbon tax is the most effective and cost-effective way to reduce global greenhouse gas emissions. The insight of economists and other policy analysts is that, in the greenhouse gas context, the design of cap-and-trade programs creates so many opportunities for rent-seeking that they may not be very cost-effective, and may not reduce greenhouse gas emissions at all. Carbon tax proposals are appealing because they are so simple and sensible that rent-seeking would have to be *very* audacious to succeed.

Carbon tax proposals, however, have divided economists from almost everybody else. In particular, the gasoline tax is an exceptionally effective and efficient carbon tax that has been even more unanimously supported by economists—and even more virulently opposed by almost everyone else. This Article explores some of the psychological barriers to public acceptance of gasoline tax increases and examines a political economic theory that has been propounded to explain a uniquely North American hostility towards gasoline taxes. An empirical analysis is undertaken, using a survey instrument to examine public attitudes towards gasoline taxes as a means of reducing emissions from motor vehicles. The concept of "revenue recycling" gasoline tax proceeds is tested for public acceptance, as well as other hypotheses pertaining to cognitive barriers to understanding gasoline taxes. Also, in understanding why gasoline taxes are so virulently opposed in North America, economic and demographic factors are examined to study the implications of this political economic theory.

I. INTRODUCTION

Economists are beginning to form a consensus that the most effective and cost-effective way to reduce global greenhouse gas emissions is through a carbon tax.[1] Economists have argued for decades that the most cost-effective

* Associate Dean for Special Projects, University of British Columbia Faculty of Law. This article was written with the support of the Social Sciences and Humanities Research Council of Canada. The author would like to thank Winston Harrington, David Green, Bill Mercer, and Gregory Miller for their helpful comments, and Julie Desbrisay for her research assistance.

1. *Economists Favor Fossil Fuels Tax to Spur Alternatives—Survey*, E&E NEWS PM, Feb. 8, 2007. Nobel Laureate Economist Joseph Stiglitz, a former chief economic advisor to President Bill Clinton, called for a global carbon tax in 2006, (Joseph E. Stiglitz, *A New Agenda for Global Warming*, *in* THE ECONOMISTS' VOICE 22, 26 (Joseph E. Stiglitz, Aaron S. Edlin & J. Bradford

way to address the large-scale pollution problems is by either cap-and-trade programs or Pigouvian taxes,[2] depending on a variety of pollution and industry circumstances.[3] However, cap-and-trade programs require the resolution of a number of design issues, such as the cap level, the emitters that would be covered by the program, whether the emissions permits would be auctioned or

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DeLong eds., 2008)), as did Harvard Economics Professor N. Gregory Mankiw, a former chief economic advisor to President George W. Bush (N. Gregory Mankiw, *Raise the Gas Tax*, WALL ST. J., Oct. 20, 2006, at A12 *available at* http://online.wsj.com/article/SB116131055641498552.html).

2. "Pigouvian" is meant to describe a tax that would be consistent with Pigou's prescription that a tax equal to the marginal social harm from pollution should be imposed to provide just the right amount of disincentive for pollution. ALFRED C. PIGOU, THE ECONOMICS OF WELFARE (1928). Taxes that reflected the extent of negative externality thus became known as "Pigouvian" taxes. WILLIAM J. BAUMOL & WALLACE E. OATES, THE THEORY OF ENVIRONMENTAL POLICY 21-23 (2d ed. 1988).

3. Cap-and-trade systems are sometimes touted for providing certainty with respect to emissions quantities, but the European Union (EU), with its cap-and-trade program, conceded that emissions in the EU rose 1.1 percent in 2007. *E.U. fails to curb emissions*, E&E NEWS PM, Apr. 2, 2008. Taxation programs would thus be touted for providing price certainty. Martin L. Weitzman has shown that questions of uncertainty and magnitude of marginal abatement costs and marginal social damages largely determine whether a price instrument (such as a tax) or a quantity instrument (such as a cap-and-trade program) will yield the lower danger of deadweight loss in case the prices or the quantities are not set at optimal levels. In other words, Weitzman shows that in case of error, either a price instrument or a quantity instrument will be a safer bet in terms of minimizing the cost to society of that error. Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477, 477 (1974). Many, many others have added to the analysis of this tax-versus-trading comparison. *See, e.g.*, Lawrence H. Goulder, Ian W.H. Parry, & Dallas Burtraw, *Revenue-raising versus Other Approaches to Environmental Protection: The Critical Significance of Preexisting Tax Distortions*, 28 RAND J. ECON. 708 (1997); William A. Pizer, *Combining Price and Quantity Controls to Mitigate Global Climate Change*, 85 J. PUB. ECON. 409 (2002); Philippe Quirion, *Prices versus Quantities in a Second-Best Setting*, 29 ENVTL. & RESOURCE ECON. 337 (2004); Richard L. Revesz & Robert N. Stavins, *Environmental Law and Policy*, (NYU Law & Econ. Research Paper Series, Working Paper No. 04-015, 2004), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=552043#PaperDownload.

On pollution taxes generally, the literature is far too vast to list, but three important basic texts in environmental and natural resource economics propound the general proposition that a Pigouvian tax is *theoretically* the most efficient means of reducing large-scale pollution problems. BAUMOL & OATES, *supra* note 2, at 23 ("In sum . . . the proper corrective device is a Pigouvian tax equal to marginal social damage levied on the generator of the externality with no supplementary incentives for victims"); P.S. DASGUPTA & G.M. HEAL, ECONOMIC THEORY AND EXHAUSTIBLE RESOURCES 52-54 (1979) ("Strictly from a *formal* point of view our example suggests that, as long as all costs in running an institution are nil, a tax equilibrium and a competitive equilibrium with markets for externalities are equivalent") (emphasis in original) (internal footnote omitted); PAUL A. SAMUELSON, ECONOMICS 744 (11th ed. 1980) ("Economists propose that greater use be made of pricing mechanisms. Taxes are to be put on firms and industries that put out effluents into the air and ground"); TOM TIETENBERG, ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS 373 (3d ed. 1992) ("We have shown that as long as the control authority imposes the same emission charge on all sources, the resulting reduction allocation *automatically* minimizes the costs of control") (emphasis in original).

allocated, and if allocated, the basis for allocating them. Resolving these issues will create winners and losers, and democratic institutions have not done this elegantly.[4] The insight of economists and other policy analysts is that in the greenhouse gas context, the design of cap-and-trade programs creates so many opportunities for rent-seeking that they may not be very cost-effective, and may not reduce greenhouse gas emissions at all.[5] Carbon tax proposals are appealing because they are so simple and sensible that rent-seeking would have to be *very* audacious to succeed. Once the carbon tax is safe from political shenanigans, the simple price effect of the tax would inevitably reduce carbon-emitting consumption.[6]

Nevertheless, carbon taxes have remained on the sidelines, at least in the North American political debate. While some carbon taxes have been proposed in the United States,[7] and some Canadian provinces have actually

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4. Even the much-praised sulfur dioxide emissions trading program under the Acid Rain Program of the United States Clean Air Act contains a provision that allocated, without any explanation, a pool of 200,000 allowances in the states of Illinois, Indiana, and Ohio, excepting several named plants. Clean Air Act § 404(a)(3), 42 U.S.C.A. § 7651c(a)(3) (2003).

The many design issues posed by cap-and-trade programs have spawned a clumsily large number of cap-and-trade proposals, seven in the 110th Congress alone: The Climate Stewardship and Innovation Act of 2007, S. 280, 110th Cong. (2007); the Lieberman-Warner Climate Security Act of 2007, S. 2191, 110th Cong. (2007); the Low Carbon Economy Act of 2007, S. 1766, 110th Cong. (2007); the Global Warming Pollution Reduction Act of 2007, S. 309, 110th Cong. (2007); the Global Warming Reduction Act of 2007, S. 485, 110th Cong. (2007); the Climate Stewardship Act of 2007, H.R. 620, 110th Cong. (2007); and the Safe Climate Act of 2007, H.R. 1590, 110th Cong. (2007).

5. The European Union, with its cap-and-trade program, conceded that emissions in the EU rose 1.1 percent in 2007. *E.U. fails to curb emissions*, *supra* note 3.

California's greenhouse gas reduction ambitions have been hailed as an example of how state action may achieve greenhouse gas emissions reductions in lieu of federal action. However, as an example of the rent-seeking that has begun as details of California's AB 32 are rolled out, Los Angeles Mayor Antonio Villaraigosa has denounced the proposed the cap-and-trade program because it would require the Los Angeles power utility, which is dependent upon fossil fuel-fired power, to pay for emissions credits to cover its carbon dioxide emissions. Without the slightest hint of irony, the Mayor railed: "I am a big supporter of AB 32, but the PUC proposal to rip off L.A. taxpayers and redirect ratepayer money to private utilities is a power grab that we will not accept." Patrick McGreevy, *L.A. Mayor Lobbies State to Head Off "Rip-Off*," L.A. TIMES, Apr. 3, 2008, at B-5, *available at* http://articles.latimes.com/2008/apr/03/local/me-mayor3. The Public Utilities Commission that proposed the scheme retreated, noting that "the agency has proposed a framework of a system, but it is up to the California Air Resources Board to decide what to adopt. The final system may allow the DWP to get pollution credits for free." *Id.*

6. At least one prominent economist, however, has questioned whether market mechanisms alone can reduce greenhouse gas emission sufficiently quickly. Economist Jeffrey Sachs has noted that the technology deployment required to reduce emissions quickly enough cannot be accomplished without substantial governmental involvement. Jeffrey D. Sachs, *Keys to Climate Protection*: *Dramatic, Immediate Commitment to Nurturing New Technologies is Essential to Averting Disastrous Global Warming*, SCI. AM., April 2008, at 40, *available at* http://www.sciam.com/article.cfm?id=keys-to-climate-protection.

