Conspicuous conservation: The Prius halo and willingness to pay for environmental bona fides

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This paper develops a theory of conspicuous conservation, a phenomenon related to conspicuous consumption in which individuals seek status through displays of austerity amid growing concern about environmental protection. We identify a statistically and economically significant conspicuous conservation effect in vehicle purchase decisions and estimate a mean willingness to pay for the green signal provided by the distinctively designed Toyota Prius in the range of $430–420 depending upon the owner’s location. Results are related to the growing literature on green markets and suggest that policy should target less conspicuous conservation investments that will be under-provided relative to those that confer a status benefit.

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"The wish to become proper objects of this respect, to deserve and obtain this credit and rank among our equals, may be the strongest of all our desires." Smith (1976, p. 1759)

Introduction

Veblen explained in 1899 that “in order to gain and hold the esteem of man it is not sufficient merely to possess wealth or power. The wealth or power must be put in evidence, for esteem is awarded only on evidence” (p. 36). Since then, a considerable literature has explored the concept of conspicuous consumption and its implications in various settings, with particular focus on purchases that signal prestige, luxury and exclusivity.1 Ownership of luxurious estates, automobiles, and fashion surely still affords a certain social status in the 21st Century. However, amid growing concern about environmental damage and global climate change, an evolution of social norms suggests that status is increasingly conferred upon demonstration of austerity rather than ostentation—particularly austerity that minimizes the environmental impact of consumption. Consumers may, therefore, undertake costly actions in order to exhibit prosocial behavior with respect to environmental protection, a phenomenon we term conspicuous conservation.

The status conferred upon demonstration of one’s contribution to environmental protection is sufficiently prized that some homeowners who purchase energy efficient home heating and cooling technologies display them prominently in their homes rather than relegate them to utility closets. Similarly, instead of boasting about the sizes of their homes, a growing number of homeowners are burying up to half of their homes underground in order to hide their magnitudes from view.

(WSJ, 2010, 2011). And, as is shown in the following sections, the desire to exhibit prosocial, pro-environment behavior motivates certain automobile purchases.

Car ownership decisions are among the most visible consumption decisions households make (e.g., Frank, 2001). They rank behind only cigarettes in the survey-based consumption good visibility index of Heffetz (2011). Consumers attach symbolic meanings to the goods they consume (e.g., Csikszentmihalyi, 1981; McCracken, 1990; Slater et al., 1997) and use vehicle choices to communicate interests, beliefs, values, and status (e.g., Grubb and Hupp, 1968; Sirgy, 1985; Grubb and Stern, 1971; Steg et al., 2001; Steg, 2005). This is particularly true of owners of hybrid and electric-powered vehicles (Gjøen and Mikael, 2002; Heffner et al., 2006, 2007; Turrette and Kurani, 2007; Skippon and Garwood, 2011). Since the U.S. introduction of the Toyota Prius in 2001, a growing number of vehicle models have been developed with features that reduce environmental impacts, particularly greenhouse gas emissions. They include small and light cars with conventional engines (like the DaimlerChrysler SmartCar), alternative fuel cars (like the Chevrolet flex-fuel fleet), and hybrid cars (like the Prius, the Honda Civic Hybrid, and others). Until the reintroduction of the Honda Insight in 2010, however, the Prius was the only model that at once provided standard features (e.g., climate control, four doors, luggage space, etc.), environmental amenities, and a design unique to the model.²

In 2010, the Prius was the clear leader among 24 different hybrid models available in the United States; 48% of the 290,271 hybrid cars sold in the U.S. in 2010 were Priuses. The success of the Prius is no doubt attributable, in part, to an aggressive and innovative marketing effort by Toyota and to equity in the Toyota brand. However, national marketing effort and brand reputation do not explain why Prius ownership increases in green communities relative to other comparably green cars, a result demonstrated in this paper. The Toyota Camry Hybrid, for instance, loses market share relative to the Prius in greener communities even after controlling for the green attributes of the two models. Likewise, the Civic Hybrid achieves green ratings virtually identical to the Prius, yet it, too, is underrepresented in green locales relative to the Prius.

We hypothesize that these market-share differences are due to the unique design of the Prius, and, thus, its ability to signal environmental bona fides, the value of which can be expected to be greater in greener communities. Toyota executives reportedly instructed their engineers to develop a unique design, regardless of the quality of the styling. Prius design has been described as both utilitarian, in order to maximize aerodynamics, and “head-turning” with a shape unique to the model. The Civic Hybrid and other hybrids, in contrast, share body styling and model names with other trims in the model class that carry conventional drivetrains. The hybrid trims of these models typically carry only a small badge on the side or rear of the vehicles indicating their types. The Prius, therefore, has historically provided the most visible demonstration of the owner’s environmental public good provision of any vehicle in the U.S (e.g., The Washington Post, 2004; TIME, 2007; The New York Times, 2007).

We test empirically for the presence of a conspicuous conservation effect in vehicle purchase decisions. The empirical strategy follows from theory developed in Section 3, which posits that society rewards with status those who undertake pro-environmental actions, provided those actions are conspicuously visible. This status reward is increasing in the greenness of the community that bestows the benefits. All else equal, then, a Prius is more valuable in communities with a strong green ethos like Boulder, Colorado than in communities with greater heterogeneity in attitudes toward the environment, like, for instance, Greeley, Colorado. Thus, while shares of all green car models might be expected to be greater in green communities than “brown” communities due to the higher concentration of environmentally conscious consumers, shares of the uniquely designed Prius should be disproportionately greater in those communities if green purchases are motivated, at least in part, by green signaling.

Using observed variation in model ownership rates across communities in Colorado and Washington and relying on political outcomes as proxies for community greenness, we identify a statistically and economically significant conspicuous conservation effect in car purchases. This result has important implications for policies designed to improve the environment and for the private provision of public goods. Status seeking can increase private provision of public goods, which, in the absence of coercive policy, can be an important response to environmental challenges, like climate change. Such motives, however, cause the individual consumer’s objective to deviate from that of the social planner. The planner seeks to maximize environmental benefit per conservation dollar whereas the consumer may seek to maximize status gains per conservation dollar by undertaking highly visible conservation projects that may not yield the greatest environmental gain. Such distortion between the private and social objectives could generate an inefficient mix of conservation projects unless corrected by policy that treats preferentially inconspicuous conservation projects.

Eco-labeling and eco-certification programs have been the subject of considerable theoretical and empirical research, as have markets for green products generally (e.g., Segerson and Miceli, 1998; Khanna, 2001; Kotchen, 2005; Lyon and Maxwell, 2008; Mason, 2011; Veld and Kotchen, 2011). However, we are unaware of any prior research that has either developed a theory of green status-seeking by consumers, as opposed to firms, or empirically tested for conspicuous conservation effects, as defined here, in any context. This paper thus contributes to the literature by introducing a modern variant of conspicuous consumption, developing a theory of green status-seeking by consumers, testing for a conspicuous conservation effect in automobile purchases, and estimating the willingness to pay for green status afforded by Prius ownership.

