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Reconciling Eco and Ego? The interplay between environmental and image concerns in consumption choices*

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Abstract

We explore the interplay between two key individual drivers of green consumption: intrinsic moral concerns for the environment and reputational concerns for social image. Our microeconomic behavioral model characterizes choices among lifestyles differing in environmental impacts (brown/green) and conspicuousness (positional/discreet), depending on how strongly one values each of these motives. We show that image concerns can substitute for environmental concerns in driving green consumption across a limited but central range of preferences, in particular through the purchase of green positional goods. Such conspicuous conservation can green individual consumption (*reconciling Eco and Ego*), especially among image-sensitive consumers, but it yields environmental benefits only under specific economic conditions. Indeed, the environmental impact of a lifestyle depends critically on its *relative impact intensity*, i.e., the pollution per dollar spent on this lifestyle, more than on the pollution per unit of the representative good of the lifestyle,

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driving volume effects and behavioral rebound effects, which both reduce the environmental benefits of green lifestyles. Knowing the collective distribution of preferences may help design targeted policies, as those preferences strongly determine policy effectiveness. Our findings are especially relevant for policies that aim to foster greener consumption choices in different economic contexts (e.g., green nudging, environmental taxes with higher rates on positional goods...).

Keywords: *Green consumption, Conspicuous conservation, Moral consistency, Environmental concern, Image concern.* **JEL codes:** D01,D11,D62,D91.

1 Introduction

Amid escalating environmental concerns, a growing number of consumers feel they have a personal moral responsibility to adopt more eco-friendly lifestyles[1] and that these are the socially appropriate behaviors. Thus, green consumption is increasingly viewed as a key component of one's *social image* — defined as an individual's perception of how others view their behavior (Bursztyn and Jensen, 2017). This is epitomized by the so-called "Prius effect" (Sexton and Sexton, 2014), in which purchasing an electric car serves as a signal of both moral environmental responsibility and social status.[2] This exemplifies the rise of *conspicuous conservation*, with some consumers "going green to be seen" (Griskevicius et al., 2010). In other words, moral motivations and social pressure may reshape traditional conspicuous consumption (Veblen, 1899) — the display of wealth or status through *positional goods* (Hirsch, 1976), such as luxury cars or big houses — by adding an environmental dimension to it. The growing appeal of expensive electric vehicles among environmentally conscious consumers illustrates this interplay between environmental and image concerns: some individuals may be ready to pay more for choices that are both socially rewarded and (seen as) environmentally beneficial. This trend contrasts with the view of status-driven consumption as being environmentally damaging (Frank, 1985), often due to overconsumption. Shifting moral values—as seen in phenomena like "flight shame" (Grossman, 2015), discouraging air travel among eco-conscious individuals— suggests that image concerns might now help curb consumption or at least mitigate its impacts. This raises the question of whether *Eco* (typically referring to green and other pro-social behaviors) can be reconciled with *Ego* (encompassing self-motivated behaviors).

Pro-environmental behaviors are playing an increasingly central role in shaping consumer image. Whether such image concerns, in turn, can drive the adoption of greener lifestyles remains an open question. We theoretically investigate the role of moral and image concerns in shaping consumer choices, and in particular the greening of lifestyles, and their environmental consequences. The role of morality, status, and social norms in pro-environmental behaviors is well-established, but much of the theoretical literature assumes that greener choices are always cleaner (e.g., Dasgupta et al., 2015). However, this assumption overlooks the ambiguous role of image concerns in "green" behavior: while shame may discourage the consumption of polluting goods (e.g., luxury combustion cars conflicting with climate goals), image considerations can also create a disconnect between perceived and actual impacts (e.g., viewing the purchase of an electric car as inherently eco-friendly). Such conspicuous green — but not necessarily clean — goods

[1] Throughout the paper, *lifestyle* refers to combinations of total expenditure in different goods, resulting in consumption levels of those goods and subsequent environmental impacts.

[2] Status can be understood as the social honor and prestige granted to an individual by others in recognition of their actions and possessions (Dawson and Cavell, 1987). In our model, exogenous status motives are internalized by consumers, providing a psychological incentive for (green) conspicuous consumption, even when they are not directly observed by other people.

raise important questions: which types of consumers choose them, and why? We contribute to bridging this gap by introducing a microeconomic model of preferences for green consumption. We develop a utility maximization framework to analyze how individual lifestyle choices shape collective outcomes under varying socioeconomic conditions—such as prices, income, and the magnitude of environmental issues—when consumers differ in their environmental and image[3] concerns. The model incorporates two interacting internal motives for green consumption: an *intrinsic* moral drive and a *reputational* pursuit of a social image aligned with those moral values. The latter may be shaped by internalized social norms—such as the perceived inconsistency of frequent flying with environmental concern—even in the absence of direct social scrutiny. Image benefits can arise from consuming positional and/or green goods, creating a trade-off between standard (polluting) conspicuous consumption and (cleaner) conspicuous *conservation*.

Our contribution to the literature is threefold. First, we investigate the effects of two main drivers of pro-environmental behaviors on lifestyle choices, focusing on the interaction of morally motivated environmental concerns with social image concerns (Brekke et al., 2003; Bénabou and Tirole, 2006), which remains underexplored in the context of green consumption. While we assume that consumers with low environmental concerns engage in status-seeking, consumers who care about the environment seek to align[4] their moral values with the social image projected through their consumption, rather than conforming to social norms as in most models of green behavior (Nyborg and Rege, 2003; Dasgupta et al., 2015). Following the distinction from te Velde (2022), image concerns of morally motivated consumers are driven by *respect-seeking* rather than by *approval-seeking* through conformity. Without modeling direct interactions between consumers, as in strategic observability models (Bénabou and Tirole, 2006), we assume that consumers derive well-being from purchasing goods that enhance their appearance—both in the eyes of others and in their own eyes. In turn, consuming those goods makes them feel better about themselves, which corresponds to the *warm glow* of social- and self-image rewards (Grossman and Levy, 2024), i.e., the intrinsic satisfaction of doing good. This allows us to study how intricate environmental and image concerns shape the appeal of green positional goods by extending the analysis of moral concerns for green (Daube and Ulph, 2014; Planas, 2018) and prosocial behavior via such warm glow effects (Andreoni, 1989). Our approach is motivated by both theoretical (Bénabou and Tirole, 2011) and empirical (Griskevicius et al., 2010) research showing that people can internalize social norms and therefore consume *as if* they were observed even if they are not directly.

Next, our paper also speaks to a broader literature linking reputational motives to

[3]In our paper, *image* implicitly refers to both social- (e.g., status and reputation) and self-image (own perception of oneself, e.g., relative to moral values; see Brekke et al. (2003)). Nevertheless, these correspond to two distinct (although interacting) drivers of behaviors, as clarified in the model below.

[4]We thus also contribute to the literature on the *value-action gap* (Aagerup and Nilsson, 2016).

environmental outcomes (Sexton and Sexton, 2014; Boon-Falleur et al., 2022). While Frank (1985) warned that status-driven image concerns may fuel overconsumption, we ask whether the interplay between moral motivation and the quest for social validation by others can instead encourage greener choices and lower overall consumption.[5] Our framework ties these behavioral drivers to specific economic conditions (e.g., prices) and environmental outcomes. By emphasizing a duality in reputational motivations, we provide a structured lens for assessing policy effects across diverse population groups, which we think is a valuable contribution to the literature on image and status-driven behaviors.