7. The Stark-McDermott tax bill, filed in April 2007, would introduce a $10 per ton carbon tax, to be imposed when coal, petroleum, and natural fuel are either extracted or imported. The tax would increase by $10 per ton annually until emissions in the United States

introduced them,[8] they are still not widely discussed as a national or international policy tool to reduce greenhouse gas emissions. Some resistance is cultural, stemming from a deep-seated antipathy towards any policy containing the word "tax," especially in North America.[9] Research has shown

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dropped below 80 percent of 1990 levels. Save Our Climate Act of 2007, H.R. 2069, 110th Cong. (2007). The Larson bill, filed in August 2007, would tax $15 per ton of carbon dioxide, increasing 10% annually for ten years and accounting for inflation. America's Energy Security Trust Fund Act of 2007, H.R. 3416, 110th Cong. (2007). Michigan Congressman John D. Dingell is proposing a $50 per ton carbon tax, with an additional $0.50 per gallon of petroleum-based fuel. The revenue would go to income tax credits, social programs, mass transit, and trust funds for highways and airports. The Honorable John D. Dingell – Carbon Tax Summary. http://www.house.gov/dingell/carbonTaxSummary.shtml (last visited Feb. 18, 2009). Connecticut Senator Chris Dodd has proposed a corporate carbon tax to fund research and development of renewable and energy efficiency technologies. Chris Dodd for President – Energy Plan, http://chrisdodd.com/issues/energy_independence/plan (last visited Nov. 17, 2008).

8. Quebec was the first province to impose a carbon tax in October 2007. A duty is charged to fuel distributors (including entities that bring fuel into Quebec for a purpose other than resale) on the basis of carbon dioxide emissions, and paid to the Green Fund. Regulation respecting the annual duty payable to the Green Fund (An Act respecting the Régie de l'énergie) R.S.Q., c. R-6.01, ss. 85.36 and 114. In February 2008, British Columbia announced its revenue-neutral carbon tax to begin in July 2008. The tax will start at a rate of $10 per tonne of carbon dioxide, increasing by $5 per tonne annually until 2012. BRITISH COLOMBIA MINISTRY OF FINANCE, BUDGET AND FISCAL PLAN 2008/09 – 2010/11 1 (2008), *available at* http://www.bcbudget.gov.bc.ca/2008/bfp/2008_Budget_Fiscal_Plan.pdf.

9. In the race for the Canadian Liberal Party leadership, once front-runner Michael Ignatieff proposed a carbon tax to reduce greenhouse gas emissions, before being pilloried by other Liberal hopefuls, including eventual winner Stephane Dion, a former Environment Minister. Canadian Broadcasting Centre News, *The Carbon Tax: the Pros and Cons of a Tax on Fossil Fuels*, June 16, 2006, http://www.cbc.ca/news/background/kyoto/carbon-tax.html.

Not only do taxes generally make up a smaller percentage of GDP in North America, but environmental taxes also make up a smaller percentage of tax revenue. For example, in the United States, Canada, and Mexico, gasoline taxes are, respectively, 10, 11 and 25 cents (US) less per liter than any other of the twenty-six other countries surveyed by the International Energy Administration in 2000. Thomas Sterner & Gunnar Köhlin, *Environmental Taxes in Europe*, 3 PUB. FIN. & MGMT. 117, 129 tbl.3 (2003). Environmental tax revenues in the United States, Canada, and Mexico constitute, respectively, approximately 0.9%, 1.45%, and 1.5% as a percentage of GDP. *Id.* at 125 fig.1. In a 2004 report, the OECD noted Canada's reluctance to embrace economic instruments generally:

> Despite [the introduction of a number of economic instruments for environmental policy purposes, mainly at the provincial level], limited use has been made of economic instruments for environmental management at any level of government. A number of constraints affect greater uptake of economic instruments. Industry is concerned about day-to-day competitiveness pressures, especially in relation to cost competitiveness with the US. It has difficulty understanding how to implement new instruments such as trading. Within governments, economic agencies have supported economic instruments in principle, but resisted specific proposals for targeted incentives on allocative efficiency grounds. The public is wary of new fees and charges, and of the allocation of the 'right to pollute.' There is general resistance to external pressure to change consumption patterns. Small but influential groups have blocked some proposals.

that the exact same program could be proposed but with different labels, where the program with a proposed "tax" will be much less popular than the one labeled "fee."[10] A related and overlapping source of resistance derives from suspicion that government would waste the tax proceeds, or at least spend them in a way inconsistent with the stated purposes.[11] However, most resistance is based on the perception that those emitters paying taxes would face extreme and unfair economic hardships, which raises fairness issues. Despite the fact that many redistributive schemes have been put forth that would ameliorate the distributional consequences of a tax,[12] concerns are both persistent and widespread that such taxes would unfairly impose unacceptable hardships upon certain individuals, groups, or industries.

This conflict has played out before, as numerous occasions have arisen in the past several decades for serious consideration of pollution taxes, or some consumption-keyed tax that scales with the quantity of emissions. In 1994, as part of a plan to reduce what was then considered a dangerously high deficit coupled with high energy consumption, President Bill Clinton proposed a "Btu tax" to be levied on consumer energy bills.[13] Initially supported by most

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NATIONAL ROUNDTABLE ON THE ENVIRONMENT AND THE ECONOMY, ECONOMIC INSTRUMENTS FOR LONG-TERM REDUCTIONS IN ENERGY-BASED CARBON EMISSIONS, 10 (2005)(citing Organization for Economic Co-operation and Development (OECD), *Environmental Performance Review of Canada* (2004)) *available at* http://www.nrtee-trnee.com/eng/publications/energy-based-carbon-emissions/full-report/energy-based-carbon-emissions-fullreport-eng.pdf.

10. Roberta Mann, *Another Day Older and Deeper in Debt: How Tax Incentives Encourage Burning Coal and the Consequences for Global Warming*, 20 PAC. MCGEORGE GLOBAL BUS. & DEV. L.J. 111, 140 (2007); Edward J. McCaffrey & Jonathan Baron, *Heuristics and Biases in Thinking About Tax*, PROCEEDINGS OF THE 96TH ANNUAL CONFERENCE ON TAXATION 434-43 (2003).

11. In Canada, gasoline tax proceeds even play into provincial rivalries and rent-seeking. William Boei & Peter O'Niel, *British Columbia's Gasoline Taxes Helping Out Quebec, Says,* VANCOUVER SUN, Mar. 21, 2007, at A3. Studies from Germany, Denmark, Ireland, France and the UK have demonstrated that the public does not trust politicians to spend environmental taxes solely on environmental measures; rather, people worry that funds will end up supplementing general government revenues. *See* Christiane Beuermann & Tilman Santarius, *Ecological Tax Reform in Germany: Handling Two Hot Potatoes at the Same Time*, 34 ENERGY POL'Y 917, 923, 924 (2006); J. Peter Clinch & Louise Dunne, *Environmental Tax Reform: An Assessment of Social Responses in Ireland*, 34 ENERGY POL'Y 950, 954 (2006); José-Frédéric Deroubaix & Francois Lévèque, *The Rise and Fall of French Ecological Tax Reform: Social Acceptability versus Political Feasibility in the Energy Tax Implementation Process*, 34 ENERGY POL'Y 940, 947 (2006); Simon Dresner et al., *History and Social Responses to Environmental Tax Reform in the United Kingdom*, 34 ENERGY POL'Y 930, 936 (2006); Jacob Klok et al., *Ecological Tax Reform in Denmark: History and Social Acceptability*, 34 ENERGY POL'Y 905, 913 (2006).

12. Various "revenue recycling" programs impose a per-pollutant tax but return the tax proceeds to the polluters either in lump sum or in some way that does not relate to the amount of pollution. For example, a NOx tax in Sweden imposed upon energy producers is rebated in proportion to energy output. International Institute for Sustainable Development, The Nitrogen Oxide Charge for Energy Production in Sweden, *available at* http://www.iisd.org/greenbud/nitro.htm.

13. Ways and Means Budget Reconciliation Act of 1993, H.R. 2141 § 4446(d).

environmentalists,[14] economists,[15] and a wide spectrum of interests,[16] the Btu tax fell victim to a coalition of energy providers, energy consumers, and even members of the Congressional Black Caucus, who were concerned about the supposedly regressive nature of the tax.[17] The Btu tax was presented as a revenue-raising alternative to a gasoline tax, which was viewed as being unfair toward automobile-dependent rural populations,[18] and to a carbon tax, which was viewed as being unfair to coal-miners and coal-mining interests.[19] It is slightly ironic and very illuminating that the Btu tax failed because of distributional concerns.

