USING THE PRINCIPLES OF TAX SALIENCE TO DESIGN A NATIONAL CARBON TAX

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I. Introduction

As concern grows over carbon dioxide’s contribution to climate change, advocates suggest that a carbon tax could help address global warming apprehensions. The carbon tax is a type of tax that is specifically designed to affect behaviors in an economy. Under traditional economic theory, when a tax is introduced into the market, buyers and sellers fully account for the cost imposed by the tax by reducing supply and demand. However, some tax policy scholars, particularly in the field of tax salience, challenge the view that market actors are perfectly rational. Contrary to theory, buyers and sellers do not efficiently account tax costs.

This Comment addresses the question of tax salience: how the design of a tax can alter individuals’ and firms’ behavior to achieve some policy goal. This analysis offers recommendations for policymakers in designing a salient carbon tax on individuals and for profit-seeking firms. Part II discusses market externalities generally and how a carbon tax can address the problem of carbon emissions as an externality. Part III analyzes the proposals for carbon tax designs, explains why a focus on individual and firm taxpayer is superior to supply-chain focus, and addresses the underlying issues policymakers will face when trying to design a salient carbon tax for individuals and firms. Part IV proposes a carbon tax design for policymakers in constructing a salient carbon tax for individuals as the statutory taxpayers of a carbon tax. Part V offers a carbon tax design for policymakers in designing a salient carbon tax for firms as the statutory taxpayers of a carbon tax. Part VI concludes this analysis’s findings and proposals. This Comment is not advocating for a carbon tax or for

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1 See generally Noah Kaufman, A Carbon Price Will Reduce Emissions More than Computer Models Predict, WORLD RESOURCES INST. (Jan. 13, 2016), http://www.wri.org/blog/2016/01/carbon-price-will-reduce-emissions-more-computer-models-predict; see also Other Organizations Supporting Carbon Taxes, CARBON TAX CTR., https://www.carbontax.org/contact-us/other-advocates/ (providing a list of different organizations held to be carbon tax supporters, as well as organizations arguing cap-and-trade alone is insufficient).


4 Id. at 20, 23.

5 Id. at 21–22.

6 Id. at 19; see also Peter Varela, Brief: Tax Salience, TTPI (Mar. 7, 2016), https://www.austaxpolicy.com/brief-tax-salience. continued . . .
a particular design for a carbon tax. Rather, the analysis provides useful guidelines policymakers should use to design a salient carbon tax for individuals or firms with the goal of reducing carbon emissions.

II. THE ECONOMICS OF MARKET EXTERNALITIES

The concept of a market externality provides the economic justification for the imposition of a carbon tax on carbon emissions. A carbon tax addresses the carbon-emission costs externality by integrating the costs of carbon emissions into the price of a transaction. This conceptual framework should guide policymakers considering the implementation of a carbon tax.

A. Understanding What a Market Externality is and is Not

When one considers the costs associated with a transaction, otherwise known as transaction costs, there are some common-sense presumptions one can make about what constitutes such costs. Generally, transaction costs are “the expenses necessary to affect the transfer of goods from a seller to a buyer.” Some examples include sales equipment, production costs, transportation costs, and any other expenses required to get a product from raw material to the final consumer. Sellers likely integrate all or some of the transaction costs associated with a transaction into the purchase price. With this understanding, one can easily conceptualize what would constitute a transaction cost.

However, what constitutes an externality may not be as obvious. Externalities arise when “the private cost facing a buyer or seller differs significantly from the social cost.” Factory emissions and highway

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8 Id.
12 Id. at 618–19.
13 See id.
14 Id. at 622.
congestion illustrate classic examples.\textsuperscript{15} Externalities are costs borne by those not immediately involved in the transition of a good from seller to buyer, but necessarily result from the transaction.\textsuperscript{16} Regarding factory emissions, the cost of producing energy or powering manufacturing equipment are reflected in the transaction costs, and the final purchase price will likely integrate these costs.\textsuperscript{17} However, the purchase price may not integrate the effect of pollution on air and water quality for surrounding communities.\textsuperscript{18} Nonetheless, the people in these communities may suffer consequences because of the reduced air and water quality in the form of negative health consequences, reduced property values, and other negative consequences.\textsuperscript{19}

These costs should be included in transaction costs, because they result from the effort to get a product from seller to buyer.\textsuperscript{20} However, for any number of possible reasons, transactions typically do not integrate these externalities into the transaction costs when determining the purchase price for goods and services.\textsuperscript{21}

Due to these uncaptured-costs, the factory owner has an economic incentive to overpollute.\textsuperscript{22} Because the factory owner can produce more products without accounting for the total costs of the production, the consumer of the good is overconsuming because the demand is not integrating the total costs of the transaction.\textsuperscript{23} As Carlton and Frankel note, “[b]y taxing pollution . . . equal to the social costs imposed [by the pollution], regulators can . . . correct these market failures.”\textsuperscript{24} This can be done by integrating the externality costs into the transaction costs, thus integrating the externality into the purchase price.\textsuperscript{25}

In any market, there are essentially two costs: transaction costs and externality costs.\textsuperscript{26} One should understand that externality costs are not typically included in the transaction costs and therefore are not

\begin{enumerate}
\item \textit{Id.}
\item It is important to note that there are both negative and positive externalities. \textit{Id.} For this analysis, which is relevant for the costs of climate change, focus will be given to negative externalities only.
\item Carlton & Frankel, \textit{supra} note 11, at 622.
\item See \textit{id.}
\item Id.
\item See \textit{id.}
\item Id.
\item See \textit{id.}
\item Id.
\item Id.
\item See \textit{id.}
\item Id.
\item Id.
\item See \textit{id.}
\item Id.
\item Id. at 618.
\end{enumerate}

\textit{continued . . .}
integrated into the purchase price presented to the buyer. As a result, producers produce more goods and consumers buy more of those goods than the market should otherwise allow. With this knowledge, one can understand how carbon emissions, with the resulting climate change effects, are an example of an externality cost.

B. How a Carbon Tax Addresses the Carbon-Emission Externality

The impact of global warming is a negative market externality that market actors do not currently consider when making decisions, and this lapse in accounting poses significant risks for economies. “Changes in global temperatures due to human activity impose costs on human and economic systems, costs that are not borne directly by the companies and individuals that undertake the activity.” By the end of the twenty-first century, climate change “will likely cost the United States between 1.2 percent and 5.4 percent of GDP . . . .” The evidence indicates that as the economy continues to emit carbon dioxide into the atmosphere to drive consumption patterns, the destabilization of the global climate will have severe consequences on society. As Bordoff and Larsen indicate, these costs are not currently integrated into producers’ and consumers’ consumption and production patterns, leading to the same over-pollution as the factory owner. This is a classic externality example and one policymakers should address due to the potential significant consequences.