² The Honda Insight was first introduced in 1999, 2 years before the Prius. However, it was a two-door subcompact car that sacrificed on amenities available in most passenger cars at the time. The Insight was re-introduced in 2010 as a four-door sedan, joining the class of four-door hybrids with unique model names and designs.
This paper proceeds in Section 2 with a brief review of the theories related to conspicuous consumption and green markets in order to motivate the concept of conspicuous conservation. The self-interested motivations for private provision of public goods are also related to the vast literature on altruism. The theory of green status-seeking is developed in Section 3. Sections 4 and 5 present empirical methods and data, respectively, while Section 6 contains results. Section 7 estimates the willingness to pay for the green halo conferred by Prius ownership. Implications and conclusions are discussed in Section 8.

**Status seeking and conspicuous conservation**

Economists since Veblen (1899) have relied on status-seeking motives to explain anomalies in consumption behavior like upward sloping individual demands and “non-additive” market demands (Leibenstein, 1950; Frank, 1985; Glazer and Konrad, 1996; Ireland, 1998, 2001; Barclay and Willer, 2007). Much of this work has focused on ostentation as a demonstration of affluence and has provided a theoretical basis to understand consumer demand for luxury goods that are functionally equivalent to less costly alternatives. Ireland (1998) and Bernheim (1994), for instance, were concerned with “bizarre” premia for designer fashions and high expenditures on cars.

The pursuit of status is thought to motivate not only demonstrations of extravagance, but also displays of charity and other prosocial behavior. Glazer and Konrad (1996), for instance, theorized that the paradoxical abundance of charity and dearth of anonymous giving could be explained by efforts to demonstrate wealth where consumption behavior is either unobservable or subject to imitation.

Other phenomena suggest that reputation is an important motivation for prosocial behavior and public goods provision. First, standard theory suggests that small extrinsic rewards for prosocial behavior should increase their provision. Yet such rewards are documented to crowd-out intrinsic motivations like altruism and warm glow (e.g., Becker, 1974; Andreoni, 1989, 1990) in a number of contexts (see Frey and Oberholzer-Gee, 1997; Frey and Jegen, 2001 for surveys). For instance, schoolchildren collected less charity when they were given nominal performance bonuses (Gneezy and Rustichini, 2000b), and parents became more delinquent in the timely retrieval of their children from childcare centers when small fines were imposed for late pick-ups (Gneezy and Rustichini, 2000a). Second, the provision of prosocial behavior declines when such behavior becomes less observable and increases when it is made public. Funk (2010) showed that the introduction of mail-in balloting in Switzerland did not increase voter participation rates anywhere and reduced voter participation rates in small communities even though the time-inclusive costs of voting declined. Similarly, when one’s election participation record is shared with neighbors, his participation increases (Gerber et al., 2008).

As Benabou and Tirole (2006) explained, such phenomena are consistent with reputational motivations for prosocial behavior. Where prosocial behavior becomes less conspicuous or where it provides a less clear signal of altruism, its provision is expected to decline. Reputational motivations can induce behaviors consistent with pure and impure altruism that are fundamentally self-interested in the traditional sense. Relatedly, psychologists have defined a competitive altruist as one who contributes to the public good in order to attain status that can generate economic rewards (Hawkes et al., 1993; Roberts, 1998; Hardy and Van Vugt, 2006; Barclay and Willer, 2007; Vugt et al., 2007).

As cultural norms change, it is natural to consider that the personal characteristics for which society confers status may change, and so, too, the behaviors that individuals exhibit to their peers. Thus, as preferences for environmental protection grow stronger and more prevalent, a homeowner may wish to conceal the extravagance of his home or draw attention to his fuel-efficient car. A number of studies have documented the importance of social norms in motivating conservation (e.g., Griskevicius et al., 2007, 2010; Allcott, 2009; Ayres et al., 2009; Goldstein et al., 2008). While a small, energy efficient home or automobile certainly provides private benefits to the owner, it also jointly provides a public good by reducing the environmental impact of consumption relative to some benchmark (Kotchen, 2006). Consumption of these “impure public goods,” then, constitutes prosocial behavior that can generate status.

As is true with conspicuous consumption, one’s peers are likely only to award status if status-worthy characteristics can be discerned from one’s behavior. The following section considers status motivations for private provision of public environmental goods.

**Theoretical foundations**

Much as the paucity of anonymous charity observed by Glazer and Konrad (1996) suggested the presence of status-seeking motives, so too does the relative success of highly visible green investments demand an explanation other than conventional altruism. Here we outline a theory premised upon social status that accrues to conspicuous green behavior.

Let two consumer types be “greens” (G) and “browns” (B). Both types reside in “communities” indexed by \( j \). Communities observe certain actions undertaken by community members and may bestow benefits to members depending upon the information communicated in the actions.

The proportion of green-type consumers living in community \( j \) is \( 0 < \theta < 1 \), and the proportion of brown types is \( 1 - \theta \). \(^3\)

We suppose that all consumers in a community have equal incomes, \( I \), and allocate those incomes between purchase of an

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\(^3\) In the subsequent application \( \theta \) is represented by the percent voter registration in the Democratic Party in Colorado and the percent vote for the Democratic Presidential candidate in 2008 in Washington.
automobile and consumption of a composite good, \( M \), with price \( p_m = 1 \). The composite good contributes directly to utility of both consumer types, and there are no environmental implications from its production and consumption.

Two brands of automobile, \( T \) and \( H \), are available for purchase, and each brand manufacturer produces two types of cars, a standard (or brown) car denoted as \( B^0 \) and \( B^1 \) for manufacturers \( T \) and \( H \), respectively, and a green car denoted as \( P \) and \( C \) for manufacturers \( T \) and \( H \), respectively. Only model \( P \) is conspicuously green. Both manufacturers charge the same price for their green and brown cars, but green cars sell for a price premium, \( p_G - p_B = \rho > 0 \).\(^4\) We assume that \( p_G < I \).

Consumers receive utility from owning and driving an automobile and from the composite good. In addition to their condition \( \delta^0 \) and \( \delta^1 \) for \( T \) and \( H \) brands, respectively, in which case consumers with no brand loyalty comprise population share \( 1 - \delta^0 - \delta^1 \). We assume that these shares are independent of \( G \) and \( B \) shares and are constant across communities. Shares, \( w \), of the six consumer types within a community \( j \) are straightforward to compute, e.g., the share of \( T \)-loyal greens in community \( j \) is \( w_{GT}^j = \delta^0 \cdot \delta^1 \).

For convenience, utilities are expressed in a separable form and it is assumed that, given preferences, each consumer optimally purchases one automobile among alternatives \( k \in \{B^0, B^1, P, C\} \), and spends the rest of his income on the composite good, i.e., \( \sum_{j=1}^{3} w_{j} = 1 - p_k \). Let \( f(M) \), \( F > 0, F' < 0 \), be the utility associated with consuming the composite good. Owning and driving an automobile may contribute to utility in multiple dimensions. First, all cars produce utility, \( D \), associated with driving services provided by each car type. \( N \) consumers get equal driving services from any vehicle: \( D(k) = D_n \) for all \( k \). Brand-loyal customers’ utility from consuming their preferred brand is at least as high as that obtained by nonloyals, i.e., the condition

\[
D(P | i = T) = D(B^1 | i = T) \geq D > D(C | i = T) = D(B^0 | i = T)
\]

holds for \( T \)-loyal consumers, and an opposite expression holds for consumers brand loyal to \( H \).