II. THE GASOLINE TAX

The subject of pollution taxes presents a deep cleave between economists and almost everyone else—economists generally love them, and everybody else generally hates them. There is no better illustration of this than the

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14. *See, e.g.*, Dawn Erlandson, *The Btu Tax Experience: What Happened and Why it Happened*, 12 PACE ENVTL. L. REV. 173, 175 (1994) (describing the Btu tax as "brilliantly conceived in every way"); Daniel A. Lashof, *The Btu Tax: A Revenue Source that Fights Pollution*, 59 TAX NOTES 1271, 1271 (1993).

15. Henry Lee, *The Political Economy of Energy Taxes: An Assessment of the Opportunities and Obstacles*, 12 PACE ENVTL. L. REV. 77, 77-78 (1994). A Btu tax, however, is not a purely Pigouvian tax, in that it taxes electricity, not the emissions resulting from electricity; energy generated from renewable energy sources would be taxed just as energy generated from coal-fired power plants.

16. *See* PIETRO S. NIVOLA & ROBERT W. CRANDALL, THE EXTRA MILE: RETHINKING ENERGY POLICY FOR AUTOMOTIVE TRANSPORTATION 105 (1995).

17. Editorial, *The Bouncing Tax Burden*, WASH. POST, June 14, 1993, at A18; Jackie Calmes, *Doing the Deal: The Deficit-Reduction Conference: White House, Democrats Seek to Boost Support for Compromise Economic Plan*, WALL ST. J., July 16, 1993, at A10. A more sober look at the regressivity of the Btu tax would have involved some inquiry as to whether it was more regressive than the alternatives to raising revenues.

Lower income drivers are more likely to reduce driving when faced with measures that increase the cost of driving and are thus more likely to perceive such measures as unfair. C. Jakobsson, S. Fujii & T. Gärling, *Determinants of Private Car Users' Acceptance of Road Pricing*, 7 TRANSPORT POL'Y 153, 154, 156 (2000). Although economic theory would predict low income groups are expected to be more opposed to road pricing because of their higher marginal utility of money and their decreased willingness to pay to reduce externalities, empirical evidence contradicts these predictions: low income individuals are more likely to perceive pricing measures as effective and income level had no significant effect on support for such measures. Sytze A. Rienstra, Piet Rietveld, & Erik T. Verhoef, *The Social Support for Policy Measures in Passenger Transport: A Statistical Analysis for the Netherlands*, 4 TRANSP. RES. PART D 181, 183, 195 (1999).

18. White House Budget Director Leon E. Panetta remarked that the President was attempting to introduce a "broad-based" energy tax, "in contrast to a gasoline tax that would tend to hit rural areas harder." Sam Fulwood III, *Budget Bill May Bypass Panel, Bentsen Says*, L.A. TIMES, June 7, 1993, at A1.

19. Amy C. Christian, *Designing a Carbon Tax: The Introduction of the Carbon-Burned Tax (CBT)*, 10 UCLA J. ENVTL. L. & POL'Y 221, 277 (1992).

pathologically hated gasoline tax, which economists uniformly support[20] and the general public virulently opposes.[21] Economic advocates for an increased gasoline tax span the political spectrum, from Harvard Professor Gregory Mankiw,[22] George W. Bush's former chief economic advisor, to right-leaning Chicago Professor and Nobel Laureate Gary Becker,[23] to Paul Krugman,[24] the New York Times columnist that has spent the last six years pillorying the Bush Administration. Even uber-libertarian Grover Norquist[25] reputedly supports a gasoline tax if the revenues are returned in the form of reduced income taxes.[26]

However the gasoline tax remains a political third-rail for North American politics.[27] Even in wake of the Arab Oil Embargo, the frantic American effort to reduce reliance on imported oil did not include a gasoline tax. In arguing against a 1975 gasoline tax proposal, Democratic Congressman Bill Alexander of Arkansas, railed:

> If this tax is enacted, we will be requiring the people of the heartland of America to carry this burden on both shoulders. It is unfair; it is inequitable; it is

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20. Martin Wachs, *A Dozen Reasons for Raising Gasoline Taxes*, INST. OF TRANSP. STUD. 1, 2 (2003) ("A survey of 40 leading US economists in 1998 found that there is little agreement among them as to which of thirteen national tax and regulatory reform programs are desirable public policies, with the exception that all support a proposed 25¢ per gallon fuel tax increase").

21. *See, e.g.*, The New York Times/CBS News Poll, Feb. 22-26, 2006 (questions posed in terms of willingness to pay gasoline tax to "cut down on energy consumption and reduce global warming," to "reduce the United States' dependence on foreign oil," and to fund "the war on terrorism"), *available at* http://www.nytimes.com/packages/pdf/national/20060228_poll_results.pdf.

22. Mankiw, *supra* note 1.

23. Gary S. Becker, *Want to Cut Gasoline Use? Raise Taxes*, BUS. WEEK, May 27, 2002, at 26 *available at* http://www.businessweek.com/print/magazine/content/02_21/b3784039.htm? chan=mz.

24. Paul Krugman, Opinion, *Gasoline Tax Follies*, N.Y. TIMES, Mar. 15, 2000, at A23 *available at* http://query.nytimes.com/gst/fullpage.html?res=9B04EEDF1E3BF936A25750C0A9669C8B63&sec=&spon=&&scp=1&sq=Paul%20Krugman%20Reckonings;%20Gasonline%20Tax%20Follies&st=cse.

25. Grover Norquist is the founder and president of the anti-tax lobbying group Americans for Tax Reform, which lobbies for lower taxes and lower governmental spending. *See generally* Americans for Tax Reform, http://www.atr.org (last visited Feb. 20, 2009).

26. Robert H. Frank, *A Way to Cut Fuel Consumption That Everyone Likes, Except the Politicians*, N.Y. TIMES, Feb. 16, 2006, at C3 *available at* http://www.nytimes.com/2006/02/16/business/16scene.html?_r=1&scp=1&sq=Robert%20Frank%20A%20Way%20to%20Cut%20Fuel%20COnsumption%20That%20Everyone%20Likes&st=cse.

27. *See, e.g.*, Nelson D. Schwartz, *American Energy Policy, Asleep at the Spigot*, N.Y. TIMES, July 6, 2008, at BU. 1 *available at* http://www.nytimes.com/2008/07/06/business/06oil.html?th=&emc=th&pagewanted=all (former EPA administrator William Reilly was quoted as recalling, during a debate in the Bush Administration over energy policy, that "[t]his was a stark lesson and people decided the gas tax was the third rail of public policy."). Canadian politicians, too, have suffered the political consequences of hiking gasoline taxes, even when used to pay for transportation infrastructure. Dirk Meissner, *B.C. Premier Target of Public Anger Over 3.5-cents-a-litre Fuel Tax Hike*, CANADIAN PRESS NEWSWIRE, Feb. 13, 2003.

> grossly discriminatory against the vast majority of the people of this country who do not have access to public transportation.[28]

In the 2006 leadership race for the Liberal Party of Canada, the center-leftist party, candidate Michael Ignatieff proposed a carbon tax that would have returned carbon tax revenues to the provinces that generated them, but that would have led to higher gas prices. Despite this nod to provincial sovereignty, and despite receiving praise from economists, Ignatieff's plan fell along with his candidacy, which he lost to Stephane Dion, who instead proposed other vague proposals, including a cap-and-trade system of emissions permits.[29] An astute political advisor might have told Ignatieff to follow one of Canada's other party leaders, Jack Layton, head of the leftist NDP party. Layton is on record as being a strong supporter of the Kyoto Protocol but has opposed a carbon tax on the grounds that it would "hurt [the] poor."[30] Whereas most economists were arguing that taxes were needed to nudge gasoline prices *higher*, here was a leading Canadian politician arguing for *lower* gasoline prices. On the U.S. Presidential campaign trail, all of the major party candidates were vying for votes by promising to deliver lower gasoline prices.[31]

On the economical or environmental merits, however, there is no reasonable argument against increasing gasoline taxes. No serious observer contends the United States (or Canada) would not benefit as a society from lower gasoline consumption. Virtually all of the economic work done on gasoline taxes shows that gasoline prices are too low.[32] Unless one believes that energy efficiency and U.S. energy independence are satisfactory, that greenhouse gas emissions from transportation are of no concern, and that there are no longer any transportation externalities, there is no way around the fact that gasoline taxes are the most effective and efficient way of addressing

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28. 121 CONG. REC. 18,435 (1975).

29. Jeffrey Simpson, *For Real Green Ideas, Mr. Dion, Talk to Iggy*, THE GLOBE & MAIL, Jan. 17, 2007, at A19.

30. Joanna Smith, *Carbon tax would hurt the poor, NDP says*, Toronto Star, May 23, 2008, at A19, *available at* http://www.thestar.com/News/Canada/article/429174.

31. Aswini Anburajan, *Obama Talks Gas Prices*, MSNBC FIRST READ, Apr. 1, 2008, http://firstread.msnbc.msn.com/archive/2008/04/01/848005.aspx ("Gas prices are killing folks"); Suzanne Malveaux, *Clinton, Obama Take on Big Oil*, CNN.COM, http://www.cnn.com/2008/POLITICS/04/01/dems.oil/index.html ("The president is too busy holding hands with the Saudis to care about American truck drivers who can't afford to fill up their tank any longer"); Liz Sidoti, *McCain Calls for Summer-long Suspension of Gas Tax*, ASSOCIATED PRESS, Apr. 15, 2008 (on file with author).