A carbon tax’s effectiveness regarding greenhouse gas emissions reduction is significantly impacted by the design of the carbon tax. When scholars suggest design models for a carbon tax, the analyses primarily focus on three designs: upstream on producers, downstream on consumers, or some hybrid approach. Therefore, these analyses

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27 Id. at 624.
28 Id.
30 Id. (quoting T. HOUSER ET AL., ECONOMIC RISK OF CLIMATE CHANGE: AN AMERICAN PROSPECTUS (2005)).
31 Id.
32 Id.
33 Id. at 18.
suggest models that would impose a carbon tax at particular points in a supply chain. These models can be understood more in-depth as follows: an upstream approach, which would impose a tax on producers near the beginning of the supply chain; a downstream approach, which would impose a tax on consumers near the end of the supply chain; or a hybrid approach of the first two models.

However, these approaches are insufficient for tax policymakers because they leave too many variables in place to design an effective carbon tax to reduce emissions. For instance, consumers can exist at several points throughout the supply chain (i.e., business-consumers who resell) and can consist of different types of consumers (i.e. business consumers and individual consumers) that may not react the same way to a carbon tax. Moreover, using a grouping such as “producers” is ambiguous, as this can include those that extract fossil fuels from the earth as well as those that use fossil fuel emissions to manufacture products. These different types of producers may have widely different incentives, which would frustrate the carbon tax’s goal of reducing carbon consumption. Policymakers would be wise to consider where in the supply chain would be most effective for other

36 Id.
37 Id. at 25.
38 Id. at 26.
39 See id. at 25, 27.
40 See id.
41 Policy suggestions have included “producers” as persons that extract fossil fuels from the earth. See WAGGNER, supra note 2, at 10; METCALF & WEISBACH, supra note 34, at 523. Policy suggestions have also included “producers” as persons that use fossil fuels for utilities. See CHRISTIAN, supra note 34, at 241-42. This merely demonstrates that the term “producer” can encompass many different types of entities, and wise policymakers should understand that these different entities may not all react the same way to a tax.
42 See WAGGNER, supra note 2, at 7.

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considerations, such as administrative efficiency. However, this Comment proposes a different model for policymakers to consider when designating the statutory taxpayers of a carbon tax for the specific purpose of reducing carbon emissions.

Rather than utilizing the upstream, downstream, or hybrid models of other academic papers, this analysis examines how to design a carbon tax based on an “individual statutory taxpayer” versus a “firm statutory taxpayer” perspective. This Comment develops a useful framework based upon these two groups of taxpayers, which will allow for a more accurate analysis of the implementation of a carbon tax with a stated purpose of reducing carbon emissions. With a framework based on individuals and firms, policymakers can more accurately predict how different types of consumers and producers may react at any point in a supply chain. Part III below explores the theoretical basis policymakers should utilize when considering whether to designate individuals or firms as the statutory taxpayers of a carbon tax.

III. TAX SALIENCE THEORY

Scholars have pondered how individuals and firms within a market economy do, or do not, incorporate tax costs when making decisions. “Tax salience refers to how the presentation of tax prices affects taxpayer behavior. In other words, tax salience measures how taxpayer behavior departs from key assumptions of neoclassical economic theory.” This analysis adopts a similar approach by considering how the tax by itself influences individuals’ and firms’ behavior. This analysis expands this definition of tax salience to include how “taxpayers account for the costs imposed by taxation when the taxpayers make decisions or judgments” in ways that might incentivize individuals and firms to reduce their carbon consumption.

A salient carbon tax must influence individuals’ and firms’ behavior in such a way to reduce the carbon footprint of transactions or operations. This policy goal reflects the economic theory that carbon emission costs are not integrated into the purchase price, allowing individuals and firms to consume more carbon than they should as a

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43 See Metcalf & Weisbach, supra note 34, at 523.
44 For this analysis, the “statutory taxpayer” is the designated taxpayer in the carbon tax statute. A “firm” is any organization consisting of more than one person that is motivated by profits.
45 Gamage & Shankse, supra note 3, at 19.
46 Id. at 23.
result.\textsuperscript{47} One could say that the negative externality of carbon emission costs is low salience, meaning the costs do not influence individuals’ and firms’ decision-making or judgments.\textsuperscript{48} A salient carbon tax should correct this market failure.

Policymakers will find that simply imposing a new carbon tax without considering its design will not correct the market failure of overconsumption of carbon emissions.\textsuperscript{49} As Gamage and Shanske state, the theory behind tax salience rejects much of the neoclassical economic understanding of how market actors behave in a market setting.\textsuperscript{50} Under the traditional economic theory, market actors are considered to make rational choices, meaning they can determine “what options are available and then choos[e] the more preferred one according to some consistent criteria.”\textsuperscript{51} However, this does not always, if it rarely ever does, reflect reality.\textsuperscript{52} “[P]reliminary evidence suggests that taxpayers systematically perceive their tax cost as being less or more than their actual cost depending on the tax’s salience level.”\textsuperscript{53} Therefore, even when a tax is imposed on a market, individuals may miscalculate the tax cost in the transaction\textsuperscript{54}, which may impede their ability to make a fully rational choice based on objective measurements.

Two possible reasons for this inaccuracy are referred to as spotlighting and ironing.\textsuperscript{55} Spotlighting is when “consumers respond to immediate or local prices and ignore the full schedule that they face.”\textsuperscript{56} [S]potlighting involves taxpayers focusing only on certain components of an aggregate price and thereby underestimating the aggregate price.\textsuperscript{57} Thus, individuals may disregard the cost of a carbon tax in a transaction altogether, which means they will not be affected by the imposition of the tax and will not adjust their carbon consumption patterns.

Another potential reason is ironing, which occurs when “taxpayers

\textsuperscript{47} See id. at 23–24.
\textsuperscript{48} Id. at 23.
\textsuperscript{49} Id. at 51.
\textsuperscript{50} Id. at 98.
\textsuperscript{53} Id. at 147.
\textsuperscript{54} Id.
\textsuperscript{55} Gamage & Shanske, supra note 3, at 26.
\textsuperscript{57} Gamage & Shanske, supra note 3, at 27.

\textit{continued...}
incorrectly use their average tax rates when making market decisions rather than their effective marginal tax rates.”

Therefore, taxpayers may use predictive measurements of a carbon tax’s cost, rather than precise calculations. Ironing may contribute to miscalculations by impeding optimal carbon consumption adjustments.

These irrationalities may not be exhaustive. As more research is conducted in the field of tax salience, scholars may find even more cognitive shortcomings for individuals in markets. This analysis addresses the effects of spotlighting and ironing on individuals when they are determining the carbon tax cost of a transaction before a purchasing decision is made. A salient carbon tax for individuals must address these issues to encourage as many individuals as possible to decrease their carbon footprint in the market. This analysis proposes carbon tax designs to influence price-sensitive consumers and eco-conscious consumers.