Lastly, we contribute to a growing literature on the ambiguous collective effects of pro-environmental behaviors (Alpizar et al., 2024; Kaufmann et al., 2024). Unlike Kaufmann et al. (2024) who look at general equilibrium effects, our approach focuses on the demand side due to our behavioral lens. This aligns more closely with Alpizar et al. (2024), especially in addressing rebound effects of green consumption. In our framework, such effects may be driven not only by income but also by individual preferences for non-positional green goods—which are cleaner, cheaper, and still carry image value. As shown by Sekhon and Soule (2020), even discreet anti-consumption practices (e.g., recycling or sharing) driven by environmental concerns can enhance reputation when made visible. This justifies including non-positional green goods as a source of image benefits for environmentally motivated consumers,[6] reinforcing the relevance of our model for capturing a wide range of green consumption behaviors.

Our findings[7] suggest that image concerns can substitute for environmental ones under some economic and cultural conditions—partly challenging Veblen's view that conspicuous consumption mostly harms the environment (Veblen, 1899). One main result emphasizes the contribution of green positional goods to smoother lifestyle switches (in terms of changes in environmental impacts) along the distribution of environmental preferences. When people care about their social image, such goods give consumers an opportunity to partly *reconcile Eco and Ego*. This effect is amplified if green positional goods fully replace standard status goods—for instance, when polluting conspicuous consumption is more heavily taxed. In that case, consumers with low environmental concern but sufficient image concern have no choice but to switch to greener lifestyles to preserve their image benefits. However, in general, whether an increase in image concern is environmentally desirable depends first on consumers' level of environmental concern. Furthermore,

[5] This loosely connects our work to the degrowth literature, advocating for reduced consumption for sustainability (Parrique, 2022). While our static model cannot fully capture degrowth dynamics, we are among the first to link this concept to underlying image and moral concerns at the consumer level.

[6] Whereas the consumption of positional goods is always visible, we assume that consumers can also choose to make the consumption of discreet goods observable (e.g., via the social media), and would do so for pro-environmental behaviors.

[7] Although they are illustrated by figures representing cases with specific parameters to enhance clarity, our results are analytical and generally robust to the choice of parameters.

the environmental consequences of moral and reputational motives critically depend on the *relative impact intensity* of each lifestyle—that is, the pollution generated per dollar spent on their consumption. We show that when conspicuous consumption involves lower impact intensity per dollar spent (for example, due to higher prices limiting overall consumption quantities), increasing environmental concern may paradoxically increase individual pollution, for some levels of image concern. To our knowledge, this effect had not been identified yet in the literature. This allows us to discuss the possibility of *behavioral rebound effects* (Dorner, 2019) that may be reinforced by image concerns (Alpizar et al., 2024). While earlier studies often associate green consumption with reduced environmental impacts (Dasgupta et al., 2015), we highlight potential discrepancies. First, promoting green choices through income growth can actually drive higher overall consumption and pollution through volume effects. Second, the *warm glow* of green choices, together with reputational rewards, may cause individuals to focus more on how their choices are perceived than on their actual environmental consequences, even among those who care deeply about the environment. This phenomenon is exemplified when discreet, yet more impact-intensive, green goods are preferred by the most environmentally concerned consumers. The latter may therefore prioritize the image of their consumption over its actual environmental impact, implying that a moderate collective emphasis on image could be more environmentally beneficial.

The paper proceeds as follows. Section 2 presents a model of heterogeneous preferences for green consumption. Section 3 explores how the economic context shapes individual lifestyle choices. Section 4 analyzes individual and collective impacts under varying preference distributions. Finally, Section 5 discusses results, limitations, and implications for future research.

2 A model of lifestyle choices with heterogeneous environmental and image concerns

2.1 Economic model: definitions and notations

Notations and assumptions on parameters. Consider a consumer allocating their entire budget[8] R across four versions of a composite good spanning all consumption domains (such as food, mobility, energy, etc.), each characterized by two dimensions: environmental quality—classified as 'green' (G) or 'brown' (B)—and intrinsic conspicuousness—classified as 'positional' (P) or 'discreet' (D). The four goods $\{\mathrm{GP}, \mathrm{GD}, \mathrm{BP}, \mathrm{BD}\}$[9] are consumed in quantities $(q_{GP}, q_{GD}, q_{BP}, q_{BD})$, characterizing the consumer's *lifestyle*.

[8] In our static model without saving, income is interpreted as exogenous total expenditures.

[9] We use a discrete choice set rather than a continuum of goods, as this is closer to our literature (Dasgupta et al., 2015; Planas, 2018) and because it makes it easier to test the model (see Section 5.1).

We denote the exogenously given environmental impact associated with good i as γ_i and assume the following order.

Assumption 1 (Environmental impact order) $0 < \gamma_{GD} < \gamma_{GP} < \gamma_{BD} < \gamma_{BP}$.

Brown goods exhibit a greater environmental impact than their green counterparts, albeit all goods pollute. This departs from most models, in which green goods are generally assumed to be perfectly clean (e.g., Dasgupta et al., 2015). We adopt this approach to acknowledge that most green products are not entirely clean and still have non-negligible environmental impacts (Alpizar et al., 2024). Moreover, due to their resource-intensive production processes, positional goods usually pollute more than their discreet counterparts. While this assumption may not align with some specific examples, it holds for goods with relatively high environmental impacts—such as cars or exotic holidays—where positional goods are generally more resource-intensive to produce or consume.

Furthermore, goods differ in their cost. Positional goods are more expensive than discreet ones, reflecting a *status premium* paid to signal wealth and prestige. Similarly, without environmental taxes, green goods cost more than brown ones, with consumers often willing to pay a *green premium* for more sustainable choices (Bartling et al., 2014), in particular to signal[10] this virtuous choice to others (Sexton and Sexton, 2014). As this green premium is higher for visible green goods (e.g., Griskevicius et al., 2010; Berger, 2019), we assume in our benchmark (without a tax) that GP is much more expensive (see the price[11] values in Section 3.1), while BD (used as a numéraire) is the cheapest, as it brings neither status nor environmental benefits. However, the model is flexible regarding whether GD or BP is more costly, which we sum up by the two versions of our price assumption. Which version holds depends on the relative size of the environmental versus status premium: if the first is higher (resp. lower) than the second, then Assumption 2A. (resp. 2B.) holds.

Assumption 2 (Price order) *With p_i the respective prices of good $i \in \{GP, GD, BP, BD\}$, we may have either of the two following relationships:*

2A. $p_{BD} < p_{BP} < p_{GD} < p_{GP}$

2B. $p_{BD} < p_{GD} \leq p_{BP} < p_{GP}$

We focus on a world in which the cost of pollution is not encompassed in prices and thus rely on Assumption 2A as a benchmark, while Assumption 2B can hold when applying a tax at the marginal damage to correct for environmental market failures, as discussed in Section 3.3.

[10] Choices can be either private or public, partly motivating status-seeking and reputation concerns. Yet, the signaling process itself and associated individual responses fall beyond the scope of our model.

[11] Strictly speaking, '(production) costs' may be more appropriate, as prices are linked to the notion of market, whereas the model is about how individuals allocate their income to different lifestyles. Yet, for simplicity and coherence with the demand-side literature, we stick to the term 'prices'.