32. The seminal and often-cited work is by Ian W. H. Parry and Kenneth Small, who estimated that if one were to set the gasoline tax to estimate the marginal damage caused by motor vehicle emissions, the tax would be approximately 83 cents per gallon, more than double the average U.S. gasoline tax incidence of 40 cents per gallon. Ian W.H. Parry & Kenneth Small, *Does Britain or the United States Have the Right Gasoline Tax?*, 95 AM. ECON. REV. 1276, 1276, 1283 (2005).

the core problem of overconsumption. While people may *feel* that driving is absolutely necessary, the reality is that gasoline consumption is somewhat elastic in the short term and more elastic in the long term.[33] Raising the price of gasoline through a tax hike will simply and brutally reduce gasoline consumption.

Many objections to higher gasoline taxes are based upon concerns about regressivity. The belief is that gasoline costs take up a larger proportion of a poor driver's paycheck than that of a rich driver. Therefore, an increase would deprive poorer drivers of more basic goods than rich drivers.[34] The media seems to revel in the miseries of poor and lower middle-class drivers that are hurt by high gasoline prices,[35] while glossing over the ultra-poor transit users

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33. Carol Dahl & Thomas Sterner, *Analyzing Gasoline Demand Elasticities: A Survey*, 13 ENERGY ECON. 203 (1991); Olof Johansson & Lee Schipper, *Measuring the Long-Run Fuel Demand of Cars: Separate Estimations of Vehicle Stock, Mean Fuel Intensity, and Mean Annual Driving Distance*, 31 J. TRANSPORT ECON. & POL'Y 277, 291 (1997); NIVOLA & CRANDALL, *supra* note 16, at 15 fig.1-7.

34. Chris Harrison, *Regressive Taxation Rage*, Democraticunderground.com, Mar. 1 2002, http://www.democraticunderground.com/articles/02/03/01_regressive.html.

> Perhaps an even better example for the innate unfairness of regressive taxation is a gasoline tax. While well-intentioned advocates of a gasoline tax tout the way it will shift demand away from gas-guzzling SUV's and toward hybrid cars and public transit, they fail to recognize how it will devastate large groups of lower-income commuters.
>
> Many of the rural poor already spend a large percentage of their income on commuting to and from work. If a sizable gasoline tax were to be enacted, without the public transportation infrastructure already in place, many of these lower-wage earners would be left to choose between gas for commuting to work, or food on the table. If they choose to immediately feed their families, they could be left without sufficient funds for gas, in which case they could lose their jobs due to their inability to get to work.

Id.; James M. Poterba, *Is the Gasoline Tax Regressive?*, 5 TAX POL'Y & THE ECON. 145 (1991), *available at* http://www.nber.org/papers/w3578.pdf.

35. The New York Times ran a series of articles on the impact of high gasoline prices on various individuals throughout the country, highlighting the hardships imposed upon: cabdrivers (Corey Kilgannon, *Driving Guzzlers for a Living, in As Gas Prices Go Up, Impact Trickles Down,* N.Y. TIMES, Apr. 30, 2006, at 24 ("Compared to a year ago, I pay $15 more a day in gas," said Miguel Gonzalez, 67, of Queens. "I only take home $100 a day, so that's my lunch and dinner right there")); immigrants ("Lesly Richardson, 50, a Haitian immigrant from Brooklyn, nodded in agreement 'That's $100 a week,' he said. 'That's your grocery bill.'" *Id.*); college students (Christopher Maag, *Cutting Into Travel and Food*, in *As Gas Prices Go Up, Impact Trickles Down*, N.Y. TIMES, Apr. 30, 2006, at 24,

> Mr. Cole, who studies computers at Lakeland Community College and earns $8.18 an hour working in a factory that heat-treats metal, did not have money for gas. So he stayed home. "I won't be able to see [my girlfriend] till I get paid," he said. "Ever since gas prices went up, it's like I'm barely able to see her."

Id.; single mothers (Doug McInnis, *At $2.39 a Gallon, a Bargain*, in *As Gas Prices Go Up, Impact Trickles Down*, N.Y. TIMES, Apr. 30, 2006, at 24 ("In an adjoining gas lane, Cindy Wright spoke of the pain high gas prices cause the single mothers who make up many of the clients at the public health clinic in Torrington, where she is a nurse.")).

that do not drive at all, yet subsidize a road infrastructure that they never use through the already regressive sales tax.[36] This line of thinking, however, based as it is on selective anecdote rather than empirical analysis, is less useful than an actual discussion of regressiveness and what it means. Do we measure income groups by an upper half and lower half, or by quartiles, or quintiles? If a gasoline tax hurts the second-lowest quintiles the most but not the lowest quintile, is it considered "regressive?" How does one measure the pain of gasoline taxes, if some people will actually substitute away from driving and take transit or ride a bicycle? A study by West and Williams analyzed different incidences of regressitivity, breaking households down by quintiles, calculating elasticities at every income quintile, and using three different assumption sets about elasticity and use of tax proceeds.[37] Their findings lend support to the assertion that gasoline taxes are regressive, but only under unrealistically harsh assumptions such as the utter inability of drivers to substitute away from driving, and that the tax proceeds are simply added to the general treasury, with no revenue recycling.

What alternatives exist to higher gasoline taxes? The alternative that seems to satisfy almost everyone, albeit by sleight of hand, is the concept of vehicle fleet fuel efficiency standards, or CAFE (Corporate Average Fuel Efficiency) standards, which require manufacturers to sell a mixture of vehicles that meet, on average, a fuel efficiency standard. CAFE standards are more publicly popular than gas taxes,[38] but have been ineffective in reducing overall gasoline consumption.[39] In addition to some regulatory loopholes that have allowed large, gas-guzzling, sport-utility vehicles to be regulated under more lenient standards,[40] CAFE standards do not provide incentives for reduced driving.[41]

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36. Wachs, *supra* note 20, at 7-8.

37. The actual determination of whether a gasoline tax is regressive or not is complicated. Regressivity could be measured by different delineations of income, and using a large variety of different assumptions about how drivers respond. The most careful study of the projected incidence of a gas tax increase was done by Sarah West and Roberton Williams, who estimated separate demand models for each of five income quintiles, one-adult and two-adult households, and found that under the most severe and simplistic assumptions — that gasoline is perfectly inelastic and people make no adjustments whatsoever to changes in the price of gasoline — the incidence on the poorest quintiles is not substantially different from that of the next two higher quintiles. Sarah E. West & Roberton C. Williams III, *Estimates from a Consumer Demand System: Implications for the Incidence of Environmental Taxes*, 47 J. ENVTL. ECON. & MGMT. 535, 551 tbl.3 (2004). *See also* Poterba, *supra* note 34.

38. *See, e.g.*, Becker, *supra* note 23.

39. NIVOLA & CRANDALL, *supra* note 16, at 27-32.

40. In the United States, CAFE standards required automakers to sell "passenger" vehicles that averaged 27.5 miles per gallon, and "light-duty trucks" that averaged 20.5 miles per gallon. Light Truck Average Fuel Economy Standards, Model Years 2005-2007, 49 C.F.R. § 553 (2004), *available at* http://www.nhtsa.dot.gov/cars/rules/rulings/CAFE05-07/Index.html. These standards were revised upward under the Energy Independence and Security Act of 2007, Pub. L. No. 110-140 (2007). Sport utility vehicles, which are much less fuel-efficient, are classified as "light-duty trucks," placing them into a pool of vehicles that are subject to a much

In fact, to the extent that CAFE standards make cars more efficient, it reduces the demand for gasoline and creates a "rebound effect" that lowers gasoline prices and stimulates driving.[42] This is one reason that a fleet of much more efficient vehicles is consuming as much or more gasoline than a generation ago.

In the final analysis, CAFE standards represent an attractive but ultimately ineffective means of reducing gasoline usage. People have been duped into equating "fuel efficiency" with reduced consumption—an illusory link. CAFE standards do not *hurt* in terms of gasoline usage, but they have been swamped by rising income and are far less effective than gasoline taxes in reducing consumption. Costs absorbed by automakers, some of which are passed on to consumers in the form of price distortions, are hidden from view to all but the most curious transportation or economic wonks, but they far outweigh the costs from a gasoline tax increase.[43] Further, as an administrative matter, a gasoline tax increase builds on an existing collection and enforcement mechanism because it is already routinely collected at the pump. Why, in the face of so much support from economists, and so much policy analysis showing the superiority of taxing instruments, is the gasoline tax such a political piñata?