A \( G \)-type consumer cares about environmental protection and derives utility \( V \) from his contributions to an environmental public good due to either pure or impure altruism, or both. Thus, a \( G \) consumer achieves utility \( V(k) \) based on his vehicle choice where \( V(P) = V(C) > 0 \), and \( V(B^0) = V(B^1) = 0 \). \( B \) types are indifferent towards the environment and derive no utility associated with environmental outcomes.

Following Akerlof and Kranton’s (2000, 2010) theory of identity, utility of consumers is also increasing in their conformance to the norms of their chosen identities and decreasing in deviations from those norms. Let \( R(k) \) denote the utility component associated with identity. Thus, for type \( G \) consumers we have

\[
R(B^0 | i = G) = R(B^1 | i = G) < 0 < R(P | i = G) = R(C | i = G),
\]

with a similar set of inequalities holding for a type \( B \) consumer.

Finally, consumers may attain utility through status, \( S \), which is conferred by communities upon consumers who undertake observable (conspicuous) prosocial behaviors, e.g., driving a green car in this specific case. Let \( S(\delta^0) > 0 \) denote the status conferred by community \( j \) upon a consumer who drives an automobile that is observably green. We assume \( S(\delta^1) > 0 \), i.e., the reward from this pro-environmental status is increasing in the extent of a community’s greenness. That is, the status reward for private provision of an environmental public good is increasing in the community’s valuation of the public good, which is presumed to increase in community greenness. Only vehicle \( P \) is able to exhibit a consumer’s private provision of an environmental public good because vehicle \( C \) is not conspicuously different from vehicles \( B^0 \) and \( B^1 \).

Given the aforementioned considerations, the utility maximization problem of a green (brown) consumer in community \( j \) is:

Green: \[ \max_k U^G = F(l - p_B) + D(k) + V(k) + R(k) + S(k, \delta), \]

Brown: \[ \max_k U^B = F(l - p_B) + D(k) + R(k) + S(k, \delta), \]

where \( S(k, \delta) > 0 \) for \( k = P \), and \( S(k, \delta) = 0 \) for \( k \neq P \). The consumer’s decisions are as follows:

T loyal \( G \): A \( T \)-loyal \( G \) will buy \( P \) if \( V(P) + R(P) + S(P, \delta) - R(B^1) > F(l - p_g) - F(l - p_B) \); buy \( B^1 \) otherwise. A \( T \)-loyal \( G \) consumer would not buy a \( H \) vehicle in this model.

Nonloyal \( G \): Given the model specification, a nonloyal \( G \) consumer has the same decision as the \( T \)-loyal \( G \). A nonloyal \( G \) will buy a \( P \) (given the equal price assumption) if he purchases a green vehicle in order to capture the status benefit. If it is optimal for him to purchase a \( B \) vehicle, he is indifferent between vehicles \( B^0 \) and \( B^1 \).

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\(^4\) Our assumption that automobile prices are exogenous and given is consistent with the focus of the model on distribution of automobile purchases within localities. Manufacturer prices are set based upon costs and national or international market conditions. One might argue that local prices are endogenous nonetheless due to differences across communities in dealer markups, and, therefore, seek to determine prices and vehicle market shares within the model, e.g., using a Hotelling framework. However, we argue in the empirical section of the paper that competition across communities among dealerships for the same brand are likely to equalize markups, justifying the exogenous-price assumption. A model structured to determine local car prices based upon heterogeneity in consumer preferences would be quite different from the status-seeking model outlined here.
H-loyal C: An H-loyal G consumer may purchase a P, C, or \(B^H\) vehicle. Between the two green vehicles, he prefers P to C if \(S(P,\theta) > \max(D(P|i), H) - D(P|i) > H\), i.e., if the status accruing to driving P exceeds the greater driving services he receives from C, given his loyalties. Between P and \(B^H\), he prefers P if \(V(P) + R(P|i = H) - R(B^H|i = H) + S(P,\theta) > F(I - p_g) - F(I - p_C) + D(B^H|i = H) - D(P|i = H)\).

T-loyal B: A T-loyal B consumer will not purchase a H vehicle. He will purchase a P if \(S(P,\theta) \geq F(I - p_g) - F(I - p_C) + R(B^H|i = B) - R(P|i = B)\).

Nonloyal B: A nonloyal B consumer has the same decision calculus as a T-loyal B consumer as to whether or not to purchase a P vehicle. He is indifferent between vehicles \(B^H\) and \(B\).

H-loyal B: A H-loyal B consumer may purchase a P, C, or \(B^H\) vehicle. His decision criteria in choosing between P and C vehicles are the same as for the H-loyal G consumer. Between \(B^H\) and P vehicles, he will prefer P if \(S(P,\theta) > F(I - p_g) - F(I - p_C) + D(B^H|i = H) - D(P|i = H)\).\n
Let \(s_k\) denote the market share of vehicle \(k\) in community \(j\), where \(s_k\) is the sum of the probability weights, \(w\), for each vehicle type, \(k\), wherein that vehicle type yields the highest utility within a consumer class.

**Proposition 1.** P vehicle share is nondecreasing in the greenness, \(\theta\), of a community.

**Proposition 2.** C vehicle share may be increasing or decreasing in community greenness.

**Proposition 3.** The relative P to C share, \(s_P/s_C\), is nondecreasing in community greenness.

**Proposition 1** follows simply from the observation that community greenness affects the P share in two ways. Green consumers are more predisposed to purchase green vehicles because they receive incremental utilities \(V(k)\) and \(R(k|i = G)\) when they purchase a green vehicle. P vehicle share is increasing in community greenness the if reputational benefits of P vehicles are sufficiently large to cause H-loyal consumers who prefer C to P in brown communities to switch to P in green communities. Second, status benefit from purchasing P is increasing in community greenness. **Proposition 2** follows simply because, whereas the first of these effects benefits C market share, the second diminishes C share in favor of P vehicles, leading, thus, to **Proposition 3**. An empirical test of **Proposition 3** is the key focus of the subsequent three sections of this paper.

This model could be extended or generalized in various ways. For instance, instead of a two-point \(\{G, B\}\) distribution of consumers in a community, the distribution could be continuous, in which case \(\theta\) could be a summary statistic from that distribution, such as its mean. Status benefit, \(S(k,\theta)\), would be unchanged in this model, but utilities \(V(\cdot)\) and \(R(\cdot)\) would be functions of a consumer’s location along the greenness distribution. Shares of particular vehicles would be found in this model by locating consumers on the distribution who were indifferent between particular vehicle types, much as in a Hotelling model. Given that the role of \(S(k,\theta)\) is fundamentally unchanged, such a model is expected to yield propositions analogous to **Propositions 1–3** here. Likewise, the model could be extended to include heterogeneous preferences for reputational benefits, allowing that some consumers do not value reputational benefits. Their demand for green cars would be invariant to community greenness. As long as some consumers value reputational benefits and the gains from green car ownership are sufficiently large, market share of conspicuous green cars would increase disproportionate to inconspicuous green cars as predicted in the present model.