Individual preferences and well-being. Individual preferences are characterized by two parameters reflecting their environmental concern – $\alpha \in [0,1]$, and *social* image concern – $\beta \in [0,1]$. The well-being W of a consumer of given preferences (α, β) is

$$
\begin{aligned}
W(q_{GP}, q_{GD}, q_{BP}, q_{BD}) \;\; = \;\; & u(q_{GP} + q_{GD} + q_{BP} + q_{BD}) \\
& -\alpha d[\gamma_{BP} q_{BP} + \gamma_{BD} q_{BD} + \gamma_{GP} q_{GP} + \gamma_{GD} q_{GD}] \\
& +\beta \left[\alpha(q_{GP} + q_{GD}) + (1-\alpha)(q_{GP} + q_{BP})\right] \qquad (1)
\end{aligned}
$$

the sum of the benefits and costs of the three following consumption drivers, corresponding respectively to extrinsic (price effects on total consumption), intrinsic (moral motivation), and reputational (social image) drivers of prosocial behavior identified by Bénabou and Tirole (2006), where only the second and third are valued differently across consumers.

The first component is a 'regular' utilitarian term u capturing the utility derived from overall consumption *per se*, i.e., from the characteristics of the goods apart from their environmental and image impacts. Without loss of generality, we normalize the unit of the different goods so that they contribute similarly to this utility, which thus depends on the sum of consumption. For model exploration and in all the results, we take a logarithmic specification for this function, i.e., $u = ln(q_{GP} + q_{GD} + q_{BP} + q_{BD})$.

The second component corresponds to the *moral* disutility of consuming goods that pollute,[12] similarly to Brekke et al. (2003). This captures the consumer's discomfort from (marginally) contributing to pollution. The parameter α represents the proportion of the environmental damage $d \sum_i \gamma_i q_i$ generated by the consumer's total consumption that they internalize, where d denotes the exogenous and constant marginal social cost of pollution (Kaufmann et al., 2024).[13] Consumers with $\alpha = 0$ are not concerned at all by the environment and overlook pollution in their choices. Consumers with $\alpha = 1$ are highly concerned by the environment and fully internalize the damage caused by their consumption even though their own contribution is negligible, similar to Kantian (or deontologists) consumers studied in Daube and Ulph (2014). Intermediate values correspond to intermediate environmental preferences.

The third component captures social image benefits from consumption, with the parameter β representing the consumer's sensitivity to the gaze of others on their choices, i.e., their need for *social validation*. The key novelty of our model is that this linear[14] image component integrates both green and conspicuous consumption, as consumers may choose green goods not only for their environmental benefits but also to make a good im-

[12] As in Brekke et al. (2003), this can also be seen as a *self-image* driver of behavior.

[13] We assume consumers do not affect aggregate pollution in a large population, a standard approach in models of moral motivation (Daube and Ulph, 2014). Thus, the pollution caused by their consumption is marginal relative to an exogenous level, with constant marginal damage—effectively a linear or linearized damage function around that exogenous level.

[14] The choice of linearity is an advantage for empirical tests discussed in Section 5.1, as this framework can be easily adapted to design Discrete Choice Experiments or perform some regression analyses.

pression. This is consistent with canonical signaling models (Bénabou and Tirole, 2006) and with empirical evidence that internal consumption motives are often psychologically entangled (Griskevicius et al., 2010). This interaction between moral motivation and image concerns also draws on the concept of the warm glow of giving (Andreoni, 1989),[15] referring to the intrinsic satisfaction derived from seeing oneself *(self-image)* and being seen by others *(social image)* as engaging in prosocial behaviors (Grossman and Levy, 2024)—in this case, adopting a green lifestyle. This 'image benefit' is encompassed in the functional form:

$$v = \beta\left[\alpha(q_{GD} + q_{GP}) + (1-\alpha)(q_{GP} + q_{BP})\right] \tag{2}$$

$$= \underbrace{\beta(q_{GP} + q_{BP})}_{\text{usual conspicuous term}} + \underbrace{\beta\alpha(q_{GD} - q_{BP})}_{\text{environmental effect}} \tag{3}$$

The environmental preference parameter α measures how much pro-environmental behavior enhances a person's image relative to standard conspicuous consumption in a world where consumers would choose to display their consumption of discreet goods when they are green. As environmental concern rises, image benefits become more strongly tied to green consumption rather than conspicuous consumption (Eq. 2), reflecting consumers' pursuit of *moral consistency* (Mullen and Monin, 2016). Rewriting terms as in Eq.(3) provides an alternative interpretation: beyond the benefits of conspicuous consumption, consumers concerned by the environment and their image incur a pride benefit and warm glow of green discreet consumption and a shame cost of brown conspicuous consumption (e.g., "flight shame").

Here, the more consumers seek social validation, the more they care about the signal their consumption choices send. The higher their moral motivation α, the more likely they are to adopt a green lifestyle to be seen as true to their values—which corresponds to the *respect-seeking* social image motive identified by te Velde (2022), rather than mere status-seeking. We posit that *pride (shame)* feelings experienced with green (brown) consumption grow with α, as these result from a consistency with (or a discrepancy between) personal values and social image. Assuming image benefits can be specified by Eq.(2), the choice of the GP lifestyle could help *reconcile Eco and Ego* by providing image benefits all over the distribution of environmental preferences. Thus, environmental concerns shape lifestyle choices via both intrinsic moral and reputational motives.

[15] The second and third component of the well-being function relate to the literature on pure and impure altruism (Andreoni, 1989): while moral internalization of damage operating regardless of any image considerations and of impacts on outcomes would consist in *pure altruism*, the social image function includes *impure altruism*, i.e., a mix of pure altruism and *warm glow* (hence the interaction).

2.2 Characterization of consumption patterns

Well-being maximization. We solve the consumption choice problem for any consumer type with preferences $(\alpha, \beta) \in [0,1]^2$, which we call the *preference square*, by maximizing the consumer's well-being (1) under a budget constraint:

$$\max_{q_{GP},q_{GD},q_{BP},q_{BD}} W(q_{GP}, q_{GD}, q_{BP}, q_{BD}) \quad (4)$$
$$s.t. \quad p_{GP}q_{GP} + p_{GD}q_{GD} + p_{BP}q_{BP} + p_{BD}q_{BD} \leq R \quad (5)$$

and the positivity constraints $q_{GP} \geq 0; q_{GD} \geq 0; q_{BP} \geq 0; q_{BD} \geq 0$.

The Lagrangian writes:

$$L = W(q_{GP}, q_{GD}, q_{BP}, q_{BD}) + \lambda[R - p_{GP}q_{GP} - p_{GD}q_{GD} - p_{BP}q_{BP} - p_{BD}q_{BD}] + \mu_{GP}q_{GP} + \mu_{GD}q_{GD} + \mu_{BP}q_{BP} + \mu_{BD}q_{BD} \quad (6)$$

where λ is the multiplier associated with the budget constraint, and the μ_i are the multipliers associated with the positivity constraints for good i consumption.