III. TAX ECONOMICS AND PSYCHOLOGY

Swedish economists Henrik Hammar, Asa Lofgren, and Thomas Sterner have proposed a political economy theory of why, in high-consumption countries such as the United States and Canada, gasoline taxes are so virulently opposed by the general public. Whereas most economic modeling has focused on the effect that gasoline prices have on consumption, Hammar et al. have explored the possibility that the causality also goes in the other direction. Insofar as high levels of gasoline consumption have created some inelastic conditions, such as sprawling cities and large stocks of gas-guzzling vehicles, it could be that as a political economy matter, voters feel trapped in a high-consumption economy, and rationally favor politicians who support lower gasoline prices.[44] While economists who study environmental economics can readily see the society-wide costs of pollution from transportation, the

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less stringent standard. National Highway Transportation and Safety Administration, CAFE, Overview-Frequently Asked Questions, http://www.nhtsa.dot.gov/cars/rules/cafe/overview.htm.

41. NIVOLA & CRANDALL, *supra* note 16, at 15 fig.1-7.

42. *See* Kenneth A. Small & Kurt Van Dender, *Fuel Efficiency and Motor Vehicle Travel: The Declining Rebound Effect*, 28 ENERGY J. 25 (2007); *see also* NIVOLA & CRANDALL, *supra* note 16, at 22-42.

43. *See, e.g.*, Terry Dinan & David Austin, *Fuel Economy Standards vs. a Gasoline Tax*, CONG. BUDGET OFFICE, ECON. & BUDGET ISSUE BRIEF, Mar. 9, 2004, at 1, *available at* http://www.cbo.gov/ftpdocs/51xx/doc5159/03-09-CAFEbrief.pdf.

44. *See* Henrik Hammar et al., *Political Economy Obstacles to Fuel Taxation*, 25 ENERGY J. 1 (2004).

economics of the individual driver is such that they can only readily see the costs of reducing transportation emissions. The average voter's keen perception of the costs of gasoline taxes and poor perception of environmental benefits creates a classic political economy cleave between a rationally disinterested majority and intensely interested industry groups determined to minimize any obstacles to gasoline consumption.[45]

Hammar et al.'s work aside, however, the yawning divide between economists and almost everyone else on the subject of gasoline taxes strongly suggests that economists do not have all of the answers when it comes to how people view the desirability of taxation. Cognitive psychology, including the so-called behavioral economics field, has dramatically changed how social scientists view and model human decision-making. Beginning with Herbert Simon's pioneering work on bounded rationality,[46] cognitive psychologists have discovered a myriad of systemic and consistent deviations from rational economic behavior. Several areas of study in cognitive psychology bear on the problem of how people view proposals to increase gasoline taxes, but in essence, all of these areas attempt to explain how the individual process of *framing* problems biases decisions in ways that traditional economics cannot explain.

The endowment effect, for example, refers to a person's reluctance to part with objects within her possession, relative to that person's willingness to obtain the same objects not in her possession.[47] Whereas traditional neoclassical economics would assume that a particular object has a certain single objective value to an individual, the endowment effect suggests that the valuation is different depending upon whether the individual has possession over the object or not.[48] Experimental simulations that actually give survey respondent items, thereby "endowing" them with those items, have provided strong evidence of the existence of this effect for a wide variety of goods.[49] One can easily see how the endowment effect would explain some resistance to hypothesized gasoline tax increases; the proposal essentially proposes a trade: pay more for gasoline, and get back some environmental or energy

45. George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3, 10-13 (1971).

46. Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q.J. ECON. 99 (1955).

47. Edward J. McCaffery & Jonathan Baron, *Thinking About Tax*, 12 PSYCHOL. PUB. POL'Y & L. 106, 108 (2006); Amos Tversky & Daniel Kahneman, *The Framing of Decisions and the Psychology of Choice*, 211 SCIENCE 453 (1981).

48. Richard Thaler, *Toward a Positive Theory of Consumer Choice*, 1 J. Ecn. Behavior & Org. 39, 44-47 (1980); Daniel Kahneman, Jack L. Knetsch, & Richard H. Thaler, *The Endowment Effect, Loss Aversion, and the Status Quo Bias*, 5 J. of Ecn. Perspectives 193, 194-97 (1991).

49. For a review of various experiments in this area, see John K. Horowitz & Kenneth E. McConnell, *A Review of WTA/WTP Studies*, 44 J. ENVTL. ECON. & MGMT. 426 (2002); Daniel Kahneman & Amos Tversky, *Choices, Values, and Frames*, 39 AM. PSYCHOL. 341, 348 (1984).

security benefits. Even if these were comparable commodities of equal certainty, the endowment effect would tilt people against such a trade.

As noted above, one of the persistent concerns with the gasoline tax has to do with its purportedly regressive nature. This is a myth, one that is reinforced by the "Do no harm effect"—an aversion to causing harm, to the point that people would prefer a greater harm to occur by omission.[50] For example, one study told respondents that a flu epidemic would kill 10 children out of 10,000, and that a vaccine that could prevent the flu, but that the vaccine could kill some children.[51] When asked what was the maximum tolerable death rate for the vaccine, respondents typically stated a number lower than nine, which would represent a just barely-better-than-even trade-off.[52] Respondents clearly preferred to allow a greater number of children die from the flu rather than take affirmative chances with the vaccination.[53] Although a gasoline tax does not force people to envision dead children, there is still a clear popular perception that real, identifiable individuals would be harmed by the higher prices. The "Do no harm effect" reinforces the myth of gasoline tax regressivity and makes the inferior alternative—CAFE standards—appear to be much more attractive as a policy matter.

Finally, the "metric effect" is a propensity for respondents to perceive quantities expressed in percentage terms differently than those expressed in absolute dollar amounts.[54] In a study of income tax progressivity, for example, respondents were generally favorably inclined towards the idea of progressivity, but when asked to provide their numerical conceptions of what they considered an appropriate level of progressivity, respondents displayed strong and persistent internal (within-subject) inconsistencies.[55] Respondents seemed to favor more steeply progressive tax rates when asked to provide them in percentage terms rather than absolute dollar terms.[56] In other words, respondents confuse percentages with absolute amounts, with the result that small percentages of large amounts seem smaller than they should.

The "metric effect" has indirectly hurt the popularity of gasoline taxes because of the way it is presented and, either explicitly or implicitly, juxtaposed with alternatives. Gasoline taxes are always expressed in absolute terms, as a cents-per-liter or cents-per-gallon quantity in Canada or the United States. By contrast, most sales taxes—the transportation financing alternative to gas

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50. Jonathan Baron, *Heuristics and Biases in Equity Judgments: A Utilitarian Approach*, *in* PSYCHOLOGICAL PERSPECTIVES ON JUSTICE: THEORY AND APPLICATIONS 109 (Barbara A. Mellers & Jonathan Baron, eds., 1993).

51. Ilana Ritov & Jonathan Baron, *Reluctance to Vaccinate: Omission Bias and Ambiguity*, 3 J. BEHAV. DECISION MAKING 263, 267-71, 275 (1990).

52. *Id.*

53. *Id.*

54. McCaffery & Baron, *supra* note 47, at 113-14.

55. *Id.*

56. *Id.*

taxes[57]—are always presented in percentage terms because so many different goods are covered by sales taxes. If compared with one another, gas taxes present themselves as a very clear cost that people are able to calculate, whereas sales tax increases present themselves as seemingly small and benign increases.[58] The "metric effect" thus biases respondents toward the more apparently benign sales tax. Even when not faced with such an explicit choice, such as on a ballot, the implicit, built-in metric bias tilts the entire general populace towards taxes that they can less easily calculate and comprehend.

In general, given the importance and prevalence of motor vehicle use for most people, the idea of paying more for gasoline presents itself very clearly as a certain loss. The periodic routine of filling up at the gas station is so familiar that virtually everyone knows how much they spend at the pump and how often they spend it. When a gasoline tax is proposed or discussed, it is a manageable calculation for even the most innumerate driver to figure out the rough magnitude of their increased gasoline bill. The economic virtue and the political downfall of the gasoline tax is that it is the most transparent of all taxes.

IV. EMPIRICAL ANALYSIS

Understanding public perceptions of gasoline taxes clearly requires empirical analysis. The aim of this article is to contribute to a greater understanding of these perceptions through the use of a mass survey instrument designed to analyze public attitudes towards gasoline taxes. In particular, some understanding of the cognitive gaps that may exist when considering gasoline taxes would seem to be helpful in understanding the broad-based opposition to higher gasoline taxes.

Of the many framing issues that might implicate the popularity of a gasoline tax increase, the one that seems most susceptible of the simple empirical testing through mass survey instruments is the "metric effect." It would be difficult, for example, to create a tight reconstruction of two situations in which one scenario tangibly harms people and another does not, so as to test the "Do no harm effect." And testing for the endowment effect would be impossible without providing survey respondents with a real and substantial gasoline-based "endowment," something that would be prohibitively expensive. To test the "metric effect," however, we posit to the survey respondents that although they may pay more for gasoline, they will receive money back in the form of tax reductions. Testing the "metric effect" can be

57. Robert Hannay & Martin Wachs, *Factors Influencing Support for Local Transportation Sales Tax Measures*, 34 TRANSP. 17, 18 (2007); Wachs, *supra* note 20, at 4-5.

58. Hannay and Wachs, *supra* note 57, at 19.

accomplished by varying how clearly respondents understand the magnitude of the hypothesized tax reductions.