**Empirical methods**

In order to identify the Prius demand shift attributable to conspicuous conservation motivations and to estimate the average willingness to pay for the Prius halo, we would ideally obtain transaction-level data on vehicle purchases in communities identical except with respect to their distributions of environmental preferences. Such an ideal experiment was not available to us, and transaction-level data are proprietary and prohibitively costly. Instead, we employed market-level product-share data in a reduced-form treatment effects setting. Then, parameterizing a simple model with elasticity estimates from the literature, we recover willingness to pay estimates based upon our empirical results.

An alternative approach would have employed the random coefficients discrete-choice models of demand estimation introduced by Berry (1994) and Berry et al. (1995) (BLP), and extended by Nevo (2001) and Petrin (2002), among others. Such models are well suited to demand estimation from aggregate market-level data, such as that available for this paper. In such a model, our interest would center on an indicator for conspicuous green cars, i.e., the Prius, and on changes in the relative magnitude of that indicator’s coefficient in markets of varying community greenness. Alternatively, an interaction of the indicator and community greenness could be included directly in the specification of the consumer’s utility function. The strength of such models is their capacity to address price endogeneity and to impose realistic substitution patterns and, hence, cross-price elasticities within the demand system. These gains come at the cost of modeling assumptions, e.g., the specification of consumer utility, heterogeneity, the outside option, and the distribution of individual attributes. Nevo (2001), for instance, employs cross-sectional and temporal variation in prices to estimate demand parameters in the ready-to-eat cereal market.

Lacking a panel of market-level data, and in the absence of any data on prices, the present research gains little from the structural approach. Instead, we assume that price is orthogonal to the vehicle characteristic of interest, or at least not negatively correlated, and derive a statistically significant estimate of the demand shift due to conspicuous conservation.
that is arguably unbiased, or, if biased, then towards zero. Indeed, the coefficient of interest in this model, as will be articulated below, is identical to the interaction term in the BLP model sketched above, though the coefficients take on different interpretations. As our interest is in identifying a single demand shift, rather than primitives in a structural model of automobile demand, we are able to focus on variation in community greenness, while avoiding reliance on several functional-form and distribution assumptions that characterize BLP and related models (Timmins and Schlenker, 2009).

Our estimation strategy exploits spatial variation in vehicle model market share and in preferences for conservation and environmental protection in the states of Colorado and Washington. The benefits bestowed upon conspicuously pro-environmental consumption behavior should be greater the more one’s peers are concerned about the environment. Kahn (2007), for example, showed that communities in California with more registered Green or Democratic party members are home to more Priuses. Communities with more Republicans have more Hummers. Were there no status-seeking motivations for hybrid demand or were the Prius indistinct relative to other green cars, we would expect to see ownership patterns like those described by Kahn (2007), with hybrid cars enjoying greater market share in green communities. But a similar pattern should exist for all hybrid models with comparable greenness; their market shares should covary with measures of community environmentalism. If Prius owners also derive utility from the halo effect that is unique to a Prius, then, conditional on vehicle characteristics, the greater value of the halo in greener communities should cause Prius ownership to increase disproportionately in those areas relative to other hybrids like the Civic Hybrid.

Following Kahn (2007) and Kahn and Vaughn (2009), we measure the relative greenness of communities using election data, particularly support for the Democratic party. As has been observed in a number of settings, political ideology is highly correlated with environmental ideology. Politically conservative consumers are less likely to purchase energy efficient products when they are labeled with environmental messages than when they are not (Gromet et al., 2013); Households in communities with high Democratic and Green party registrations pay higher premia for homes with solar panels (Dastrop et al., 2010); per capita energy consumption has been trending upwards in majority Republican states but relatively flat in majority Democrat states; and public opinion surveys show that Republicans are more than three times as likely as Democrats to think that the seriousness of global warming is exaggerated in the news media (Loewenstein, 2009).

We focus on Democratic Party electoral data for this analysis. Green party affiliation could also be an important indicator of the strength and prevalence of preferences for environmental protection. Strategic voting, however, limits the Green party share of the electorate. Many environmentalists participate in Democratic party politics to ensure that their votes have the greatest impact on primary and general-election outcomes.

Markets are defined at the zip code level, the smallest geographical area for which car share data are available. We employ a reduced-form fixed-effects model that is effectively a regression-based difference in difference (DD) model with partial treatment. To motivate the full DD model, we first propose a two-by-two DD model in which we consider the market shares for the Prius and the Civic Hybrid in a green market and in a brown market. This 2 x 2 model assumes that the unique design of the Prius makes it a purchase that conveys status utility and that the Civic Hybrid is a perfect control for all attributes of the Prius except that it lacks a design that enables the owner to gain the status utility associated with conspicuous conservation. Its further assumes that green and brown markets are identical apart from preferences over the environment. Environmental preferences can be thought of as the policy parameter in treatment effect models with partial treatment. To motivate the full DD model, we first propose a two-by-two DD model in which we consider the market shares for the Prius and the Civic Hybrid in a green market and in a brown market.

Finally, aware that the Civic Hybrid, while similar to the Prius, is an imperfect control for attributes of the Prius apart from its unique design, we specify a full model that relies on the “common support” or “overlap” assumption on the distribution of covariates among treated and untreated groups. This specification incorporates many car models and controls for model heterogeneity with model fixed effects and for heterogeneous effects of green car characteristics according to market preferences for the environment by interacting a measure of a model’s greenness, \( \text{GREEN}_k \), with \( VOTE_j \). This serves to control for the Prius attributes apart from the unique design that could cause its demand to increase disproportionately in areas with high Democratic and Green party registrations.

\[ \hat{\beta} = (\frac{\hat{\sigma}_N^2}{\hat{\sigma}_C^2} - \frac{\hat{\sigma}_P^2}{\hat{\sigma}_C^2}) - (\frac{\hat{\sigma}_N^2}{\hat{\sigma}_C^2} - \frac{\hat{\sigma}_P^2}{\hat{\sigma}_C^2}) \]

where for \( k \in \{ \text{Prius, Civic} \} \), the \( V_j \) are the market fixed effects, \( D_k \) is a Prius indicator, \( VOTE_j \) is a measure of the greenness of the market (i.e., the strength of the policy), and \( \epsilon_k \) is an idiosyncratic error. The coefficient of interest is \( \beta \), which represents the change in Prius market share due to a one-unit change in \( VOTE_j \).

5 These states were chosen because of the availability and affordability of vehicle registration data and because of spatial variation in political preferences, which we use to measure community greenness.