First-order optimality conditions (FOC). The FOCs write:[16]

$$\partial L/\partial q_{GP} = u' - \alpha d\gamma_{GP} + \beta - \lambda p_{GP} + \mu_{GP} = 0 \quad (7)$$
$$\partial L/\partial q_{GD} = u' - \alpha d\gamma_{GD} + \beta\alpha - \lambda p_{GD} + \mu_{GD} = 0 \quad (8)$$
$$\partial L/\partial q_{BP} = u' - \alpha d\gamma_{BP} + \beta(1-\alpha) - \lambda p_{BP} + \mu_{BP} = 0 \quad (9)$$
$$\partial L/\partial q_{BD} = u' - \alpha d\gamma_{BD} - \lambda p_{BD} + \mu_{BD} = 0 \quad (10)$$

along with the complementary slackness conditions i) $\mu_i \geq 0$ and $\mu_i q_i = 0$, and ii) $\lambda \geq 0$ and $\lambda(R - p_{GP}q_{GP} - p_{GD}q_{GD} - p_{BP}q_{BP} - p_{BD}q_{BD}) = 0$.

We make an *ad hoc* assumption to rule out cases in which the budget is not fully consumed.[17]

Assumption 3 (Non-deterring level of marginal damage)

$$d < u'(R/p_{GP})/\gamma_{BP} = p_{GP}/R\gamma_{BP}$$

The assumption corresponds to the requirement that the marginal environmental damage

[16] Within each FOC, u' is the derivative of u with respect to each (composite) good i, i.e., $u'(q_i)$, which is equal to the marginal utility of aggregate consumption as u depends on total consumption.

[17] We derive a sufficient condition for the budget constraint (5) to bind, implying that the associated constraint multiplier λ is strictly positive. This condition combines the extreme parameter values for $\alpha = 1$ and $\beta = 0$, to ensure $\lambda > 0$ in all FOCs whatever the preference parameters (α, β) and the consumption mix.

is low enough not to deter the consumer from consumption. As such, our model does not consider the case of voluntary simplicity, i.e., a voluntary choice to limit consumption.

The multiplier λ can be interpreted as the gain associated with an additional unit of income, which can be allocated to the consumption of any of the four goods. For each of the FOCs (7-10), denoting B_i the image benefit of good i, we can derive an expression involving λ for each good. If good i is actually consumed at the optimum, μ_i is nil, and we obtain the equality $\lambda = \frac{u' - \alpha d\gamma_i + B_i}{p_i}$, which is the marginal well-being derived from spending income on the corresponding good. If good j is not consumed, $\mu_j \geq 0$ and we obtain an inequality $\lambda \geq \frac{u' - \alpha d\gamma_j + B_j}{p_j}$, which means that the benefits of allocating a unit of income to good j are lower than λ, the marginal value of income. It implies that the marginal well-being derived from the allocation of marginal income to this good is lower than what can be gained when allocating marginal income to good i, and that is preferable to allocate income to good i than to good j in the sense that $\frac{u' - \alpha d\gamma_i + B_i}{p_i} \geq \frac{u' - \alpha d\gamma_j + B_j}{p_j}$. This defines what we call *preference for good i over good j*.

General results on lifestyle choices. The four conditions on λ derived from the FOCs characterize the optimal mix of goods for a given set of parameters. If two types of goods are jointly consumed, equalizing the corresponding expressions of λ means that the marginal well-being derived from the two goods normalized by their prices are equal, and the consumer is indifferent between the two goods at the margin. This is possible only under some conditions on the parameters (Proof in Appendix A.1.1), formalized below:

Result 1 (Mixed lifestyles) *A consumer with preferences (α, β) combines two goods i and j such that $p_j > p_i$ if and only if there is a $u' \in [p_i/R; p_j/R]$ such that*

$$u' = \frac{(\alpha d\gamma_i - B_i)p_j - (\alpha d\gamma_j - B_j)p_i}{p_j - p_i} \tag{11}$$

Equation (11) implies that (see Appendix A.1.1 for the derivation):

$$\frac{B_j - \alpha d\gamma_j}{p_j} > \frac{B_i - \alpha d\gamma_i}{p_i} \tag{12}$$

This can be interpreted as a necessary condition for two goods to be combined in a mixed lifestyle: the per-dollar "extra benefit" - defined as the effect of good i on image (moral benefit) minored by its effect on perceived environmental damage (moral cost)—of the more expensive good of the two must exceed that of the cheaper one to compensate for the fact that consuming the more expensive good reduces the utilitarian part of well-being.

Consumption patterns over the range of preference parameters.

We use the optimality conditions to characterize *zones* in the preference square $[0, 1]^2$

that correspond to ranges of parameter values (i.e., "areas") with homogeneous consumption patterns. To do so, we consider all possible consumption combinations (and corresponding FOCs) and identify the values of α and β for which it is possible/impossible to equalize the marginal well-being of consumption of different goods, in line with Result 1. We distinguish so-called *exclusive zones*, in which a given good is strictly preferred to all others—so that the full budget is allocated to a single type of goods—from *mixed consumption zones*, in which a consumer type would mix various goods in a mixed lifestyle. Considering all the possible subsets of the goods, there are potentially 15 consumption patterns, although Result 1 implies that the actual number of mixed lifestyles depends on the value of model parameters.[18] As such, when discussing the effect of the parameters (Section 3), we focus on exclusive zones only, which consistently exist across parameter values.We now formally derive the conditions characterizing the GP exclusive zone as an example, and refer to the Appendix A.1.4 for the other cases.

Shining a light on conspicuous conservation: the example of the exclusive GP lifestyle. We characterize the range of preferences for which it is optimal for a consumer to allocate their whole budget to conspicuous conservation, i.e., $(q_{GP}, q_{GD}, q_{BP}, q_{BD}) = (R/p_{GP}, 0, 0, 0)$ and $u' = p_{GP}/R$. This corresponds to the case in which the positivity constraints multipliers satisfy $\mu_{GP} = 0$ while $\mu_i \geq 0$ for the other goods. Such consumers would jointly prefer GP to GD, to BP and to BD.

FOC (7) then implies that $\lambda = \frac{\frac{p_{GP}}{R}+\beta-\alpha d\gamma_{GP}}{p_{GP}}$, whereas FOC (8) implies that $\lambda \geq \frac{\frac{p_{GP}}{R}+\alpha\beta-\alpha d\gamma_{GD}}{p_{GD}}$, which yields the inequality $\frac{\frac{p_{GP}}{R}+\beta-\alpha d\gamma_{GP}}{p_{GP}} \geq \frac{\frac{p_{GP}}{R}+\alpha\beta-\alpha d\gamma_{GD}}{p_{GD}}$. This can be interpreted as a marginal well-being condition: GP is preferred to GD by consumers who derive greater well-being from consuming the former. Rearranging the different terms to isolate parameter β, the previous equation is equivalent to

$$\beta \geq \frac{\frac{p_{GP}}{R}\left(\frac{p_{GP}}{p_{GD}}-1\right)+\alpha d\left(\gamma_{GP}-\gamma_{GD}\frac{p_{GP}}{p_{GD}}\right)}{1-\alpha\frac{p_{GP}}{p_{GD}}} \tag{13}$$

Likewise, combining FOCs (7) and (9) on the one hand, and FOCs (7) and (10) on the other hand leads to conditions characterizing preference for GP over BP (14) and over BD (15):

$$\beta \geq \frac{\frac{p_{GP}}{R}\left(\frac{p_{GP}}{p_{BP}}-1\right)+\alpha d\left(\gamma_{GP}-\gamma_{BP}\frac{p_{GP}}{p_{BP}}\right)}{1-(1-\alpha)\frac{p_{GP}}{p_{BP}}} \tag{14}$$

$$\beta \geq \frac{p_{GP}}{R}\left(\frac{p_{GP}}{p_{BD}}-1\right)+\alpha d\left(\gamma_{GP}-\gamma_{BD}\frac{p_{GP}}{p_{BD}}\right) \tag{15}$$

[18] For instance, under Assumptions 1, 2A. and 3, it is not optimal to combine GD, BP, and BD, for any preference parameters (α, β). Subsequently, no consumer combines the four goods either in this case (Proof in Appendix A.1.3).