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58 Id. at 31.
59 See id. (explaining how tax payers do not always understand how to properly apply the marginal and graduated tax rate to their own incomes and consequently do not know the precise impact of any given tax on their own finances).
60 Id.
61 Price Sensitivity, READY RATIOS, https://www.readyratios.com/reference/analysis/price_sensitivity.html (last visited Mar. 21, 2019) (“Price sensitivity can be defined as the degree to which consumers’ behaviors are affected by the price of the product or service.”).
62 See Eco-conscious, MERRIAM-WEBSTER (2016) (defining eco-conscious as “marked by or showing concern for the environment”). This analysis utilizes these two individual groups, because a carbon tax should impact these groups the most. An additional cost will get a reaction from price-sensitive individuals, and an explicit demonstration of the carbon footprint of a particular good or service should get a reaction from individuals who are driven by environmental impact in their purchasing decisions. See Waggoner supra note 2, at 2. This analysis does not conclude that these may be the only individual groups with a reaction to a carbon tax; there may be strong anti-tax individuals who will avoid any tax at all costs. However, for simplicity, this analysis considers these two groups as the most obvious individuals to respond to a carbon (environmental) tax (cost) given the nature and purpose of the tax.
IV. DESIGNING A SALIENT CARBON TAX: DESIGNATING INDIVIDUALS AS THE STATUTORY TAXPAYERS

This analysis posits that policymakers have two options for designing a carbon tax where individuals are the statutory taxpayer: a posted-cost design or a tax-inclusive design. While the research shows that either method can be highly salient to individuals, a posted-cost design will influence both price-sensitive and eco-conscious individuals, whereas a tax-inclusive design may not incentivize eco-conscious consumers as effectively.

A. The Tax Must Be Prominent and Provide the Carbon Tax Cost at the Point the Individual Makes Purchasing Decisions.

A tax will influence individuals’ behavior if it is prominent at the time that the individual is making decisions or judgments about whether to engage in a transaction. As the article Sales Tax Not Included: Designing Commodity tax for Inattentive Consumers by Jacob Goldin states, the concept of “prominence” can be interpreted to mean “noticeable and easy to process.” As Gamage and Shanske suggest, individuals may be less likely to spotlight a tax cost when it is noticeable and will not rely on averaging or estimates when the tax cost is easily understood. Studies have suggested that “taxpayers often discount taxes that are not assessed until after a market decision has been made.” This illustrates the notion that “individuals appear to spotlight on the prices charged (or displayed) at the time of market decision-making.” Thus, it is just as important to determine when a carbon tax will be made noticeable and calculable to an individual as how. The evidence suggests that the tax must be presented when the individual is

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63 This design method displays the cost of a tax separately from the purchase price of a good. Hayes Holderness, Price Includes Tax: Protecting Consumers from Tax Exclusive Pricing, 66 N.Y.U. ANN. SURV. AM. L. 783, 783 (2011).
64 This design method does not separately display the cost of a tax from the purchase price, but rather integrates the tax cost with the posted purchase price. Id.
65 Dipti Barge et al., Eco Friendly Products Attitude towards Pricing, 13 PRAVA MGMT. REV. 29, 35 (2014).
66 Id.
68 Id.
69 Gamage & Shanske, supra note 3, at 27.
70 Id. at 29.
71 Id.
making the purchase decision.\textsuperscript{72} Scholars have designed several experiments and studies analyzing the effect of a tax’s design on the salience of the tax to the taxpayer.\textsuperscript{73} These studies suggest that a salient carbon tax should be noticeable to the taxpayer, easy to calculate, and presented in close proximity to the moment that the taxpayer is making the purchasing decision.\textsuperscript{74}

Raj Chetty, Adam Looney, and Kory Kroft provide this evidence in their research findings, titled \textit{Salience and Taxation: Theory and Evidence}.\textsuperscript{75} The Chetty et al. research is often considered the “seminal paper on the market salience of taxation.”\textsuperscript{76} The analysis conducted an experiment in a grocery store in a jurisdiction that imposed a 7.375 percent sales tax on certain goods.\textsuperscript{77} Like most sales taxes, the jurisdiction’s sales tax is paid by the individual consumer at the register, meaning the tax is not presented to the individual when they walk through the aisles of the store deciding which products to purchase.\textsuperscript{78} In the experiment, the researchers posted the 7.375 percent sales tax for certain products on the price tags, and observed how individual consumers responded.\textsuperscript{79} The posted figure provided the calculated cost of the sales tax as determined by the purchase price of the product, rather than the sales tax rate.\textsuperscript{80} The researchers found that consumer demand dropped by eight percent when the price tag included the sales tax cost the customer would be paying at the register.\textsuperscript{81} The researches infer that “most consumers do not normally take the sales tax into account” when making market decisions.\textsuperscript{82} Therefore, the sales tax was more salient when it was noticeable and fully calculated on the price tag where individuals would be making purchasing decisions.\textsuperscript{83}

A critical finding in the Chetty et al. research was that ignorance of

\textsuperscript{72} Goldin, \textit{supra} note 67, at 261.
\textsuperscript{73} \textit{Id.} at 266.
\textsuperscript{74} Holderness, \textit{supra} note 63, at 788.
\textsuperscript{76} Gamage & Shanske, \textit{supra} note 3, at 27.
\textsuperscript{77} Chetty et al., \textit{supra} note 75, at 1146.
\textsuperscript{78} \textit{Id.}
\textsuperscript{79} \textit{Id.}
\textsuperscript{80} \textit{Id.}
\textsuperscript{81} \textit{Id.} It is not stated whether the researches felt there was some correlation between the reduction in demand and the tax rate being relatively similar; both around 8%. Thus, policymakers should not take this to mean that a 10% carbon tax will have a correlative reduction in demand for fossil fuels of 10%.
\textsuperscript{82} \textit{Id.}
\textsuperscript{83} \textit{Id.}
the tax was not a significant factor influencing individuals’ behavior.\textsuperscript{84} When interviewing the grocery store customers, “[t]he median individual correctly reported the tax status of seven out of eight products on the survey,”\textsuperscript{85} and most had a high level of accuracy in determining the sales tax rate.\textsuperscript{86} This information suggests that the phenomenon of spotlighting was occurring, as individuals overlooked the tax.\textsuperscript{87} Moreover, the individuals’ deviations from predicting the accurate sales tax rate may indicate that individuals were ironing the sales tax cost based upon prior experience or exposure to the tax.\textsuperscript{88} This inference is not as strongly supported by the evidence. Therefore, the Chetty et al. research and Goldin’s extrapolation from the data\textsuperscript{89} suggests that individuals react to tax costs more when the tax cost is noticeably displayed at the point the purchasing decision is made and the tax cost is calculated for the individual.\textsuperscript{90}

In another study on tax salience, Amy Finkelstein in her research, titled \textit{E-ZTax: Tax Salience and Tax Rates}, shows that how individuals paying toll fares influences the salience of the fare, making it easier for policymakers to increase fares without individuals’ awareness.\textsuperscript{91} Like

\textsuperscript{84} \textit{Id.} at 1147.

\textsuperscript{85} \textit{Id.} at 1147. “Tax status” includes those items that are subject to sales tax.