6 It is reasonable to assume that this measure of market greeness is exogenous to Prius market share. Indeed, while Kahn and Vaughn (2009) show that environmentally minded individuals cluster around environmental amenities and mass transit access points, it is unlikely that individuals move to a community because they own a Prius or that Prius ownership induces individuals to align with the Democratic party.
green markets relative to other models. Specifically, we consider

\[ s_{jk} = \delta_k + \xi_j V_j + r \text{GREEN}_k \ast VOTE_t + \beta \text{PRIUS}_s + \xi J_k. \]  

(2)

where \( D_k \) now represents a product fixed effect and interest again centers on the estimate of \( \beta \). A characteristic unique to the Prius apart from its unique green design would violate the standard overlap assumption. Such a characteristic would bias estimation of the conspicuous consumption effect if it were correlated with market greenness.

Car manufacturer and dealer marketing effort may be correlated with the greenness of the region. In particular, one may be concerned that Toyota and Toyota dealers market Prius more heavily in green communities. Based on conversations with Toyota marketing executives, we believe that these concerns are minimal. Toyota marketing is undertaken at the national, regional, and dealer levels. Colorado and Washington are each fully encompassed within their respective marketing regions, so regional marketing cannot confound. In addition, Toyota indicated that Prius success in specific markets is largely independent of marketing effort. Data on model-specific marketing by dealers are unavailable. Nevertheless, in order to control for such effects, we defined dealer marketing areas by assigning each zip code to the nearest Toyota dealership using Euclidean distance from the zip code centroid. We then included separate fixed effects for each product in each marketing area by interacting the product dummies with dealer dummies.7

We address concerns related to omitted variables bias arising from variation in the relative demand for different vehicle attributes by different demographic groups in two ways. First, because marketing data indicate that hybrid car ownership is positively correlated with income and education, which are themselves highly correlated, and because both may be correlated with Democratic vote share, we allow for median household income to have a unique effect on the market share for each product. We do this by interacting the product dummies with median household income. In addition, while it is unclear whether the Toyota Prius should be in relatively higher demand in suburban areas or in cities, the high concentration of Democratic vote share in urban areas in our data suggests that population density may also confound the conspicuous conservation effect. Therefore, we also allow population density to have a unique effect on the market share of each product by interacting product dummies with population density.

As to vehicle prices, our vehicle data are market shares based upon vehicle registrations, and, thus, reflect local vehicle prices over a period of years, none of which we observe. However, omission of price information is important to the analysis only if model prices exhibited considerable variation at the zip code level. Such variation is unlikely, however, because consumers can readily arbitrage such price differences by shopping outside their communities. They have clear incentive to arbitrage for a major purchase, such as a car. Nonetheless, car prices may be uniformly higher, say, in rural areas, reflecting nonzero arbitrage costs and some buyers’ desire to buy local. Such an effect, however, should be captured in the dealer area fixed effect and not influence the distribution of shares among vehicles. The main issue for this analysis is if dealers were able to price discriminate, they could charge more for Prius in green communities in order to capture all or a portion of the green-halo status benefit. Although we think consumer arbitrage and dealer competition markedly limit such opportunities, it is worth noting that the effect, if it exists, would attenuate market shares of Prius in green communities, and bias the results from our model in the direction of finding no conspicuous conservation effect.8

Data

Data on all registered vehicles in the states of Colorado and Washington were obtained from the states’ respective vehicle licensing departments. For Colorado, 3.9 million vehicle identification number (VIN) records were matched to one of the 511 5-digit zip codes. For Washington, 4.2 million VIN records were matched to one of the 412 5-digit zip codes. A third-party, proprietary data set was used to decode the VINs in order to obtain the make, model, and year of the car in each vehicle record, as well as other characteristics used in this analysis, including the U.S. Environmental Protection Agency’s fuel economy ratings. We defined products by iteration of make and model (i.e., model generation). In order to reduce dimensionality, we did not treat each model year as a distinct product but rather grouped models across years as long as model design was unchanged.9

We generated the average characteristics of each “product” and dropped subcompact cars and luxury vehicles defined as those with Manufacturer Suggested Retail Price (MSRP) greater than $100,000. In order to further reduce dimensionality, we restricted attention to models manufactured by Acura, Cadillac, Chevrolet, Ford, General Motors, Honda, Lexus, Mercury, and Toyota since 2002—356 products in total and 27% and 25% of all cars registered in Colorado and Washington, respectively.

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7 This analysis includes all 19 Toyota dealerships in Colorado, i.e., 19 marketing areas. In Washington, we combined marketing areas for dealerships in the same cities or, in some instances, for proximal dealerships in nearby cities in order to improve the tractability of the econometric model. From the 30 dealerships in Washington, we created 18 marketing areas.

8 The literature has documented price discrimination according to buyer attributes like race and gender (e.g., Ayres and Siegelman, 1995), market experience and payment characteristics (e.g., Goldberg, 1996), and age (e.g., Harless and Hoffer, 2003). However, price variation due to these immutable characteristics likely cannot be arbitrated away unless buyers employ agents of different races or opposite genders or greater market experience to execute car purchase transactions. Non-trivial transactions costs likely permit some price discrimination along these dimensions to persist. In contrast, buyers can more readily conceal their preferences for the environment by shopping outside their communities, limiting the opportunity for price discrimination according to such preferences.

9 For instance, the 2010 Toyota Camry is the sixth generation of Camry ever produced. The sixth generation was first introduced in 2007. We group Toyota Camry’s from model years 2007 to 2010 as one product.
These brands manufactured all but a few of the hybrid vehicle models available in the U.S. by 2010. Our measure of market greenness in Colorado is Democratic party registration share in each zip code as reported by the Colorado Secretary of State. Washington state has an open primary system, so voters do not register with political parties. Therefore, our measure of market greenness for each zip code in Washington is vote share for Democratic candidate Barack Obama in the 2008 Presidential election.

Green car ratings are used to condition car characteristics that could have a heterogeneous effect on market share that varies with market greenness. For this rating, we used the American Council for an Energy Efficient Economy (ACEEE) “Green Book,” which grades all models in the U.S. on a 100-point curve according to their environmental impacts, with tailpipe emissions ratings, fuel economy, and curb weight being the most important inputs into the grades.\(^\text{10}\)

Summary statistics are reported in Table 1. Fig. 1 shows Democratic party share of registered voters in Colorado by zip code along with Prius locations (each dot denotes five Priuses). Likewise, Fig. 2 shows 2008 Presidential vote share for the Democratic party candidate by zip code in Washington along with Prius locations. Consistent with the findings of Kahn (2007), Priuses are clustered in the more Democratic areas.

Results

Results from the estimation of (1), the ‘\(2 \times N\)’ model, are reported in Table 2. We report results for Colorado using Democratic party registration as a measure of community greenness in column 1 and Green party registration as a measure of community greenness in column 2. We report both measures to demonstrate robustness of our results to alternative measures of community greenness. However, as described in Section 4, Green party measures are thought to be more reliable because of strategic voting concerns. The results from estimation of (2) are reported in Table 3 using two specifications. The top panel reports results from the model that includes only product-specific marketing area effects. The bottom panel reports our preferred estimates, which additionally include product-specific median-household-income and product-specific population-density effects in order to control for potential confounds. In all instances, we report the point estimate of the coefficient of interest, the standard error in parentheses, and the estimated elasticity of Prius market share with respect to Democratic (or Green Party) vote share in brackets.