The GP exclusive zone (represented in Appendix A.1.5) is thus delineated by the joint satisfaction of conditions (13) to (15). This example emphasizes that the range of preference parameters for which a given lifestyle choice is optimal (GP here) directly depends on the value of exogenous model parameters, which we dwell on in Section 3.

3 Socioeconomic conditions for green consumption

This section tackles the influence of the socioeconomic context on the shape of the consumption zones to identify drivers of morally motivated green consumption. Parameter shifts represent changes in the individual cost/benefit ratios of adopting a given lifestyle compared to others. We first describe how the levels of the parameters are selected to build contrasted cases (Section 3.1). Starting from a description of baseline cases for two levels of marginal damage in Section 3.2, we then examine the respective roles of prices (Section 3.3) and revenue (Section 3.4) on lifestyle choices. All results are derived analytically and remain robust across parameter values; parametrization is used solely to illustrate representative cases that capture the core mechanisms we study here.

3.1 Building contrasted cases: parameter values

To assess parameter effects, we build contrasted scenarios varying parameter values inspired by real data where feasible. All monetary values are in thousands of US dollars (1,000 USD). These combinations are summarized in Table 1, at the end of the section.

Damage. Marginal environmental damage (d) reflects the severity of environmental issues and distinguishes between different states of the world (e.g., low vs. high pollution). Focusing on carbon, we interpret d as the marginal cost of an additional ton of CO2—i.e., the *social cost of carbon* (SCC), a standard measure of damage. We calibrate our low-damage baseline at $d = 0.1$, corresponding to 100 USD per ton of CO2, in line with IPCC lower-bound recommendations (IPCC, 2022). Given the wide range of SCC estimates, we set the high-damage scenario at $d = 0.3$ (i.e., 300 USD per ton).

Income and baseline good prices. We set income at $R = 16$ as a benchmark, based on World Bank estimates of *disposable income* per capita (more details in Appendix A.5.2). We also explore a low-income case ($R = 12$) and, in the same appendix, a high-income case ($R = 24$), reflecting global heterogeneity. As to consumption prices, BD is priced at unity (numeraire), and all prices are expressed as relative expenditures compared to the benchmark good. In the baseline, GP goods are assumed to be about 50% more expensive than GD or BP ones, drawing on the aforementioned literature on the green visibility premium (Griskevicius et al., 2010; Berger, 2019).[19]

Emission intensities. The environmental impact parameters γ correspond to the goods' emission intensities, expressed in tons of CO2 per thousand dollars of good expenditure. As we study composite goods and lifestyles, we can't calibrate the parameters on accurate emission data and instead have to choose these values based on orders of magnitude of what total consumer emissions could plausibly be, depending on their lifestyle, as explained in Appendix A.5.1.

Pollution per lifestyle. Beyond emission intensities, a key quantity is the ratio between those intensities and corresponding lifestyle prices. Indeed, due to the budget constraint, this determines which lifestyle is the cleanest or the dirtiest, taking into account the quantities consumed by those adopting it. Two polar assumptions can be made:

Assumption 4 (Impact-intensity of lifestyles) *Positional lifestyles are*

4A. more impact-intense per dollar than their discreet counterparts if

$$\gamma_{GD}/p_{GD} < \gamma_{GP}/p_{GP} < \gamma_{BD}/p_{BD} < \gamma_{BP}/p_{BP} \quad (16)$$

4B. less impact-intense per dollar than their discreet counterparts if

$$\gamma_{GP}/p_{GP} < \gamma_{GD}/p_{GD} < \gamma_{BP}/p_{BP} < \gamma_{BD}/p_{BD} \quad (17)$$

In the main part of the paper, we mostly rely on Assumption 4A.[20] This means that, for a fixed income level, conspicuous consumption is not expensive enough for the budget constraint to result in smaller individual impacts (through lower consumed quantities) than for discreet goods, while it would be the case under Assumption 4B.

Table 1 summarizes how we combine parameter values to explore various cases.

We thus analyze 2×3 cases in the main text[21] that we represent in Figure 1. Each panel shows the preference square $[0, 1]^2$, with α on the x-axis and β on the y-axis. To ensure readability, we only represent explicitly the four exclusive consumption zones,[22]

[19] Although these ratios are somewhat arbitrary, we perform extended sensitivity analyses. Besides, we shall see that comparison between cases matters more than baseline values themselves.

[20] The question of knowing which of the two is more likely to be verified in practice is a tricky empirical question to which we could find no easy answer, especially considering different types of positional goods (as 4A. could be true in some fields of consumption and 4B. in others).

[21] Extra cases in which we study higher income levels (+50%) and Assumption 4B. are analyzed for sensitivity analyses respectively in Appendices A.5.2 and A.5.3.

[22] These are represented graphically using the Geogebra software. An interactive version of the Figure (link in the figure's caption) allows the reader to smoothly (and thus beyond our specific contrasted cases) modify the parameters and see how the shapes of the frontiers of exclusive zones respond.

Parameters Cases – Main text	R	d	γ_{BP}	γ_{BD}	γ_{GP}	γ_{GD}	p_{BP}	p_{BD}	p_{GP}	p_{GD}
Baseline – low damage	16	0.1	0.5	0.2	0.15	0.05	1.9	1	3	2
Baseline – high damage	16	**0.3**	0.5	0.2	0.15	0.05	1.9	1	3	2
Environmental tax – low damage	16	0.1	0.5	0.2	0.15	0.05	**1.95**	**1.02**	**3.015**	**2.005**
Environmental tax – high damage	16	0.3	0.5	0.2	0.15	0.05	**2.05**	**1.06**	**3.045**	**2.015**
Low income – low damage	**12**	0.1	0.5	0.2	0.15	0.05	1.9	1	3	2
Low income – high damage	**12**	0.3	0.5	0.2	0.15	0.05	1.9	1	3	2
Cases – Appendix										
High income – low damage	**24**	0.1	0.5	0.2	0.15	0.05	1.9	1	3	2
Baseline- Assumption 4B	16	0.3	**0.45**	**0.25**	**0.1**	**0.08**	1.9	1	3	2

Table 1: Values of the exogenous parameters in the different cases. Values in bold correspond to changes relative to the corresponding baseline.

but not the mixed consumption ones. Still, one can see how the position and size of these zones vary between cases. Note that when lifestyles are mixed, the consumption level of the different goods varies continuously between quantities consumed in the neighboring exclusive zones.

3.2 Baseline cases and effect of the damage parameter

Figures 1a and 1b depict the four exclusive zones in the model baseline for two different levels of marginal damage—which is the parameter generating the most significant qualitative shifts in consumption patterns.

Before discussing the shape and position of the different consumption zones, we provide some general results regarding the behavior of the model for the extreme values of preference parameters (i.e., on the edge of the preference square). Proofs of the corresponding results are in Appendix A.1.6.