\textsuperscript{86} \textit{Id.} at 1165. 75\% of those interviewed reported the sales tax percentage within 0.5\% of the actual rate, while 97\% were able to report a rate within 6.75\% and 8.75\%, showing that individuals were not only aware of the tax, but also that they were aware with significant accuracy of the tax rate. \textit{Id.} Furthermore, the researchers conducted a survey with an undergraduate class where only 18\% students shown tags with the tax-exclusive price calculated the tax within $0.25 of the amount, compared to 75\% when the class was shown the product with the tax-inclusive price. \textit{Id.} at 1151

\textsuperscript{87} \textit{Id.} at 1148.

\textsuperscript{88} \textit{Id.}

\textsuperscript{89} See \textit{Goldin, supra} note 67, at 261; Chetty et al., \textit{supra} note 75, at 1149. It would be interesting to see the results of a study where the price tag only included the sales tax rate, and not the sales tax costs. Theory and the Chetty et al. research would suggest that the demand for such products would not have decreased as significantly, due to the issue of individuals’ ability to accurately calculate the sales tax cost.

\textsuperscript{90} See \textit{Goldin, supra} note 67, at 261.


\textit{continued} . . .
sales taxes, toll fares utilize a posted-cost design because they are presented separately from other transportation costs. In a Massachusetts survey, Finkelstein found that sixty-two percent of drivers using E-ZPass responded “I don’t know” when asked to approximate the amount they paid in tolls, versus only two percent of cash-paying drivers. In a similar survey of drivers using tunnels and bridges operated by the Port Authority of New York and New Jersey, 38.1 percent of E-ZPass drivers responded that they did “not know” or refused to estimate their toll liabilities, as compared to twenty percent of cash-paying drivers. From these surveys, Finkelstein concluded that E-ZPass made the toll fares less salient to drivers “[b]ecause the driver need no longer actively count out and hand over cash for the tolls.”

While Finkelstein’s evidence does not show a change in individuals’ behaviors when using E-ZPass versus cash payments, the surveys demonstrate the impact tax presentation can have on spotlighting and ironing. Drivers utilizing E-ZPass are more unaware of their toll liabilities, and therefore are likely not fully accounting for that cost when making decisions concerning transportation methods and routes. Moreover, because the E-ZPass is a prepaid account, drivers utilizing E-ZPass may be more likely to use ironing to approximate toll cost based on average payments from the past, rather than an accurate accounting used by cash-paying drivers. Furthermore, because E-ZPass separates the payment (uploading money to the pre-paid account) from the decision-making (the moment when the driver passes through the toll booth), E-ZPass drivers are presumably even less affected in

92 Finkelstein, supra note 91, at 970-71. For example, a toll fare would be more tax-inclusive if it were pre-paid using individuals’ income taxes or consumption taxes. Goldin, supra note 67, at 281.
93 Finkelstein, supra note 91, at 981. It is important to note that Finkelstein’s findings are using subjective measurements in the Massachusetts study, which may not provide complete accuracy on drivers’ ability to calculate their toll liability. Id. at 981. The refusal of some respondents to answer the survey question is problematic in determining the actual number of drivers who were unable to calculate their toll liabilities. Finkelstein does not address why the discrepancies in knowledge between E-ZPass drivers and cash-paying drivers was narrower for the New York-New Jersey survey than the Massachusetts survey.
94 Id. at 975 (demonstrating a case of a low-salience tax).
95 Id. at 971.
97 Id. at 971.
98 Finkelstein, supra note 91, at 981 (stating that ETC can reduce “the link between the actual and the perceived toll”).

continued . . .
their decision-making by the toll fare. Finkelstein’s findings demonstrate the importance of noticeable and easily-calculable tax costs, and the importance of proximity between the tax payment and the purchasing decision.

Nicholas Rivers and Brandon Schaufele provide research on tax salience and its effects on individual behavior by analyzing British Columbia’s (B.C.) carbon tax in their research titled *Salience of Carbon Taxes in the Gasoline Market.* B.C.’s carbon tax imposes a tax on the purchase of fuel, such as gasoline. B.C.’s carbon tax has one design similarity to a retail tax: B.C.’s carbon tax provides that those purchasing gasoline are the statutory taxpayers and the sellers remit the tax. Rivers and Schaufele note an important distinction between B.C.’s carbon tax and retail taxes in grocery stores and toll collections: gasoline prices are advertised as *tax inclusive,* meaning that the posted price includes the carbon tax cost. Rivers and Schaufele correctly note that this decreases the risk of miscalculation, thereby addressing the factor Goldin posits requiring a salient tax to be “easy to process.” However, this would make the tax less noticeable than providing a

100 *Id.* (stating that “payment decoupling,” separating payment from decision making, can “reduce awareness of amount spent”).

101 *Id.* at 969, 981.


103 *Carbon Tax Act, S.B.C. 2008, c 40, sched. 1, col. 2. 2 (Can.).

104 *Id.* c 40, s. 8(1). The Carbon Tax Act defines a “purchaser” as a person who “buys or receives delivery of fuel.” *Id.* c 40, s. 1(1). A “person” includes the government of Canada. *Id.* A purchaser is not limited to individuals, therefore the evidence from the Rivers & Schaufele study is not as precise in its application of a tax to individual consumers’ behavior as the Chetty et al. study. See generally RIVERS & SCHAUFELE, supra note 102. However, the Rivers & Schaufele evidence is still useful in determining the impact of tax-inclusive prices on market actors’ behavior. Furthermore, nothing in their research suggests that the findings would exclude the behavioral shifts of individual consumers. Rather, the reader should understand that the percentage shifts in demand do not focus solely on individual consumers, but all types of consumers. *Id.* This demonstrates the problem with the consumer-producer approaches addressed in Section II.B.

105 RIVERS & SCHAUFELE, supra note 102, at 3 (including excise and sales taxes on gasoline).

106 *Id.*

107 Goldin, supra note 67, at 264.

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*continued . . .
separate calculation like the Chetty et al. study.\textsuperscript{108} Thus, while the carbon tax functions similarly to a retail or sales tax,\textsuperscript{109} it departs from the design by being tax-inclusive in the price.\textsuperscript{110}

Rivers and Schaufele found that the carbon tax reduced demand for gasoline by 12.5 percent.\textsuperscript{111} Rivers and Schaufele posit that the carbon tax was an “important reason” for the reduction in demand for gasoline.\textsuperscript{112} They argue that, because the carbon tax was designed to be revenue \textit{neutral},\textsuperscript{113} but in reality was revenue \textit{negative} due to greater reduction on gasoline sales than anticipated, the tax had greater effect on short-term demand than policymakers expected.\textsuperscript{114} Rivers and Schaufele infer that this shows that the carbon tax, by itself, played a role in gasoline’s demand reduction. B.C.’s carbon tax was likely salient enough to reduce individuals’ demand for gasoline to some degree.\textsuperscript{115} Goldin’s noticeability theory, supported by Chetty et al.’s research findings, suggests that B.C.’s carbon tax may have been more salient had it been designed as a posted-price, rather than tax-inclusive.\textsuperscript{116}