The coefficient of interest on the interaction of the Prius indicator and the vote-share variable is positive and significant at the 99% level in each instance, and, thus, supportive of Proposition 1. These estimates suggest economically significant conspicuous conservation effects on Prius market share. The elasticity of Prius market share with respect to Democratic share is 0.33 and 0.1 in Colorado and Washington, respectively, as reported in Table 3. The change in Prius market share induced by a one percentage point increase from the mean in Democratic share is 0.000052 and 0.000062 in Colorado and Washington, respectively.

A series of falsification tests were conducted by sequentially replacing the Prius indicator and vote share interactions in (2) with (i) a Civic Hybrid indicator and Civic Hybrid-vote-share interaction and (ii) a Camry Hybrid indicator and Camry Hybrid-vote-share interaction. Because the Civic Hybrid and Camry Hybrid do not have unique designs, we expect the coefficient on these interactions to be non-positive. If market share for these models were independent of Prius market share, we would expect the coefficients to be insignificant. As reported in Table 4, however, the estimated coefficients on the interaction variables are negative and statistically significant, indicating the absence of a conspicuous conservation effect, and, moreover, that Prius is likely being substituted in place of the Civic Hybrid and Camry Hybrid in these areas due to the value of the green halo signaled uniquely by the Prius. These results viewed in conjunction with the results for Prius contained in Tables 2 and 3 are supportive of Proposition 3.

An alternative explanation for the disproportionate increase in Prius market share in green communities is a “social contagion” effect whereby an individual’s adoption behavior is a function of the adoption behavior of others. However, the mechanisms of social contagion are either consistent with the theory presented in this paper or unlikely to have caused the observed variation in Prius ownership. den Bulte and Lilien (2001) defined four causal mechanisms of social contagion: normative pressures, competitive concerns, network effects, and information transfer. The first is consistent with the status-seeking motivations that we described as inducing demand for the Prius halo. The second mechanism, in the present context, is equivalent to competitive altruism, and therefore also subsumed within the theory developed in this paper. With respect to the third mechanism, there is no reason to expect network effects associated with Prius ownership just as there are not likely to be network effects associated with adoption of other conventional or hybrid car models.\(^\text{11}\)

A careful analysis of potential information transfer mechanisms demonstrates that this, too, is unlikely to confound the preceding analysis. Information transfer would confound this analysis only to the extent that information transfer is heterogeneous across hybrid cars, i.e., if information transfer is more important to adoption of Prius than other models, including other hybrids. For instance, one might posit that “green” consumers evangelize to other consumers, who may be less informed about hybrid vehicle technology, and that the less-informed consumers, upon receiving “the good news”, preferentially choose the Prius because of its market share advantage. But even this model of information transfer would not

\(^{10}\) For more information about ACEEE Greenbook ratings, see http://www.greencars.org/greenbook_method.htm.

\(^{11}\) There may be network effects associated with plug-in hybrids, but they were not introduced until the 2012 model year and, thus, are not reflected in these data.
lead to a disproportionate increase in Prius market share in green communities in the absence of additional strong assumptions.

In contrast to the evangelism model, one could imagine individuals seeking out information from hybrid vehicle owners. Because the Prius is more conspicuous, these individuals are more likely to seek information from Prius owners who may be more likely to provide information that is preferential to the Prius. In such a model, one Prius begets another, which begets another, and so on. But, importantly, it suggests that Prius market share should grow more rapidly in green communities than other hybrid cars, but not that those hybrid cars should experience market share losses, as is exhibited in our data. The same social contagion forces should favor greater penetration of other green cars in green communities, if at lower rates than the Prius.

While such information transfer could occur, it is doubtful that it would be decisive in the decision making of the individual, and, therefore, be reflected in market shares, for several reasons. First, information transfer can either inform the consumer about a new technology about which he was previously uninformed or it can cause the consumer to update his beliefs about the costs and benefits of adopting the new technology. Focusing on the former type of information transfer

Table 1
Summary statistics.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Hwy MPG</td>
<td>22.27</td>
<td>7.61</td>
<td>23.54</td>
<td>8.11</td>
</tr>
<tr>
<td>City MPG</td>
<td>17.17</td>
<td>7.09</td>
<td>18.12</td>
<td>7.74</td>
</tr>
<tr>
<td>Green score</td>
<td>31.05</td>
<td>7.45</td>
<td>33.61</td>
<td>7.45</td>
</tr>
<tr>
<td>MSRP ($)</td>
<td>30,733</td>
<td>10,696</td>
<td>30,596</td>
<td>11,715</td>
</tr>
<tr>
<td>Dem. share</td>
<td>0.30</td>
<td>0.11</td>
<td>0.54</td>
<td>0.14</td>
</tr>
<tr>
<td>Pop./sq. mi.</td>
<td>1513</td>
<td>2405</td>
<td>1724</td>
<td>2716</td>
</tr>
<tr>
<td>Med. income ($)</td>
<td>48,506</td>
<td>14,538</td>
<td>45,303</td>
<td>13,339</td>
</tr>
</tbody>
</table>

Fig. 1. Prius ownership and Democratic party share of registered voters in Colorado (one dot denotes 5 Priuses). (For interpretation of the references to color in this figure caption, the reader is referred to the web version of this paper.)
first, it is unlikely to be influential in Prius sales because the Prius was aggressively marketed and enjoyed tremendous exposure in the popular press. Word-of-mouth information transfer was hardly necessary for learning about the existence of the Prius. Information from the neighbor about costs and benefits of the new technology would only be important if that information were unique and if it were uniquely influential in information transfer from Prius owners. Given the easy access to professional and consumer product reviews on the internet, the ease of communication across geographically dispersed social networks, and the abundance of free and paid media, it is unlikely that the information about costs and benefits from a neighbor is unique. It is also difficult to reconcile a theory of information transfer with the findings of UC Davis researchers who conducted extensive interviews with early adopters of hybrid cars in California. Heffner et al. (2007) conclude that symbolism was important to hybrid owners who had “only a basic understanding of environmental issues or ecological benefits of hybrid electric vehicles…” Thus, it is unlikely that Prius owners were transferring unique and important information to their neighbors.

Even if influential information transfers occurred disproportionately with Prius owners than owners of other green cars, it is doubtful that this would disproportionately favor Prius adoption. Consumers are known to routinely spend 3 months contemplating purchasing a new car before making the actual purchase decision given its importance relative to other household expenditures. Thus, even if a Prius owner were to educate a neighbor about hybrid car technology and recommend the Prius, it seems reasonable that this information transfer does not disproportionately favor the Prius relative

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**Table 2**

Conspicuous conserv. effect on Prius market share: $2 \times N$ model for Colorado.