First, image-indifferent consumers ($\beta = 0$) consume only discreet goods (BD and/or GD). Since they don't feel any need to find social validation through their choices, they only consider the trade-off between consumption and (perceived contribution to) pollution, without valuing positional goods. Their actual consumption mix depends on the marginal damage d and on their environmental preferences α, according to the following result.

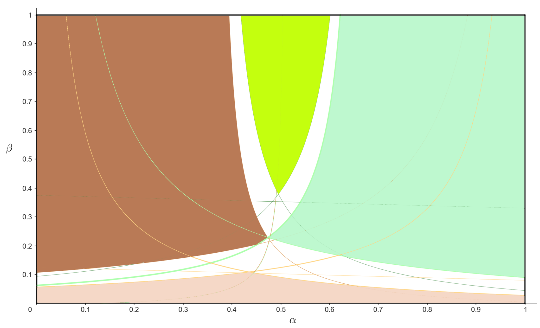
Result 2 (Image-insensitive consumers) *Consumers with $\beta = 0$ adopt*

A. an exclusive BD lifestyle for $\alpha < \hat{\alpha} \equiv \frac{(p_{GD}-p_{BD})\frac{p_{BD}}{R}}{d(\gamma_{BD}p_{GD}-\gamma_{GD}p_{BD})}$, which is always true if $d < \bar{d} \equiv \frac{\frac{p_{BD}}{R}(p_{GD}-p_{BD})}{\gamma_{BD}p_{GD}-\gamma_{GD}p_{BD}}$

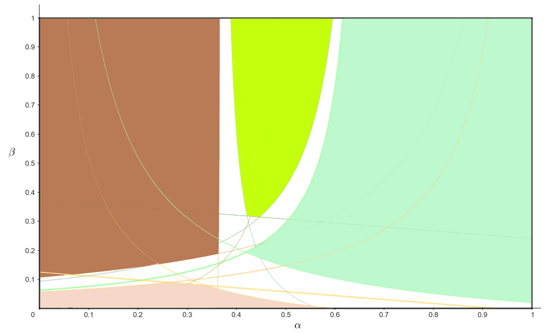
B. a mixed BD-GD lifestyle for $\hat{\alpha} \leq \alpha < \hat{\hat{\alpha}} \equiv \frac{R}{p_{GD}} \frac{d(\gamma_{BD}p_{GD}-\gamma_{GD}p_{BD})}{p_{GD}-p_{BD}}$, only if $d \geq \bar{d}$

C. an exclusive GD lifestyle for $\hat{\hat{\alpha}} \leq \alpha$, occurring only if $d \geq \bar{\bar{d}} \equiv \frac{\frac{p_{GD}}{R}(p_{GD}-p_{BD})}{\gamma_{BD}p_{GD}-\gamma_{GD}p_{BD}} > \bar{d}$

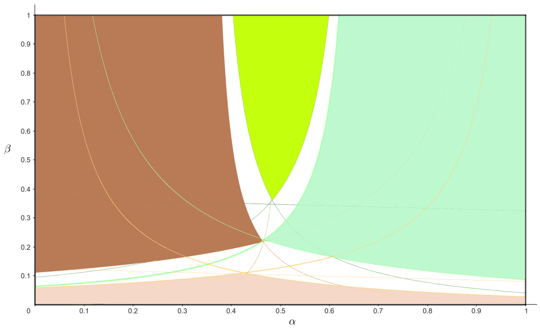
Result 2A is illustrated by Figure 1a and Result 2B is illustrated by Figure 1b. Result 2C would require a much higher damage level than in our illustrative cases to occur. This



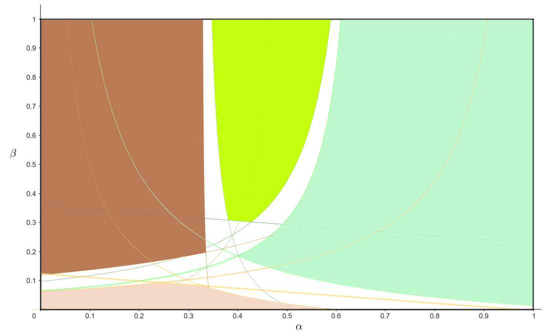
(a) Low damage baseline



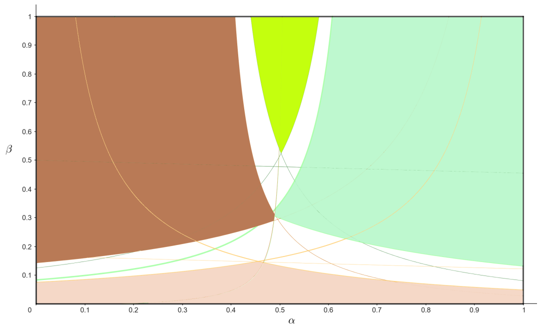
(b) Higher damage baseline



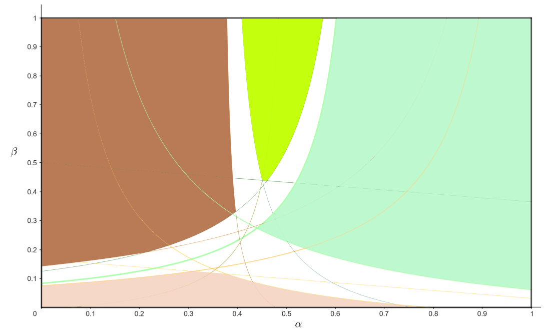
(c) Environmental tax with low damage



(d) Environmental tax with high damage



(e) 25% lower income, low damage



(f) 25% lower income, high damage

Figure 1: Exclusive zones in the different cases described in Table 1- An interactive version of the (uncolored) figure is available at https://www.geogebra.org/m/zyngvmvu.

result exemplifies the *value-action gap*: some consumers with high environmental concern but low social image concern may not consume green goods at all under moderate levels of environmental damage (and/or insufficient purchasing power, as minimal damage thresholds for green consumption are a decreasing function of income R). This role of income shows that the quest for moral consistency can be hindered by economic constraints.

Secondly, those without any moral environmental motivation ($\alpha = 0$) only consume brown goods.[23] They only consider the trade-off between consumption quantity and positionality, without accounting for either perceived pollution or for the image benefit

[23]By continuity, results true at the edge of the square are still verified for neighboring values of preferences, owing to the definition of the frontiers (Section 2). For instance, people with negative α (enjoying brown consumption, e.g., for identity and/or political reasons) would still make similar choices as those with $\alpha = 0$. The same is true around the three other edges of the square.

of consuming green, as they do not feel any personal responsibility to do so. Their consumption mix depends on their image preferences β, according to this result.

Result 3 (Environmentally-insensitive consumers) *Consumers with $\alpha = 0$ adopt*

1. *an exclusive BD lifestyle for $\beta < \beta_1 \equiv \frac{p_{BP}}{R}(1 - \frac{p_{BD}}{p_{BP}})$*
2. *a mixed BP-BD lifestyle for $\beta_1 < \beta < \beta_2 \equiv \frac{p_{BP}}{R}(\frac{p_{BP}}{p_{BD}} - 1)$*
3. *an exclusive BP lifestyle for $\beta > \beta_2$*

Consumers who fully internalize the environmental damage from their choices ($\alpha = 1$) consume only discreet goods. Given their strong sense of personal responsibility, they gain social image benefits only from green consumption, as consuming polluting positional goods does not align with their values. Their consumption mix depends on marginal damage d and on their image preferences β, following this result.