These three studies demonstrate three key components for a salient tax on individuals: noticeability, ease of calculation, and proximity of tax to purchasing decisions.\textsuperscript{117} As Rivers and Schaufele demonstrate, a tax can be salient even if it is not as noticeable.\textsuperscript{118}

A carbon tax could be designed as tax-inclusive, which would remove any need for individuals to determine the tax liability, thus decreasing the risks of spotlighting and ironing.\textsuperscript{119} Moreover, it would be in close proximity to the individual’s purchase decision, as it is

\textsuperscript{108} Id. at 265.
\textsuperscript{110} Id.
\textsuperscript{111} RIVERS & SCHAUFELE, supra note 102, at 10.
\textsuperscript{112} Id.
\textsuperscript{113} Id. at 4 (emphasis added).
\textsuperscript{114} Id. at 10; see also id. at 9 (showing that the assumption would be that policymakers may have accounted for market factors when projecting gasoline demand). However, whether policymakers accounted for such factors is subject to speculation.
\textsuperscript{115} Id. at 21.
\textsuperscript{116} Goldin, supra note 67, at 261.
\textsuperscript{117} Id. at 264.
\textsuperscript{118} RIVERS & SCHAUFELE, supra note 102, at 5.
\textsuperscript{119} See Gamage & Shanske, supra note 3, at 56–57. 

\textit{continued . . .}
integrated into the purchase price, even if not posted separately. 120

However, a carbon tax lacking noticeability will have less impact on eco-conscious individuals by increasing the possibility that such individuals will spotlight the tax’s demonstration of their carbon consumption contribution, and therefore will not react to the tax cost unless they are also price-sensitive to some degree. 121 Section IV.B demonstrates why policymakers should design a carbon tax like the design used in the Chetty et al. research to have the greatest impact on carbon emissions.

B. A Salient Carbon Tax Would Have the Greatest Impact by Targeting Both Price-Sensitive Individuals and Eco-Conscious Individuals.

The optimal design of a high-salience carbon tax on individuals would be a posted-price, cost-calculated tax design to increase the noticeability of the tax, allow individuals to internalize the tax with the greatest ease of computation, and displayed at the moment they make purchasing decisions. This analysis posits that such a design would impact both price-sensitive individuals and eco-conscious individuals.

As suggested in Part III, individuals have a narrow range of responses to a tax increase. 122 Gamage and Shanske posit two individual reactions to a salient tax: substitution and income-shifting. 123 Substitution refers to a scenario where one good is subject to a carbon tax, and another is not, an individual may shift their consumption to the tax-exempt good to avoid the tax. 124 This analysis posits that, even when two goods are subject to a carbon tax, a price-sensitive individual will shift their consumption to the lower-taxed good, so long as it is cheaper than the alternatives. 125

Moreover, if a carbon tax is made noticeable like the Chetty et al. research suggests, eco-conscious individuals may opt for goods with a lower carbon tax, because this means they are choosing a good produced with fewer carbon emissions. 126 Income-shifting reactions are changes in the individual’s budget, where the individual may forgo a product category altogether and instead spend money on higher-priority

120 See id.
121 See id.
122 See infra Part III.
123 See Gamage & Shanske, supra note 3, at 61–65.
124 See id. at 62.
125 See id.
126 See Chetty et al., supra note 75, at 1171. continued . . .
items. The price-sensitive individual may determine the additional carbon tax cost is not worth any available good, and instead may choose to spend money on other items. The eco-conscious individual may have the same reaction but may do so with the intent of spending money only on items with no or inconsequential carbon footprint.

The following examples show why a noticeable, easily-calculable carbon tax at the point the purchasing decision is made would have the greatest impact on carbon emissions by incentivizing eco-conscious individuals to reduce their carbon consumption when the price-sensitive consumer may not be incentivized to reduce theirs. For example, Widget A and Widget B both have sales prices of $3.00. Widget A has a carbon tax of $2.00, while Widget B only has a carbon tax of $0.50 because Widget A is manufactured with coal-powered electric, whereas Widget B is produced with solar-powered electric. A price-sensitive consumer will either pick Widget B because its total cost is $1.50 less than Widget A’s total cost or the individual may be so price sensitive that they forgo both products, shifting their income to other expenses. Similarly, the eco-conscious individual will either buy Widget B because it has the lesser carbon footprint or may shift their income away from both goods altogether for the greatest carbon consumption reduction possible.

In another example, Widget A has a sales price of $2.00, whereas Widget B has a sales price of $5.00. Widget A has a carbon tax of $3.00, making the total purchase price $5.00. Widget B has a carbon tax of $1.00, making the total purchase price $6.00. The price-sensitive consumer will likely purchase Widget A (unless they shift their budget priorities), thus increasing their carbon footprint by $3.00 instead of $1.00. But the eco-conscious individual may still buy Widget B because it has a lesser carbon footprint or may shift their budget away from both goods.

These two examples demonstrate why a posted-cost design is more salient. If the tax were tax inclusive, like B.C.’s carbon tax, the price-sensitive individual would have acted the same in both examples.

127 See Gamage & Shanske, supra note 3, at 62–63.
129 See Gamage & Shanske, supra note 3, at 62.
131 Id. at 134.
132 Id. continued . . .
However, in both scenarios, the eco-conscious individual is not incentivized to seek out the less-carbon intensive good in either scenario, but particularly in the second example. A posted-cost design like the Chetty et al. experiment makes the tax more salient for both individuals. Therefore, policymakers would have a greater chance at reducing carbon emissions by taxing individuals with a posted-cost, cost-calculated design method for a carbon tax at the decision-making point.

V. Designing a Salient Carbon Tax: Designating Firms as the Statutory Taxpayers

Firms operate in an environment of complexity and uncertainty. Firms face the challenge of scaling their business to a large market. Where individuals can either substitute or forgo products, firms in markets with millions of potential customers have greater pressure to make the best business decision possible. Moreover, firms compete with each other in a market, and firms that make the better decisions may prosper at the expense of firms who make less optimal decisions. These high-stakes decisions, compounded by a high level of complexity and market uncertainty, may lead firms to “resort to decision-making shortcuts and rules-of-thumb,” rather than rational calculation of the optimal strategy. Firms may utilize this generalization to make decisions in their difficult environments. As a result, firms may rely on assumptions when reacting to a carbon tax, rather than hard analysis.

A. Firms May Use Generalizations When Making Business Decisions Rather than Accurate Cost-Benefit Considerations.

Irrationalities are not limited to individuals. Firms also face plenty of cognitive shortcomings that may prevent full-accounting of a tax in business decisions. Some firms “might rely on simple rules of thumb

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133 Chetty et al., supra note 75, at 1175.
135 Id. at 2.
136 Id. at 2–3 (noting that firms compete with each other, while “consumers usually do not”).
137 Id. at 3.
138 Id.
139 Id. at 2.

continued . . .
rather than on explicit calculation of complex optimal strategies.”