<table>
<thead>
<tr>
<th>Dependent variable: product market share</th>
<th>(1) Democratic</th>
<th>(2) Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIUS*VOTE*</td>
<td>0.0094***</td>
<td>1.0139***</td>
</tr>
<tr>
<td>(0.0007)</td>
<td>(0.1163)</td>
<td></td>
</tr>
<tr>
<td>[0.59]</td>
<td>[0.42]</td>
<td></td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses. Elasticity of Prius share with respect to Democratic share in brackets.

* $p < 0.1$, ** $p < 0.05$, and *** $p < 0.001$
to its market share because the would-be Prius owner likely seeks additional information that will lead him to consider comparable cars, including similar hybrid and non-hybrid cars. Thus, it is difficult to identify a theory of information transfer to explain a disproportionate increase in Prius market share in green communities that is grounded in decision-theoretic microeconomic foundations.

Even if such a social contagion were likely, it would portend rising Prius market share overtime as more individuals learn about the car—this is the very essence of the "contagion" concept, i.e., that it can grow and spread like a contagious disease. Moreover, it predicts the market share of other green cars should also grow in the greenness of the community, but at a slower rate than the Prius. Both predictions of a social contagion model are belied by empirical evidence. Prius market share increased, leveled, and then declined from 2001 to 2006 (Heutel and Muehlegger, 2010). The falsification checks performed in this analysis also confirm that the market shares of comparable green cars, the Toyota Camry Hybrid and the Honda Civic Hybrid, decline in the greenness of communities, which is inconsistent with a story of information transfer, and, instead, suggests that individuals substitute away from these inconspicuous green cars and toward the Prius at rates that increase in community greenness.

### Estimating benefits from the Green Halo

In the absence of sales price data, and, hence, ability to estimate a Prius demand curve, our econometric results alone cannot value the Prius halo. A parametric model informed by the foregoing econometrics, however, can provide estimates of consumer willingness to pay for the environmental status afforded by Prius ownership. A locally linear Prius demand is
assumed and the conspicuous conservation effect is treated as a (parallel) demand shifter. For any community in the data, it is first determined what magnitude of Prius demand would, for a given price, generate an equilibrium market share equal to the model estimate of actual market share. Then, the hypothetical market share without the green halo is estimated by subtracting the estimated conspicuous conservation effect from the observed share, generating a hypothetical shift back in demand for a Prius without the green halo.

This approach is illustrated in Fig. 3. \(D_1\) represents Prius demand in a given community, measured in market share, and assuming that the Prius has all of its existing features except the halo-generating unique design. \(D_2\) represents actual Prius demand (including the green halo) if the community is “brown”. A green-halo effect is present, but it is less valuable than if the community is “green”, as represented by a demand shift to \(D_{2}\). As previously argued, Toyota must price the Prius nationally, and that price is represented in the Figure as \(P^n\). Given \(P^n\), the market share for Prius without the green halo is \(s_1\). Because of the conspicuous conservation effect, the Prius market share in the brown community is \(s_2\); it is \(s_2\) in the green community. The incremental willingness to pay in the brown and green communities is measured by the vertical shift in demand, the amounts \(W^B - P^n\) and \(W^G - P^n\), respectively.

To quantify the approach set forth in Fig. 3, we use our econometric estimates of the magnitude of the conspicuous conservation demand demand shifter from the previous section and fit locally linear demand curves using estimated price elasticities of demand for individual vehicle models from the literature. To our knowledge, there are no price elasticity estimates in the literature for the Prius or for individual hybrid models. Therefore, we relied on estimated elasticities for similar models. Specifically, Mannering et al. (1985) estimated a Toyota Corolla elasticity of 1.59, while Mannering and Winston (1985) estimated a Corolla price elasticity of 1.7. Honda Accord elasticities were estimated to be 2.0 and 4.8 by Mannering et al. (1985) and Berry et al. (1995), respectively. Because of the uniqueness of the Prius, its price elasticity likely falls in the low end of this range. Thus, although we present willingness to pay estimates using Barry’s elasticity estimate of 4.8 to form a lower bound on willingness to pay, we believe that the cluster of elasticity estimates in the 1.6–2.0 range likely generates the more realistic set of values for willingness to pay.

With these elasticity estimates and the estimated magnitude of the conspicuous conservation effect, the willingness to pay for the Prius halo is estimated. Using preferred specifications from the bottom panel of Table 3, the willingness to pay for the green halo in a Colorado community with mean Democratic party registration share (0.30) is estimated to be between $1,402.84 and $4,208.53, depending on the demand elasticity estimate chosen to parameterize the model. In Washington, willingness to pay for the green halo in a community with mean Democratic vote share (0.53) is estimated to fall in the range $430.45–1,291.34. These results are reported in Table 5.

Spatial variation in green intensity implies that the willingness to pay for the Prius halo is greater in some communities than in others, as Fig. 3 illustrates. Table 6 reports for each of the three price elasticities the difference from state-mean willingness to pay for two green cities with high Democratic registration shares in Colorado (Denver and Boulder) and two brown cities with low Democratic registration shares in Colorado (Longmont and Loveland). Similar estimates are reported for two green cities with high Obama vote share in Washington (Seattle and Spokane) and two brown cities with low Obama vote share (Yakima and Richland). The table also reports, for each city, the difference from statewide mean willingness to pay as a percent of statewide mean willingness to pay. In Denver, for instance, the value of the green signal is estimated to be more than twice the state mean. The signal is worth as much as $5,000 more in Denver than the average Colorado community. Likewise, it is worth as much as $3,400 more in Boulder. In less green communities, like Longmont and Loveland, however, the value of the green signal is worth as much as $300 and $700 less than the state mean, respectively. In Seattle, the signal is worth 54% more than the Washington state mean (as much as $698 more), whereas in Richland, it is worth 27% less than the state mean (as much as $350 less).

The benefit to Toyota from designing the Prius to convey the green halo is not easy to estimate because Toyota’s pricing decisions likely involve fleet considerations and constraints imposed by CAFE standards. For example, given the high fuel economy of the Prius, Toyota could rationally choose to sacrifice profits from the Prius by setting price below a monopoly optimum in order to expand market share and improve its CAFE rating. However, back-of-the-envelope calculations can provide insight into how much of a price premium Toyota is likely to capture on the Prius due to the green halo. Such a calculation depends upon an estimate of the price of a Prius without signaling value. Because Toyota does not manufacture such a counterfactual Prius, one is created by adding the estimated cost of Toyota’s hybrid system to the price of the most comparable conventional car in the Toyota fleet. According to Consumer Reports, the Toyota Corolla is “the closest available” non-hybrid alternative to the Prius, considering “all factors, including performance, safety, and features” (Consumer Reports, 2011). Thus, the price of a hypothetical Prius without signaling value is calculated as the price of a hypothetical hybrid version of the Toyota Corolla. The price of the most comparable Corolla, the Corolla LE, was $15,615 in 2008. In order to estimate the price of a Corolla with a hybrid system, we infer the cost of Toyota’s hybrid system by comparing the price of the Camry Hybrid with a comparably equipped non-hybrid version of the Camry. Apart from the hybrid system, a 2008 Camry Hybrid priced at $25,200, was comparable to the Camry LE, priced at $20,025, and to the Camry SE, priced at $21,240. Assuming Toyota’s margin is the same across Camry trims, then the 2008 cost of the hybrid system was between $3,960 and

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12 Assumption of a parallel shift is of no great consequence for the analysis here. Our data do not allow estimation of slope changes in demand because we are unable to construct interaction terms with a price variable.