This test of the "metric effect" requires a hypothesized tax reduction as a *quid pro quo* of the gasoline tax increase. This concept, often referred to as "revenue recycling," has been gaining favor slowly for a long time in some public policy circles.[59] Revenue recycling is an important policy tool and has been extensively analyzed in terms of formal economic results,[60] but empirical testing of its public acceptance is lacking.[61] Most empirical studies of how people view revenue recycling proposals have been in the context of road congestion policies.[62] This article presents some results from a test of public acceptance when applied to gasoline tax proceeds.

One unexpected hypothesis arose from debriefings that were conducted in pre-tests. In some cases, there was surprisingly little enthusiasm for revenue recycling of gasoline tax proceeds. Some post-hoc discussions with respondents revealed that they seemed particularly enamored with technological fixes to pollution and climate change problems. This aspect was, therefore, made into a variant to test the hypothesis that people are more willing to support technological initiatives than measures to reduce pollution by curbing driving. This would be consistent with earlier studies finding that respondents were much less supportive of measures that they perceived as "coercive," or designed to alter their behavior than measures that were

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59. Winston Harrington, Alan J. Krupnick, & Anna Alberni, *Overcoming Public Aversion to Congestion Pricing*, 35 TRANSP. RES. PART A 87, 89 (2001) [hereinafter *Overcoming Public Aversion*]; Ian Parry, *Revenue Recycling and the Costs of Reducing Carbon Emissions*, RESOURCES FOR THE FUTURE, CLIMATE ISSUES BRIEF NO. 2, June 1997, at 3, *available at* http://www.rff.org/rff/documents /rff-ccib-02.pdf; Ian W.H. Parry & Antonio Bento, *Revenue Recycling and the Welfare Effects of Road Pricing* 17 (Resources for the Future, Discussion Paper No. 99-45, 1999), *available at* http://www.rff.org/Documents/RFF-DP-99-45.pdf; Govinda R. Timilsina, *The Role of Revenue Recycling Schemes in Environmental Tax Selection: A General Equilibrium Analysis* 33 (The World Bank Dev. Res. Group, Sustainable Rural & Urban Dev. Team, Pol'y Res., Working Paper No. 4388, 2007), *available at* http://papers.ssrn.com/sol3 /papers.cfm?abstract_id=1069478.

60. *See, e.g.*, A. Lans Bovenberg & Lawrence H. Goulder, *Optimal Environmental Taxation in the Presence of Other Taxes: General-Equilibrium Analyses*, 86 AM. ECON. REV. 985, 985-86 (1996); Lawrence H. Goulder, *Effects of Carbon Taxes in an Economy With Prior Tax Distortions: An Intertemporal General Equilibrium Analysis*, 29 J. ENVTL. ECON. & MGMT. 271, 275-79 (1995); *See also* Goulder, Parry & Burtraw, *supra* note 3; William D. Nordhaus & Joseph Boyer, WARMING THE WORLD: ECONOMIC MODELS OF GLOBAL WARMING 1-6 (2000); West & Williams, *supra* note 37.

61. One of the relatively rare empirical studies surveys Southern Californians and asks them about their willingness to replace their vehicle and inspection maintenance program with a system of what are essentially pollution fees that are based upon the emissions rate of vehicles, and multiplied by the annual vehicle miles traveled. Alan Krupnick, Winston Harrington & Anna Alberini, *Public Support for Pollution Fee Policies for Motor Vehicles with Revenue Recycling: Survey Results*, 31 REG'L SCI. & URB. ECON. 505 (2001) [hereinafter *Public Support*].

62. *See, e.g.*, *Overcoming Public Aversion*, *supra* note 59; *but see Public Support*, *supra* note 61.

perceived as problem-solving.[63] This may explain the popularity of CAFE standards over a gasoline tax.[64]

Several possible alternative framings of gasoline tax questions were used to test the following hypotheses:

1. Gasoline taxes are more acceptable if packaged with a revenue recycling scheme.

The public generally does not support taxes or fees when revenues are allocated to general public funds.[65] Any hypothesized benefits such as improved environmental quality is speculative and uncertain enough that they are not viewed on par with the certain and obvious loss suffered at the gasoline pump. For most drivers, an increase in gasoline taxes, causing an increase in gasoline prices, triggers psychological reactions that draw from the endowment effect, exciting in them a desire to protect what they view as their baseline wealth. For tax or fee measures, some form of revenue recycling would be a way of negating the obvious loss that befalls drivers, which one would expect would increase public acceptability.[66] This is hereinafter referred to as the "Revenue Recycling Hypothesis."

2. A gasoline tax is more acceptable if the revenues are devoted to technological solutions to environmental problems.

Revenue recycling may mollify some opponents of a gasoline tax, but some studies have indicated that people are also more willing to pay higher taxes if it will lead to some technological solution to environmental problems. This is hereinafter referred to as the "Technological Earmark Hypothesis."

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63. Cecilia Jakobsson, Satoshi Fujii & Tommy Gärling, *Determinants of Private Car Users' Acceptance of Road Pricing*, 7 TRANSP. POL'Y 153 (2000).

64. The New York Times/CBS survey, *supra* note 21, contained a question that asked, "In order to cut down on energy consumption and reduce global-warming, which would you prefer—requiring car manufacturers to produce cars that are more energy efficient OR imposing an increased federal tax on gasoline?" 87% said they preferred "More energy efficient cars," while only 80% said they favored a federal tax on gasoline. *Id.*

65. ACCEPTABILITY OF TRANSPORT PRICING STRATEGIES (Jens Schade & Bernhard Schlag eds., 2003); Geertje Schuitema & Linda Steg, *Effects of Revenue Use and Perceived Effectiveness on Acceptability of Transport Pricing Strategies*, Presented at 45th Congress of the European Regional Science Association, Free University, Amsterdam (Aug. 2005), *available at* http://ideas.repec.org/p/wiw/wiwrsa/ersa05p719.html, at 10-14; Linda Steg et al., *Why are Energy Policies Acceptable and Effective?*, 38 ENV'T & BEHAV. 92 (2006).

66. *Overcoming Public Aversion*, *supra* note 59, at 87-89; Peter Jones, *Gaining Public Support for Road Pricing Through a Package Approach*, 32 TRAFFIC ENGINEERING & CONTROL 194-95 (1991); *Public Support*, *supra* note 61, at 505; GLENN LYONS ET AL., ATTITUDES TO ROAD PRICING – ASSESSING THE EVIDENCE BASE (2004), *available at* http://www.dft.gov.uk/psr/roads/introroads/roadcongestion/feasibilitystudy/supplementary/evidencereview.doc.

3. Alternatives to gasoline taxes are less acceptable if expressed in absolute dollar terms rather than in percentage terms.

The "metric effect" causes people to perceive changes expressed in percentage terms differently from those expressed in absolute dollars.[67] Alternative revenue-raising mechanisms to the gasoline tax include sales taxes and income taxes, which are often expressed in percentage terms, while gasoline prices are expressed in dollars and cents. Moreover, changes to sales and income taxes are usually expressed in percentage terms, while changes to gasoline prices are expressed in dollars and cents. We test the hypothesis that respondents will find revenue recycling more attractive when some information is provided to the respondent about how much money, in dollars, the sales tax and income tax rebates are likely to be. In other words, revenue recycling will appear more attractive if people actually understand how much money they will recoup. This is hereinafter referred to as the "Metric Effect Hypothesis."

A survey was conducted in the Greater Vancouver area by randomly approaching individuals in public places and asking them to complete a questionnaire. Respondents were told the questionnaire would take about five minutes, and that they would receive two dollars for participating in the survey.[68] We chose popular public gathering places, ones that are accessed by walking, driving, biking, and public transportation. 797 samples were obtained over a four-week period.

The survey began with three central questions about respondents' willingness to support a large gasoline tax increase of 50 cents per litre:

1. to "reduce motor vehicle pollution by reducing driving;"
2. if coupled with a 17 % reduction in income taxes; and
3. if coupled with a reduction in the GST from 6% to 3%.

Responses were coded on a four-point scale, varying from "Strongly Oppose" to "Strongly Favor." The three basic questions were varied in the way they were asked. In general, we expected to find some greater support for the gasoline tax in questions 2 and 3 than in question 1, which would support the Revenue Recycling Hypothesis. We also varied the questions to test the other two hypotheses.

To test the Technological Earmark Hypothesis, we varied question 1 by asking respondents if they support a 50-cent gasoline tax to fund "research projects to reduce pollution from motor vehicles, such as developing hybrid electric vehicle technology, hydrogen fuel cell technology, or alternative fuel sources." Questions 2 and 3 remained the same.

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67. McCaffery & Baron, *supra* note 47, at 113-14.

68. Consistent with behavioral ethical guidelines, however, respondents were told that they would receive the two dollars even if they did not complete the survey.

Also, holding question 1 constant, we varied questions 2 and 3 so that additional information was provided to give the respondent some information about the rough magnitude of the tax reduction benefit that was involved. Therefore, we also posed question 2 with the additional statement that the "average Canadian household paid about $12,000 in income taxes last year, and would pay about $2,000 less per year," and posed question 3 with the additional statement that the "average household paid about $4,000 in GST last year, and would pay about $2,000 less per year."[69] These variants test the Metric Effect Hypothesis.