These generalizations and rules-of-thumb will impact how a firm chooses to respond to a tax increase. For instance, a firm could integrate the cost of a carbon tax in ways that do not decrease the firm’s carbon footprint, such as outsourcing production to jurisdictions without a carbon tax, cutting other costs, and implementing a wide-variety of other strategies.

The irrationalities of a firm are different from those of individuals because individuals and firms have different motivations and considerations when making decisions. For this analysis, it is necessary to understand that firms are also subject to irrationalities just as individuals. It is also important to understand that firms have a wider range of possible reactions to a carbon tax than individuals. Because firms may integrate the cost of a carbon tax by not reducing their carbon footprint, a salient carbon tax must incentivize as many firms as possible to choose carbon footprint reduction investments, rather than investments in additional revenue streams or alternative cost-cutting strategies.

B. Perceptions of Significant Risks and Prohibitive Costliness May Deter Carbon-Reduction Investments

“Part of the problem [with green-initiative investments] lies in the relative newness of green construction. Being green means using new, relatively untried materials and procedures, observers say.” Carbon-reduction investments have a perception problem; many firms see it as too expensive, and something only affordable to the “rich guys.”

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140 Id.
141 Id.
142 See infra Section V.B.
143 ARMSTRONG & HUCK, supra note 134, at 2–3 (exploring in detail the differences between the rationale and capabilities behind business decision juxtaposed against those behind consumer decisions).
144 Id. at 2.
145 See discussion infra Section IV.C.

continued . . .
The perception that it costs an arm and a leg to ‘go green’ keeps plenty of small businesses . . . from even trying—let alone in a recession. Sure, many eco-friendly improvements do require some initial capital. But they also can yield significant cost savings—and drive revenues—in the long run.148

Linder continues her article documenting several business owners who have seen these cost savings because of their environmental initiatives.149 Thus, firms can realize cost-savings by making carbon-reduction investments in their business models. However, some firms may be discouraged by the perception that any return on investment from carbon-reduction investments is too distant in the future.150

Beyond the perception of prohibitive costs, there are perceived prohibitive risks.151 As Greenwald states in her article, green investments, such as carbon-reduction investments, rely on new technologies and strategies relatively untested in the market.152 The “newness” of these technologies and strategies indicates that they are relatively untested in a market setting.153 Thus, some firms may not tolerate the uncertainty of carbon-reduction investments in an already uncertain environment.154 However, as Section V.C demonstrates, certain firms may be more attracted to carbon-reduction investments than others.155 Highly-innovative firms and smaller firms looking for a competitive advantage against established firms in a market may see some competitive advantage in the cost-savings of carbon-reduction investments.156 One potential advantage is demonstrated by the first

148 Id.
149 Id.
150 Id.
151 While risk is associated with costs, there is a distinction in this analysis. Perceived prohibitive risks are those impediments that make carbon-reduction investments less attractive to investors, creditors, and managers. Id. Where investors, creditors, and managers may be attracted to carbon-reduction investments, but feel the costs are too prohibitively high, this is perceived costs. Id. Thus, perceived prohibitive risks insinuate an aversion to carbon-reduction investments, whereas perceived prohibitive costs insinuate a feeling that such investments are attractive, yet impossible for the firm.
152 Greenwald, supra note 146.
153 Id.
155 See infra Section V.C.
156 See., e.g., Andrew Winston et al, Energy Strategy for the C-Suite, HARV. continued . . .
example in Section IV.B.  If two goods have the same purchase price, but one producer can reduce their carbon tax cost, this would increase that producer’s profit margins in comparison to their competitor. This demonstrates just one example of competitive advantage that a firm could see in carbon-reduction investments.

C. Risk-Averse Investors and Creditors May Hesitate to Support Carbon-Reduction Investments.

In a survey of working professionals, seventeen percent of respondents stated that integrating “new and untested ideas” would be rewarded by their firm, whereas forty-seven percent of respondents stated the reaction would be “unpredictable.” Moreover, the bigger a firm becomes, the more risk averse the firm becomes, suggesting that smaller to medium sized firms that promote innovation may be more likely to perceive competitive advantages in carbon-reduction investments than the larger firms.

Smaller, more innovative firms may see competitive advantages in the cost-savings carbon-reduction technologies and strategies may provide. Moreover, smaller firms tend to receive investment from...
venture capital firms, who are generally more open to risk-taking initiatives. However, because these firms are smaller, and therefore have less capital, these firms may take issue with carbon-reduction investments due to perceived prohibitive costs. Both the innovative firm and its venture capital partners may be interested in carbon-reduction investments but may have the perception that such investments are “for rich guys.” Because smaller firms and their investors may perceive the return on such investments from cost-savings as too distant in the future, smaller companies that have less cash may conclude that carbon-reduction investments are too costly in the immediate term to justify potential cost-savings years down the line, even if such cost-savings manifest more quickly than perceived.

As a smaller company grows beyond the venture capital phase, it may retain the innovative, risk-taking culture developed in its nascence. However, the new form of institutional investment the firm seeks may not have the same attitude as risk-taking venture capital firms. Increased risk-averseness as companies grow may be largely attributable to the form of financing the firm receives, and the relative risk-averseness of those firms providing the investment depends on the type of investment firm. “Private equity firms take over when companies scale beyond the interest of the venture capitalists.” And while “[v]enture capitalists clearly understand risk . . . most private equity firms are the antithesis of [venture capitalists] in their thinking.” Because private equity firms are more focused on EBITDA than revenues, which accounts for firms’ earnings minus interest, taxes, depreciation, and amortization, “[t]hings [the firm does] to drive profits, are typically at the expense of reinvesting those profits into additional growth and innovation of the business.” This statement would be especially true for untested carbon-reduction technologies and strategies that most private equity firms would perceive as unrelated to profit generation. Thus, innovative firms in the

163 Lindner, supra note 147.
164 Id.
165 Id.
166 Id.
167 Deeb, supra note 160.
168 Id.
169 Id.
170 Id.

continued . . .
private equity financing stage may see opportunity in carbon-reduction investments but may be constrained by their investors.

Moreover, in addition to investor pressures, creditors may impose covenants on firms to reduce risk exposure to ensure repayment of obligations.\textsuperscript{171} Creditor restrictions could apply to both private equity financed firms and small, venture capital financed firms.\textsuperscript{172}

Therefore, smaller-sized innovative firms in the venture capital phase and medium-sized innovative firms in the private equity phase may see some competitive advantage to carbon-reduction technologies and strategies that would make them more competitive in their respective markets. However, they may face constraints from investors, creditors, or managers due to the perceptions that carbon-reduction investments are prohibitively risky and costly.\textsuperscript{173} These perceptions, as the word suggests, may be more attributable to generalizations than precise calculation. Therefore, a salient carbon tax on firms must increase the perception that carbon-reduction investments are affordable and decrease the perception that such investments are too risky. There are tools well-known to tax policy scholars in other areas of tax law that can help carbon-reduction investments with their perception problem for firms.\textsuperscript{174} These tools would increase the number of firms who would react to a carbon tax by investing in carbon consumption reduction.