13 Toyota has not offered a hybrid version of the Corolla.
The price of a hypothetical Corolla hybrid, then, would be $19,575 to $20,790, assuming a constant absolute markup. A rough estimate of the markup extracted by Toyota due to the Prius’ green halo is the difference in the price of a 2008 Prius ($21,500) and the price of the hypothetical Corolla hybrid, which is between $710 and $1925. Cognizant of the likely complexity of Toyota’s pricing decision for the Prius, this estimated Prius halo markup is consistent with estimates of consumer willingness to pay earlier in this section. A monopoly seller and consumers share the benefits of a demand shift according to the functional forms of demand and the seller’s marginal cost. In the benchmark case of linear demand and constant marginal cost, the seller captures by higher prices exactly half of the incremental willingness to pay.

Conclusion

This paper introduces conspicuous conservation as a modern variant of conspicuous consumption that is intended to garner social status. In the theoretical model, status is attained by consumption of conspicuous green products, i.e., private provision of an environmental public good, and its value is increasing in the strength of environmental preferences of one’s peers, i.e., the

Table 5
Estimated mean willingness to pay for the Prius Halo (in dollars).

<table>
<thead>
<tr>
<th>Percent change in share</th>
<th>Price elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>– 1.6</td>
</tr>
<tr>
<td>10.1 (WA)</td>
<td>1291.34 [229.11, 2353.57]</td>
</tr>
<tr>
<td>32.9 (CO)</td>
<td>4208.53 [2023.33, 6393.73]</td>
</tr>
</tbody>
</table>

95% confidence interval is reported in brackets holding elasticity constant.

Table 6
Willingness to pay for the Prius Halo (in dollars) relative to state mean.

<table>
<thead>
<tr>
<th>City</th>
<th>% Diff. in WTP relative to state mean</th>
<th>Price elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>– 1.6</td>
</tr>
<tr>
<td>Colorado</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denver</td>
<td>120.75</td>
<td>5082.13</td>
</tr>
<tr>
<td>Boulder</td>
<td>81.22</td>
<td>3418.13</td>
</tr>
<tr>
<td>Longmont</td>
<td>– 7.74</td>
<td>– 325.87</td>
</tr>
<tr>
<td>Loveland</td>
<td>– 17.63</td>
<td>– 741.86</td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seattle</td>
<td>54.10</td>
<td>658.66</td>
</tr>
<tr>
<td>Spokane</td>
<td>22.54</td>
<td>291.07</td>
</tr>
<tr>
<td>Yakima</td>
<td>– 7.17</td>
<td>– 92.55</td>
</tr>
<tr>
<td>Richland</td>
<td>– 27.59</td>
<td>– 356.28</td>
</tr>
</tbody>
</table>

$5,175. The price of a hypothetical Corolla hybrid, then, would be $19,575 to $20,790, assuming a constant absolute markup. A rough estimate of the markup extracted by Toyota due to the Prius’ green halo is the difference in the price of a 2008 Prius ($21,500) and the price of the hypothetical Corolla hybrid, which is between $710 and $1925. Cognizant of the likely complexity of Toyota’s pricing decision for the Prius, this estimated Prius halo markup is consistent with estimates of consumer willingness to pay earlier in this section. A monopoly seller and consumers share the benefits of a demand shift according to the functional forms of demand and the seller’s marginal cost. In the benchmark case of linear demand and constant marginal cost, the seller captures by higher prices exactly half of the incremental willingness to pay.
community’s valuation of the environmental public good. This phenomenon is identified in the demand for the Toyota Prius using zip-code-level data on vehicle ownership in Colorado and Washington. Empirical results suggest that consumers in Colorado and Washington are willing to pay up to several thousand dollars to demonstrate their environmental bona fides through their car choices. These results support predictions of the theoretical model and suggest that status-seeking by environmentalists can increase the private provision of environmental public goods via purchases of impure public goods in the green market. This motivation also suggests opportunities for firms to price discriminate, differentiate products, and gain market share by developing conspicuous green products.

While much of the literature on conspicuous consumption emphasized the wastefulness of spending to signal wealth, conspicuous conservation may improve social welfare by moving towards optimal provision of environmental protection, particularly in the presence of market failures that under-value environmental amenities and in the absence of first-best policies. In wealth signaling models characterized by utility over one’s consumption in relation to a peer, conspicuous consumption leads to the “Keeping Up with the Joneses” arms race that induces wasteful and costly signaling that does not change the relative position of competitors. All are made worse off (Hopkins and Kornienko, 2004). In a similar model of green status seeking, however, the competitors may be made worse off while others, and society writ large, may be better off because the competition is over provision of public goods, not wastefulness. Thus, there may exist a role for policy to enhance the conspicuousness of private behaviors that bear on the stock and quality of environmental public goods. Household energy billing records, for instance, are public record in some jurisdictions in the United States but protected from disclosure by law in others. If such information were made public and easily accessible, once private behavior would become conspicuous, perhaps inducing conservation.

The social welfare implications of conspicuous conservation, however, depend upon substitution effects with respect to conservation effort. The status-seeking motive can distort private incentives from those of the social planner, generating conservation investment that is individually rational but not social welfare maximizing. For instance, homeowners may over-invest in residential solar power because of its conspicuousness and under-invest in home insulation improvements, energy-efficient heating and cooling systems, and window sealing treatments because of the relative inconspicuousness of those investments.

Policy makers, then, should re-evaluate subsidies for conspicuous green products such as green cars and solar panels in order to better align private incentives with behaviors that are in the public interest. Subsidies should be targeted toward inconspicuous conservation in order to achieve a more efficient mix of conservation effort. Moreover, policy makers should be mindful of the potential to crowd out intrinsic motivation with extrinsic rewards like tax-breaks and subsidies. Because conspicuous-conservation goods enable their purchasers to demonstrate their willingness to sacrifice to enhance the environment, the public subsidy of such goods diminishes their reputational value. Public support for conspicuous green products may, therefore, have the perverse effect of reducing their demand.

Since 2010, vehicle manufacturers have introduced several green car models with unique model names and unique designs. These include the electric-powered Honda Leaf, a redesigned Honda Insight hybrid, and the Chevrolet Volt gas-electric car. These product introductions may reflect industry recognition of the conspicuous conservation effect. Regardless, they present an opportunity for further empirical work on conspicuous conservation. For instance, with suitably disaggregated data, it may be possible to identify whether neighbors engage in escalating battles over vehicle greenness, demanding ever-greater expenditures on the newest and greenest vehicle technologies. They also raise interesting questions about how firms decide to introduce green variants of the conventional fleet or to launch new green models.

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