Result 4 (Perfect environmental sensitivity) *Consumers with $\alpha = 1$ adopt*

A. *an exclusive GD lifestyle for $\beta > \hat{\hat{\beta}} \equiv \frac{p_{GD}}{R}(p_{GD} - p_{BD}) + d(\gamma_{GD}p_{BD} - \gamma_{BD}p_{GD})$, which is always the case if $d > \bar{\bar{d}}$ (defined in Result 2)*

B. *a mixed BD-GD lifestyle for $\hat{\hat{\beta}} \geq \beta > \hat{\beta} \equiv \frac{p_{GD}}{R}(p_{GD} - p_{BD}) - d(\gamma_{BD}p_{GD} - \gamma_{GD}p_{BD})$, which occurs only if $d \leq \bar{\bar{d}}$*

C. *an exclusive BD lifestyle for $\beta < \hat{\beta}$, which occurs only if $d \leq \bar{d}$ (defined in Result 2)*

Result 4B is illustrated by Figure 1b and Result 4C is illustrated by Figure 1a. This result highlights that even consumers with a maximal concern for the environment could paradoxically consume BD (even exclusively) when the environmental issue is not of high importance. In that case, green consumption is interestingly triggered by image motives.

Last, consumers who have maximal image concern for social validation ($\beta = 1$) can consume either BP, GP, or GD exclusively or mix GP with one of the two others depending on their environmental preference parameter α, according to the next result.

Result 5 (Perfect image sensitivity) *Consumers with $\beta = 1$ adopt*

A. *an exclusive BP lifestyle for $\alpha \leq \alpha_1 \equiv \frac{(p_{GP} - p_{BP})(1 + \frac{p_{BP}}{R})}{d(\gamma_{GP}p_{BP} - \gamma_{BP}p_{GP}) + p_{GP}}$*

B. *a mixed BP-GP lifestyle for $\alpha_1 < \alpha \leq \alpha_2 \equiv \frac{(p_{GP} - p_{BP})(1 + \frac{p_{GP}}{R})}{p_{GP} - d(\gamma_{GP}p_{BP} - \gamma_{BP}p_{GP})}$*

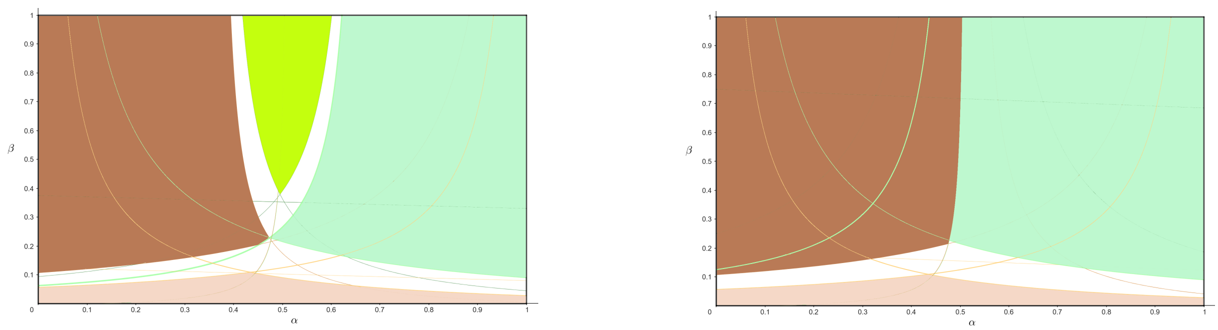
C. *an exclusive GP lifestyle for $\alpha_2 < \alpha \leq \alpha_3 \equiv \frac{p_{GD} - \frac{p_{GP}}{R}(p_{GP} - p_{GD})}{p_{GP} + d(\gamma_{GP}p_{GD} - \gamma_{GD}p_{GP})}$*

D. *a mixed GP-GD lifestyle for $\alpha_3 < \alpha \leq \alpha_4 \equiv \frac{p_{GD} - \frac{p_{GD}}{R}(p_{GP} - p_{GD})}{p_{GP} - d(\gamma_{GD}p_{GP} - \gamma_{GP}p_{GD})}$*

E. *an exclusive GD lifestyle for $\alpha > \alpha_4$*

Interestingly, Result 5 means that GP goods are not consumed by the consumers who have the highest environmental preferences. More specifically, conspicuous conservation is adopted by consumers with sufficient image concern β and medium environmental motivation α (as characterized in Section 2.2, and in line with Result 5). The exclusive green positional lifestyle corresponds to the central neon green zones in Figure 1.

This highlights a key takeaway about conspicuous conservation: because the GP-exclusive consumption zone lies between the two impact extremes in the sense of Assumption 1 (i.e., brown positional (BP) and green discreet (GD) lifestyles), green positional (GP) consumption can play a pivotal role in smoothing the impacts of lifestyle switches along the α distribution, particularly for consumers with relatively high β. It offers a form of compromise lifestyle that may help reconcile *Eco* with *Ego*—providing image benefits while significantly reducing environmental impact compared to BP. Conspicuous conservation goods can therefore serve to align partly contradictory psychological motivations. To better understand this effect, in Figure 2, we compare our benchmark case to a counterfactual scenario in which the good GP is not available.[24] Making good GP available may create a *synergy between Eco and Ego*. In a world with GP goods, green goods are consumed for a broader range of preference parameters, with some consumer types going for GP instead of BP. Also, the BP (dark brown) and GP (neon green) exclusive zones in Figure 2a are separated by a frontier which is strictly decreasing in α, going from couples of preference parameters with lower α and higher β to couples with lower β and higher α. It induces a form of substitutability between environmental and image concerns when considering green consumption: a consumer with preference parameters located just left to that frontier would switch from BP to GP either if their concern for the environment increases, or if their image concern increases. This is not the case in a world without GP, in which only an increase in α would trigger a switch between BP and GD.[25]



(a) Low damage baseline with GP

(b) Low damage baseline without GP

Figure 2: Exclusive zones in a world with vs. without conspicuous conservation

[24]The tiny price gap between BP and GD in the baseline explains why we don't have any mixed BP-GD lifestyle in between the exclusive consumption zones in Figure 2b, but such a mixed consumption zone would appear and grow larger as the price gap widens.

[25]In a world without GP, an increase in β could even trigger a switch from GD to BP for few values of (α, β).

In the same spirit, it is worth considering a world without BP goods. Removing them from the market—or making them prohibitively expensive, which is equivalent under budget constraints—makes it optimal for environmentally-indifferent consumers ($\alpha = 0$) with sufficient image concern (β not too low, otherwise they choose BD) to consume green positional goods (as can be seen from Equation 1). In this setting, conspicuous conservation becomes the only source of image benefits, paradoxically leading consumers unconcerned with the environment to adopt greener lifestyles purely for reputational reasons.[26]

As opposed to consumers of GP goods, consumers with the highest moral motivation reap image benefits from green consumption more than from standard status-seeking, making GD a better and cheaper substitute to GP for signaling, in addition to having a lower environmental impact. Indeed, such consumers prioritize the environment, also for image concerns.