Testing for the revenue recycling hypothesis was thus within-subject, and testing for the other two hypotheses were between-subject and across samples. A small number of surveys were discarded for irreparable reasons, such as failing to answer the basic questions of whether they supported the gasoline tax scenarios.

Alternative explanations of public attitudes towards higher gasoline taxes may be, as Hammar et al. suggests, more economic or demographic in nature. The survey instrument thus collected information on the respondent's age, gender, level of education, household income, and the first three characters of their postal code, which was converted into a dummy variable indicating whether or not they lived in Vancouver, North Vancouver, or West Vancouver, those localities where we found the greatest support for a gasoline tax. We also collected information about the respondent's vehicle (or if they did not have one), number of kilometers driven each year, whether they used their vehicle to commute to work, and the days and distances commuted. Dummy variables were used to represent whether the respondents had an SUV, a van, or had no vehicle at all. We also constructed a variable for the respondents' weekly commute (distance of commute times and days commuting), and dummy variables that sought to capture those respondents that had a "long" commute (over 25, 30, or 50 kilometres per week). Table 1 presents some descriptive statistics below. In general, the sampled population was slightly more affluent, had higher levels of education, drove slightly less and was more likely to have no vehicle at all than the general population in British Columbia.

69. GST and income tax figures and the number of households were derived from STATISTICS CANADA, PROFILE OF CANADIAN FAMILIES AND HOUSEHOLDS: DIVERSIFICATION CONTINUES (2002), *available at* http://www12.statcan.ca/english/census01/products/analytic/companion/fam/contents.cfm.

TABLE 1.

Kilometres Per Year Driven	Percent	Highest Education Level	Percent
less than 5000	39	less than high school	2
5000 to 15000	26	High school/GED	15
15000 to 25000	17	some university	28
25000 to 35000	7	graduated university	41
over 35000	6	post-graduate degree	15
Type of Vehicle for Primary Use	**Percent**	**Annual Household Income**	**Percent**
Car	50	less than $20,000	17
Truck	5	$20,000 to $40,000	20
SUV	8	$40,000 to $60,000	18
van/minivan	5	$60,000 to $80,000	14
Other	2	$80,000 to $100,000	9
no car	30	$100,000 to $120,000	6
		more than $120,000	14
Means of Commute	**Percent**		
Driving	49		
Non-driving	49		

The survey instrument also asked respondents if they believed the government would actually deliver on a revenue recycling promise. If not, one might expect respondents to behave as if revenue recycling was not a benefit at all. In fact, more than one-third of respondents expressed some skepticism that a revenue recycling program would actually result in the recycling of revenues. In pre-test debriefings, respondents expressed a belief that the proceeds of a gasoline tax increase would get placed into the general treasury, and that accounting tricks would be employed to use the funds for general purposes instead of reducing income taxes or the GST. Oddly enough, there was only a slight correlation between skepticism and the willingness to support the gasoline tax increase in any form.

V. RESULTS

All of the hypotheses were tested using difference in means tests. As the response data is most conservatively characterized only as ordinal data and not necessarily cardinal, a difference in means test might be suspect; thus, in all cases, supplementary tests were conducted. For the within-subject testing of the revenue recycling hypothesis, Wilcoxon Matched Pairs tests were also

conducted. For the between-subject testing of the other hypotheses, we also constructed ordered probit models, utilizing a sample dummy variable to conduct a z-test test for the effect of variation around the hypothesis. Also for between-subject testing, we used Mann-Whitney U-tests. In all cases, the supplementary tests—the Wilcoxon Matched Pairs, the Mann-Whitney U-tests, and z-tests—yielded results that were almost identical to those obtained by difference in means tests.

A. Revenue Recycling Hypothesis

We tested the revenue recycling hypothesis across all four samples combined and each of the samples separately. In each case, the revenue recycling hypothesis was tested with the income tax reduction and GST reduction separately, as the results were sometimes different. The results of the tests for the combined samples, however, are representative of the overall results and are reported in Tables 2 (income tax) and 3 (GST) below.

TABLE 2. Gas Tax Increase vs. Gas Tax Increase With Income Tax Reduction, All Samples

	Gas Tax Increase Alone	Income Tax Reduction
N	797	797
Mean	2.277	2.650
t-stat	-7.138	

TABLE 3. Gas Tax Increase vs. Gas Tax Increase With GST Reduction, All Samples

	Gas Tax Increase Alone	GST Reduction
N	797	797
Mean	2.277	2.452
t-stat	-3.343	

These results present some reasonable evidence for the revenue recycling hypothesis, which is consistent with other revenue recycling tests.[70] It is particularly noteworthy that respondents were slightly in favor of the gas tax increase and income tax reduction package, the mean response being greater than the midway point of 2.50. Given the hostility towards gasoline taxes, this was a significant result.

It was also notable that enthusiasm for a GST reduction was weaker than for an income tax reduction. Also, testing among subsamples showed that enthusiasm for revenue recycling was muted when the counterfactual was an

70. NY Times/CBS Poll, s*upra* note 21.

earmark of gasoline tax proceeds for technological research, meaning that respondents seem to have an enthusiasm for earmarking tax proceeds in that manner. Overall, however, the revenue recycling effect was fairly robust and significant. This is not a surprising result. All other things being equal, one would expect respondents to find revenue recycling more attractive than the alternative—losing the money outright. However, the variations in this data and results were interesting and are discussed below.

B. Technological Earmark Hypothesis

Given our pre-test experiences with hypothesizing an earmark of gasoline tax proceeds to fund technological research, we tested to see whether support for the 50 cent-per-litre gasoline tax increase, by itself, with no revenue recycling, varied with whether or not we hypothesized the earmark. To formally test the Technological Earmark Hypothesis, we tested for a difference in responses to question 1 in two subsamples. In one subsample we asked respondents if they would support a gasoline tax increase "to reduce motor vehicle pollution by reducing driving." In the other subsamples we asked if they would support a gasoline tax increase "to fund research projects to reduce pollution from motor vehicles, such as developing hybrid electric vehicle technology, hydrogen fuel cell technology, or alternative fuel sources." Table 4 shows the results.

TABLE 4. Technological Earmark Hypothesis

	No Earmark	Technology Earmark
N	400	397
Mean	2.16	2.40
t-stat	-3.29	

Consistent with our suspicions regarding the attractiveness of offering a technological research program, respondents were more willing to pay an increase gasoline tax if the proceeds would be earmarked for government funding of technological research. This is also consistent with earlier findings that "push" measures that are viewed as being "coercive" or behavior-changing are considerably less popular than "pull" measures that were perceived as problem-solving.[71]

71. Louise Eriksson, Jörgen Garvill & Annika M. Nordlund, *Acceptability of Travel Demand Management Measures: The Importance of Problem Awareness, Personal Norm, Freedom, and Fairness*, 26 J. ENVTL. PSYCHOL. 15, 23 (2006); Olaf Hölzer, *Which Role Does the Objective Play?, Empirical Findings from Germany*, *in* ACCEPTABILITY OF TRANSPORT PRICING STRATEGIES 219, 219-33 (Jens Schade & Bernhard Schlag eds., 2003); Rienstra et al., *supra* note 17 at 188; Jens Schade, *European Research Results on Transport Pricing Acceptability*, *in* ACCEPTABILITY OF TRANSPORT PRICING STRATEGIES 109, 110 (Jens Schade & Bernhard Schlag eds., 2003); Linda Steg, *Factors Influencing the Acceptability and Effectiveness of Transport Pricing*, *in* ACCEPTABILITY OF TRANSPORT PRICING STRATEGIES 187, 190 (Jens Schade & Bernhard Schlag eds., 2003); Linda Steg et al., *supra* note 65 at 94-96; Linda Steg & Charles Vlek, *The Role of Problem Awareness in*

Comments in the pre-testing stage seemed to be particularly on point in that they evinced a preference for technological solutions over behavioral solutions. Respondents seemed to indicate that they would rather believe that there is some technological "magic bullet" that solves the vehicle emissions problem, rather than have to deal with the fact that less driving is required. These results, coupled with the New York Times/CBS poll result indicating that respondents overwhelmingly favored forcing auto manufacturers to produce more efficient vehicles over raising gasoline taxes,[72] seem to indicate that people desperately hope for a technological solution, sparing them from having to make behavioral changes such as driving less.

C. Metric Effect Hypothesis

As noted above, questions 2 and 3 were varied pertaining to revenue recycling in the form of income tax reduction and GST reduction, respectively, and contained additional information about the magnitude of the reductions. In one subsample, question 2 contained the additional information that "the average Canadian household paid about $12,000 in income taxes last year, and would pay about $2,000 less under this proposal." Question 3 in the same subsample contained additional information that "the average Canadian household paid about $4,000 in GST last year, and would pay about $2,000 less under this proposal." The idea was to test whether people actually had any idea of what a 17% income tax reduction meant, or what a 3% GST reduction meant. The results are shown in Tables 5 and 6 below.

TABLE 5. Gas Tax Increase With Income Tax Reduction

	No Additional Information	Additional Information
N	202	195
Mean	2.520	2.590
t-stat	-0.665	

TABLE 6. Gas Tax Increase With GST Reduction

	No Additional Information	Additional Information
N	202	195
Mean	2.248	2.549
t-stat	-2.903	

It is interesting that there is a statistically significant metric effect with respect to the GST reduction, but no difference at all with respect to the

Willingness-to-Change Car Use and in Evaluating Relevant Policy Measures, *in* TRAFFIC AND TRANSPORT PSYCHOLOGY: THEORY AND APPLICATION 465-75 (Talib Rothengatter & Enrique Carbonell Vaya eds., 1997).