D. Carryforward and Credits and/or Deductions May Decrease Perceived Risks and Costs, Thus Increasing the Salience of the Tax to a Larger Number of Firms.

Innovative firms may perceive carbon-reduction investments as cost-prohibitive, and their investors and creditors may perceive such investments as risk-prohibitive. The introduction of a carbon tax will further complicate these perception problems. A tax increase may further discourage cost-sensitive smaller firms from making carbon-


\textsuperscript{172} Id. at 671.


\textit{continued . . .}
reduction investments by adding an additional cost to their bottom-line, thus leaving less capital available for potential investments. This would only enhance the perception that such investments are prohibitively costly.

A carbon tax also frustrates the risk perception problem. “A tax increase will then reduce the expected profits of the risky project by more than that of the safe project and firms should respond by reducing risk.” When there is a tax increase imposed in a market, “firms respond . . . by reducing their earnings volatility . . . .” This means that firms will seek safer investments, as opposed to risky investments. This will make carbon-reduction investments less attractive to risk-averse investors and creditors. Alexander Ljungqvist, Liandon Zhang, and Luo Zuo provide three ways firms may reduce their risk-taking: changing the risk profile of existing operations, reducing sensitivity of profits to changes in output, or changing the risk profiles of their investment projects. To reduce the risk of investment projects, firms “may choose safer [research and development] projects (say, to enhance quality or variety of their existing products) over riskier ones (say, to invent new products).” Therefore, a carbon tax will incentivize firms to find other means of mitigating the tax cost other than carbon consumption reduction.

Policymakers thus face an issue similar to the price-sensitive individual who chooses a higher-carbon intensive product over a lower-carbon intensive product, since not all firms will react to a carbon tax as policymakers would desire. Firms may opt for lower-risk investments that integrate the carbon tax cost. Unlike individuals, who will generally react to a tax cost by either substituting for alternative goods or forgoing the product type altogether, firms may deploy a variety of strategies to mitigate the cost of a carbon tax. Firms may cut other costs, such as firing employees or reducing wages, move production overseas to jurisdictions that do not impose a carbon tax.
increase revenues by expanding production (thus increasing carbon emissions) or hedging in financial markets, and any number of other alternatives that firms may determine are wiser uses of investment capital given the perceived risks of carbon-reduction investments.\textsuperscript{183} To policymakers attempting to influence firms’ investments to reduce carbon emissions, this may seem a significant setback to making firms the statutory taxpayer of a carbon tax. However, there is a potential tax policy tool that may mitigate this issue.

Several scholars that discuss a U.S. carbon tax have provided various theories and designs of credits for initiatives firms may take to decrease their carbon emissions.\textsuperscript{184} Alexander Ljungqvist, Liandong Zhang, and Luo Zuo found that impacts on risk-taking due to increases in state-level corporate income taxes could be offset by carryover deductions.\textsuperscript{185} “[F]irms respond to more generous carryforward rules by increasing risk (sometimes significantly so).”\textsuperscript{186} This shows that allowing businesses to mitigate risks by offsetting current and future tax liabilities may decrease the perceived risks and costs of an investment in the present.\textsuperscript{187}

Therefore, a carbon tax that also provides a carryover credit, carryforward deduction, or some combination will decrease the perceived riskiness and perceived costliness of carbon-reduction investments in the present by allowing risk-averse firms and cost-sensitive firms to save current and future tax dollars and decrease future


\textsuperscript{184} BORDOFF \& LARSEN, supra note 29, at 23–24 (describing a refundable tax credit for purchasers of taxed fossil fuels that do not use such fuels in a way that contributes to greenhouse gas emissions or is exported); Christian, supra note 34, at 248 (describing a refundable credit for feedstock using a value-added tax design for a carbon tax in the supply chain); Metcalf \& Weisbach, supra note 34, at 537–40 (promoting a carbon sequestration credit); Waggoner, supra note 2, at 12–13 (describing a refundable credit for a power plant that recaptures carbon for activities removing carbon dioxide from the atmosphere).

\textsuperscript{185} Ljungqvist et al., supra note 171, at 680.

\textsuperscript{186} Id. at 698. (finding that firms will decrease risk when carryback deductions are made less generous, but also noting that firms will generally not respond when carryback deductions are made more generous).

\textsuperscript{187} See id. at 698–99. \textit{continued \ldots}
earnings volatility.\textsuperscript{188} Carryover deductions and credits will allow smaller firms to realize cost-savings from carbon-reduction investments, and also realize current and future tax savings.\textsuperscript{189} To make the carbon tax more salient, Ljungqvist et al.’s research suggests that firms should be allowed to apply the carryforward credits and deductions to other federal taxes, such as income taxes.\textsuperscript{190} The more generous the carryforward of carbon-reduction investment credits and deductions, the more the perceived risks and costliness of these investments dissipates.\textsuperscript{191}

Policymakers can increase the salience of a carbon tax on firms by reducing the perception that carbon-reduction investments are prohibitively risky and costly. Carryover credits and deductions mitigate these perceptions by allowing firms to offset current and future profits by making carbon-reduction investments in the present.\textsuperscript{192} Ljungqvist et al. explain this as “the government shoulder[ing] part of the losses.”\textsuperscript{193} Thus, when a government increases tax cost, it is “investing” in the upside of the investment; that the firm’s activities will continue to generate profits from which the government will collect revenue.\textsuperscript{194} When the government provides tax cost mitigation tools, the government is taking some of the risk by sharing in the firm’s losses by decreasing potential future government tax revenues.\textsuperscript{195}

VI. CONCLUSION

Climate change poses significant risks for economies and societies.\textsuperscript{196} While scholars have given attention to the rate of a carbon tax and who should ultimately be responsible to pay such a tax,\textsuperscript{197} this

\textsuperscript{188} See id. at 698; see also BORDOFF & LARSEN, supra note 29, at 23–24; see also Christian, supra note 34, at 248; see also Metcalf & Weisbach, supra note 34, at 537–40; see also Waggoner, supra note 2, at 12–13.
\textsuperscript{189} Ljungqvist et al., supra note 171, at 697–98.
\textsuperscript{190} Id. at 698.
\textsuperscript{191} Id. at 698–99.
\textsuperscript{192} Id. at 696–97.
\textsuperscript{193} Id.
\textsuperscript{194} Id. at 700.
\textsuperscript{195} Id. at 699.
\textsuperscript{196} BORDOFF & LARSEN, supra note 29, at 14.
\textsuperscript{197} See id., at 18–28, 30–33 (discussing which sectors and fuels to tax and the rate of a carbon tax); Christian, supra note 34, at 240–50 (advocating for a carbon-burned tax (CBT) that would function similarly to a value-added tax (VAT), imposing a tax throughout a supply chain rather than at any particular point); Sewalk, supra note 34, at 794–801 (prefers a tax based on four industrial sectors (industry; buildings; transportation; and land use, land use change, and forestry)

\textit{continued} . . .
analysis offers a fresh perspective on optimal carbon tax designs for individuals and firms to provide greater reductions in carbon consumption in the market.

The costs of carbon emissions, which include economic costs,\textsuperscript{198} environmental costs, and health costs, are not borne by the participants in transactions.\textsuperscript{199} This may be due to the “remoteness” of those costs, making such costs less visible to the buyers and sellers in transactions. Therefore, the market is failing by not integrating the full costs of a transaction into the purchase price, which would increase the price at which sellers would be willing to sell and decrease the number of buyers willing to pay.\textsuperscript{200} This would likely decrease consumption of those goods, as fewer buyers would be willing to pay a higher price for a good that has not increased in quality, or some other metric buyers may use when determining a good’s value.

However, the economic theory behind a carbon tax only proscribes the ends to the carbon tax. The economics tell us how the tax could produce the desired reductions in carbon emissions, but not the means of achieving that goal. Scholars have attempted to bridge this divide by advocating for the various sectors, industries, or consumers that should bear the carbon tax liability.\textsuperscript{201} Scholarly works on carbon taxes provide support for various proposals on which market actors should bear the carbon tax liability, including efficiency\textsuperscript{202}, administrability\textsuperscript{203}, (LULUCF); and a fixed dollar amount per ton of carbon dioxide emission); and Waggoner, \textit{supra} note 2, at 2 (prefers a production-tax design for a carbon tax); see Metcalf & Weisbach, \textit{supra} note 34, at 511–39 (discussing the carbon tax rate and the various industry sectors who would bear the tax liability).

\textsuperscript{198} Bordoff & Larsen, \textit{supra} note 29, at 13.

\textsuperscript{199} Id.

\textsuperscript{200} The magnitude of the decreases in demand and supply will depend on any particular market’s elasticity.

\textsuperscript{201} Ljungqvist et al., \textit{supra} note 171, at 673.

\textsuperscript{202} \textit{See} Bordoff & Larsen, \textit{supra} note 29, at 8 (“The broader the scope [of the carbon tax], the more efficient . . . the tax”); Christian, \textit{supra} note 34, at 234 (arguing for a VAT-design, broad tax base because “the broader the tax base, the more money the government can raise at any given rate of tax” per dollar spent on collection.); Metcalf & Weisbach, \textit{supra} note 34, at 521 (“In particular, the tax base should be set so that the benefit of a small expansion in the base is equal to the increase in administrative or compliance costs.”).

\textsuperscript{203} \textit{See} Sewalk, \textit{supra} note 34, at 769 (proposing a VAT-design because “[t]his simplifies the challenge of applying the tax by creating a tax structure that is applied in a manner similar to a sales tax.”); Waggoner, \textit{supra} note 2, at 10 (by applying a carbon tax to producers, the carbon tax “simplifies the process of identifying them and collecting the carbon tax”); Metcalf & Weisbach, \textit{supra} note 34, at 521 (a narrow base would be less administratively burdensome).

\textit{continued . . .}
and greatest environmental impact. However, consideration must be given to how the design of the carbon tax would achieve reductions in carbon emissions.

As behavioral economics theory suggests, and as various researchers have demonstrated, simply imposing a tax will not necessarily impact individuals’ behavior. Moreover, firms may not integrate the cost of a carbon tax by shifting behavior in a way policymakers desire. Therefore, simply imposing a carbon tax into the market is not guaranteed to reduce consumption of carbon emissions. Policymakers must consider how the tax should be presented to individuals to incentivize carbon-reducing behavior. Furthermore, policymakers must consider how to incentivize firms to integrate a carbon tax into their business models by investing in carbon-reducing technologies and strategies, and not other cost savings that either maintain or increase the firm’s current carbon consumption levels.

To get individuals to optimally integrate the carbon costs of their transactions into their decision-making and judgments, policymakers should design a carbon tax that is pre-calculated for the individual and is presented separately from the purchasing price. By pre-calculating the carbon tax costs, rather than posting the carbon tax percentage, this reduces individuals’ impulse to average or estimate their tax liability, which will not allow them to fully integrate the tax costs into their decision-making. Posting the carbon tax costs separately from the purchasing price avoids individuals’ habit of simply not considering the tax at all in their decision-making.

Moreover, such a design method would target both price-sensitive and eco-conscious individuals. While the price-sensitive individual would still respond to a carbon tax that was included in the purchase price, an eco-conscious individual may not fully integrate the cost of their carbon footprint when purchasing the good. This would decrease the salience for the eco-conscious individual, as they would be less likely to react to the carbon tax. Additionally, where a less-carbon intensive good is more expensive than a high-carbon intensive good, the tax salience is reduced for the price-sensitive individual but remains higher for the eco-conscious individual. By making the tax salient for

204 See BORDOFF & LARSON, supra note 29, at 8 (“The broader the scope [of the carbon tax], the more . . . environmentally effective . . .”); Metcalf & Weisbach, supra note 34, at 521 (while rejecting a carbon tax that “would include all activities that produce climate externalities” as too administratively costly and inefficient, Metcalf and Weisbach acknowledge that such as design would be the “ideal” carbon tax system.).

205 See supra Parts III, IV.A.
as many individuals as possible, this may encourage individuals to substitute high-carbon intensive goods for less-carbon intensive goods or shift their budget to exclude all goods from that category. Either outcome has the desired effect of reducing individuals’ carbon consumption.

Firms’ responses to a carbon tax are likely to be more complex than individuals’ responses. Firms can do more than substitute and forgo goods. Because of the complexity and uncertainty of the environments in which firms operate, firms may reduce other costs without reducing carbon consumption, seek new revenues without reducing carbon consumption or increasing carbon consumption, or some other response that does not decrease the firm’s carbon consumption. Some innovative firms may see the cost-savings of carbon-reduction technologies and strategies as competitive advantages in their market places. However, carbon-reduction technologies and strategies are relatively new and untested, and therefore may be perceived as prohibitively risky by investors. Furthermore, a tax increase will only exacerbate such investments’ perceived riskiness to managers, owners, and creditors. Smaller firms with less capital may perceive carbon-reduction investments as prohibitively expensive. The additional carbon tax cost will enhance the cost-prohibitive perception. The government can mitigate both issues by providing carryover credits and deductions for carbon-reducing investments. By allowing firms to offset current and future profits by making current carbon-reducing investments, the government can reduce the perceived riskiness and costliness of these investments by shouldering some of the risk, in the form of lost revenues, and allowing firms to offset other tax liabilities.

Policymakers will be able to use the proposals in this analysis to inform any carbon tax design no matter where a carbon tax is imposed in a supply chain. Thus, policymakers will be able to develop effective, dynamic carbon tax systems that can incentivize carbon-consumption reduction for both individuals and firms. As a result, the economy will more efficiently integrate the costs of climate change into transactions, which will help combat the growing threat climate change poses.