72. New York Times/CBS Poll, *supra* note 21.

income tax reduction. This is some evidence of the metric effect, especially because the level of support for the gasoline tax increase with revenue recycling is consistent across both samples (approximately 2.5), and only significantly lower in one subsample and for question 3 (approximately 2.40). But why is there no metric effect with respect to income tax? The most likely explanation is that respondents can do the mental calculation in their minds as to how much a 17% income tax reduction amounts to as they remember how much they paid in income taxes, but do not know how much money they pay in GST every year. Respondents might *understand* that a 17% income tax reduction is a significant amount of money, but do not comprehend the magnitude of a 3% GST tax reduction.

Better support for this hypothesis might require some follow-up to verify that, indeed, people are generally more able to recite their income tax payments than their GST payments. But because the only difference between the two subsample formats is the additional metric information—essentially converting a percentage figure into a hard number—it is difficult to attribute the difference in attitudes towards revenue recycling to anything other than a metric effect.

VI. DETERMINANTS OF WILLINGNESS TO SUPPORT A GASOLINE TAX INCREASE

In addition to testing these non-economic hypotheses, ordered probit models were developed for the purpose of finding some economic or demographic determinants of when individuals are willing to support an increase in gasoline taxes. Ordered probit models were estimated for when the gasoline tax is: (i) proposed alone, (ii) proposed with an income tax reduction, and (iii) proposed with a GST reduction. These three models are set forth from left to right in Table 7 below.

TABLE 7. Determinants of Willingness to Pay Increased Gasoline Tax			
	Q1	**Q2**	**Q3**
N	755	759	758
Variable	**Z**	**Z**	**Z**
Proceeds Used to Fund Tech Research	3.87		
Quant Information Provided With Tax Reduction			1.47
Commuter	-4.76		
Weekly Commuting Distance		2.28	3.64
Drives Minivan			-2.04
Does Not Own Car	2.22	4.06	3.65
Level of Education (1 through 6)	3.74	1.95	
Gender (1=female)			2.59
Household Income Level (1 through 7)		3.71	1.57
Vancouver, N. Van., W. Van. Resident	2.07		

The first model (Q1) does the best job of explaining the determinants of respondent willingness to support a gasoline tax, when not coupled with either the income tax or GST reduction. Most prominently, respondents seemed much more willing to pay an increased gasoline tax when the proceeds would be used to fund technological research. The strong statistical significance of this factor is as great as any variable, save the dummy variable indicating that the respondent is a driving commuter.

The other behavioral hypothesis, the metric effect, did not appear to be statistically significant when the subsample dummy was regressed with a number of other variables. This seems to indicate that the metric effect is a fairly weak one, at least in comparison with other factors more economic or demographic in nature.

Not surprisingly, respondents that drove to work were very strongly opposed to any gasoline tax increase. This is not surprising, as for these commuters, a tax reduction would probably not compensate them completely for the loss accruing from higher gasoline prices. For these people, also, the

salience and clarity of the price of gasoline is more likely to overwhelm other considerations and possibly prevent them from even considering the revenue recycling. On the other hand, those that did not own a car were more willing to pay a higher gasoline tax. This is also not surprising, since a gasoline tax increase would be nearly costless to them, and revenue recycling would represent an almost complete windfall to them.

In other studies, household income has not typically been a strong explanatory variable, but we should not be surprised that it was a strong determinant in Model Q2, the gasoline tax increase coupled with an income tax decrease. Because the income tax decrease was stipulated to be 17% straight across the board, those with higher incomes would benefit more than those with lower incomes. The revenue recycling would thus be a greater benefit for those with above-average incomes, and clearly attracts more support from that demographic.

A very interesting result was the strong statistical significance of the minivan dummy variable in Model Q3, the gasoline tax increase coupled with a GST reduction. Strangely enough, the minivan dummy variable was not significant for any other model in this study. Those respondents that drove minivans as their primary vehicle in this study (approximately 5% of respondents) were much *less* likely to support a gasoline tax increase coupled with a GST reduction. A possible explanation for this is that those with minivans typically have young children. Drivers with young children often have less disposable income, or perhaps engage in less discretionary spending, and would benefit very little from a GST break. However, drivers with young children also find it difficult to transport their children without driving, so their demand for gasoline is less elastic than for the general population. The proposal put forth by question 3 thus presents a double burden for families with young children. More research into this question would be required before a conclusion could be drawn.

VII. CONCLUSION

Several interesting non-obvious points seem to emerge from this study. First, a very strong theme throughout the results was the appeal of funding technological research, supporting our Technological Earmark Hypothesis. This points to the possibility that one reason for the historical lack of support for a gasoline tax is a strong and unrealistic desire that technological solutions will achieve the necessary environmental improvements without requiring any behavioral modifications. This would help explain the dominance of CAFE type regulation over gasoline taxes. The problem is, of course, that as a matter of environmental policy, behavioral modifications will actually be necessary to reduce greenhouse gas emissions from motor vehicles. Moreover, motor vehicles generate many types of externalities, not just ones that can be fixed by efficiency standards or tailpipe emission improvements. The problem is exacerbated by the historical success that automakers have had in reducing

tailpipe emissions *rates*. As discussed above, this has led to very little emissions reduction by motor vehicles because of the greater volume of motor vehicles and because of a steady increase in vehicle miles traveled. A gasoline tax proponent would thus have to fight a second front in raising awareness of the other problems with excessive motor vehicle use that cannot be fixed by technological means.

Second, another strong theme throughout all the models is the strong effect of a respondent being a driving commuter. The commuter dummy variable came through as significant in almost every model. In other models, the weekly commuting distance came through as more significant, but if the weekly commuting distance was replaced by the commuter dummy variable, it too, would have been significant. Clearly, the issue of gasoline prices is considerably more salient to commuters than non-commuters. Conversely, the group of people most predictably supportive of higher gasoline taxes was the group of respondents that did not own a motor vehicle. This makes sense, because a gasoline tax increase would affect these people very little and revenue recycling would be a windfall for them. The prevalence of these effects seems to lend support to the Hammar et al. findings because they suggest an economic motivation for opposition to gasoline tax increases. An important policy implication is that if a jurisdiction could actually get people out of their cars and turn commuters from drivers to public transit riders or bicyclists, it could change the political dynamics of gasoline taxes, in keeping with the political economy findings of Hammar et al.

Thirdly, demographics matter. Certainly, household income was an unsurprisingly strong determinant of the willingness to support gasoline tax increases coupled with income tax reductions. However, age, gender, level of education, and residence in some of the "greenest" jurisdictions—Vancouver, North Vancouver, or West Vancouver—matter for reasons that this study does not explain. Perhaps public transportation in these jurisdictions is better than those of the suburbs and outlying areas of Vancouver. This is left to future research.

Finally, the results provide some fairly weak evidence of the metric effect. The difference in results from the two formats was clear: respondents were somewhat more receptive to the GST reduction as a sweetener when they were given the additional information that "the average Canadian household paid about $4,000 in GST last year, and would pay about $2,000 less under this proposal." While some households obviously spent more and some spent less, the information provided respondents with an order of magnitude reference which helped to impress upon them the size of a 3% GST cut. When compared with some of the other, more economic factors described above, however, this metric adjustment had a relatively weak effect.

An important caveat for all of these results is that respondents showed great skepticism and distrust of government. Respondents were asked if they

believed that the government would follow through with a plan to redistribute gasoline tax proceeds by reducing income taxes or GST, and almost one-third indicated that they did not. Clearly, the Canadian government (and most other federal governments) has credibility problems that would hinder its ability to sweeten a gasoline tax increase with revenue recycling should it choose to do so.

A gasoline tax is a highly effective and desirable way of reducing motor vehicle emissions, most prominently carbon dioxide emissions. The lack of support in any political stakeholder group has been puzzling. This study provides some clues as to why gasoline taxes have been so unpopular, and provides some guidance as to what might overcome opposition. Part of the answer begs for solutions well within the reach of policymakers: revenue recycling, and an information strategy that makes clear the magnitude of recycled revenues. Another part of the answer is more structural and more difficult: following Hammar, et al., a different population must be constructed. The results of this study seem to suggest that behavioral modifications may have positive feedback effects in that non-drivers beget support for non-driving policies. If the slow and politically painful process of getting people out of their cars can be successful, then there is hope that a new political economy can emerge, one that is less hostile to energy conservation and emissions reduction measures.

This political economy story could as well be true of carbon taxes generally; the political economy of carbon taxation is to some extent structural in that much greenhouse gas-emitting capital, in the form of coal-fired power plants, is threatened by the imposition of carbon taxes. Changing the political economy of carbon taxation may require the slow and painful process of shunting certain greenhouse gas-emitting sectors down other emissions paths. In the general greenhouse gas context as well, then, the process of reducing greenhouse gas emissions may have a nakedly political component that is aimed at changing the political dynamics of greenhouse gas emissions.