Comparing Figure 1b to Figure 1a allows us to qualify the effect of the level of damage on the size of these exclusive zones. With higher damage, a substantial area of the preference square—in particular the "South-East" (i.e., relatively high environmental concern and relative indifference to image)—switches from brown to green or mixed lifestyles due to more acute damage.[27] The next result formalizes some of these elements.

Result 6 (Higher environmental damage foster green consumption) *All else being equal, in a society where environmental issues are more acute, green lifestyles are adopted for a wider range of preference parameters. (Proof in Appendix A.1.6)*

This result is in line with recent empirical evidence on the effect of pollution on green consumption. For instance, He and Zheng (2024) find that bad air quality in Chinese cities (equivalent to higher marginal damage in our model) is associated with higher purchases of hybrid vehicles. This illustrates the role of the magnitude of damage on green behavior: greater damage reduces the minimal level of environmental concern needed to make green lifestyles optimal, and these are adopted for a larger segment of the α distribution.

3.3 Who goes green with a tax?

A first way to spur green choices is by making green goods relatively cheaper than brown ones, as this widens the range of preference parameters for which green lifestyles are preferred. This can be done by implementing an environmental tax,[28] which results in

[26] We return to the policy implications of this insight in Section 4.2.

[27] One can take the example of a country more exposed than another to climate change (e.g., for geographical reasons), or to a type of pollution that is more harmful than before, and in which a significant share of consumers of discreet goods (e.g., everyday household items) swaps for greener alternatives, provided they have a minimum level of environmental awareness.

[28] We could also have tested a subsidy on green goods, making green lifestyles cheaper. For the sake of parsimony, as mechanisms would be similar here, we only study the tax case.

prices $p_k^{tax} = p_k + d\gamma_k$ in our framework.[29] Such a tax actually results in a sizeable effect on consumption zones only when damage d is high, as shown by Figure 1d (compared to the pre-tax Figure 1b). When damage is more limited (i.e., $d = 0.1$), such a tax only slightly increases the relative price of the most polluting goods without making them more expensive than the green alternatives (thus Assumption 2A. still holds). Therefore, consumption patterns do not change much, as shown by Figure 1c, which is quite similar to Figure 1a. When damage is higher (i.e., $d = 0.3$), the cost increase associated with the tax is much higher for each lifestyle, leading BP to get more expensive than GD (switching our model to the condition of Assumption 2B.). As a result, we obtain increased substitution between GP and BP, due to their relative prices changing the most with the tax.

We obtain that an environmental tax leaves lifestyle choices largely unchanged for most combinations of preference parameters. However, particularly in high-damage cases, some areas of the preference square—especially those near mixed consumption zones—shift toward green lifestyles. Importantly, changing relative prices may trigger radical lifestyle changes only for a narrow range of parameters—mostly corresponding to consumers who adopt a mixed lifestyle. This is because such price effects have the greatest influence on consumers whose preferences place them at the margin between several lifestyle options, all else being equal. For these consumers, the tax can tip the balance and shift their optimal choice.

3.4 Who goes green when income rises?

We now look at the effects of changes in income R on the range of preference parameter values corresponding to exclusive or mixed lifestyles. For exclusive consumers, the budget constraint yields a direct relationship between consumption of the chosen good, the price of this good, and income. Given the logarithmic form of utility, the marginal utility of consuming exclusively q_k can be expressed as $u'(q_k) = \frac{1}{q_k} = \frac{1}{R/p_k} = \frac{p_k}{R}$. Hence, the marginal utility of consuming each composite good is inversely related to income.

Two effects of income on lifestyle choices must be disentangled. On the one hand, higher income relaxes the budget constraint, thereby increasing consumption (*income effect*). On the other hand, this changes trade-offs between lifestyles in favor of the more expensive ones (*substitution effect*), facilitating green consumption. *Ceteris paribus*, the range of parameters for which consumers can afford costly goods indeed goes up, widening both green consumption zones, as shown by the baseline cases compared to Figures 1e and 1f of poorer societies. By contrast, looking at the effect of income on lifestyle switch thresholds from Results 2 to 5 shows that a lower income leads to choices less aligned with intrinsic preferences, as consumers compromise between their values and their budget. This provides a rationale for the *value-action gap* we already mentioned: in

[29] This does not fully coincide with the Pigovian tax with image concerns (Bénabou and Tirole, 2012).

poorer societies, one might have to stick to BD goods despite being concerned about the environment if one's budget constraint is too tight. As income decreases and marginal utility increases, the weights of both the damage and the image benefit functions in well-being decrease relative to marginal utility; hence, the rise in the cheapest lifestyle. For instance, with inflation (having more of a downward effect on income than an effect on relative prices), more and more households turn to discount products (BD) instead of brand-name industrial products (BP) or organic products (GP or GD).

This springs up in Figure 1f: both mixed (in white) and brown consumption zones are then wider, as lifestyle switches for similar preference shifts are harder due to decreased purchasing power. This shows the inertia exerted by budget constraints over lifestyle choices, echoing policy debates on the need for environmental policies to tackle inequality. Conversely, it follows that increasing disposable income is a driver of green individual consumption choices, which is visible in the case $R = 24$[30] in Appendix A.5.2 and confirmed by Result 9 in Appendix A.2. This echoes the descriptive statistics from Liu (2014) on the demand for hybrid cars, which is higher among wealthier people.

Relaxing the budget constraint allows for easier lifestyle switches when preferences slightly change (i.e., moving to neighboring parameter values). For example, even for low marginal damage, maximum environmental concern then leads to green choices (Result 4), unlike in the baseline poorer society. This can be linked to the threshold condition on minimal income necessary for the consumption of some green goods to be always optimal for α=1 (see Appendix A.1.6). However, whether this ultimately reduces environmental impacts depends on the balance between this substitution effect and the income effect: if the latter dominates, lower revenue leads to lower impacts—and conversely when revenue increases. The next section explores how this balance varies across consumer groups.

4 From individual choices to environmental impacts

We analyze consumption levels and environmental impacts at a collective level, based on a finite set of heterogeneous consumers[31] with preferences (α, β) distributed over $[0, 1]^2$. For each couple (α, β), we compute optimal consumption and pollution, and aggregate outcomes by weighting behaviors by population shares. We explore how various population structures–considering small subgroups of consumers, not total populations, hence disregarding market effects– shape impacts and inform targeted policy design.

[30] Testing even higher income levels (R=48) only reinforces the changes depicted here, without any qualitative change in differences between scenarios. We thus omit the representation of such cases.

[31] The literature models heterogeneity using either discrete individuals (e.g., Sexton and Sexton, 2014) or continuous distributions, often uniform (e.g., Dasgupta et al., 2015). Our discrete approach simplifies analysis and visualization without altering the core results.

4.1 Environmental impacts of individual consumption levels.

Methodology. We discretize the preference square $[0, 1]^2$ and compute numerically[32] the optimal consumption levels for each parameter value (α, β) of the grid. Denoting $q_i^*(\alpha, \beta)$ the optimal consumption of good i by a consumer with preferences (α, β), the environmental impacts $\Gamma(\alpha, \beta)$ associated to individual choices in coordinates (α, β) write

$$\Gamma(\alpha, \beta) = \sum_{i \in (GO,GD,BO,BD)} \gamma_i q_i^*(\alpha, \beta) \tag{18}$$

We plot in Appendix A.3.3 the corresponding heatmaps of impacts for the six different economic cases examined in Section 3.

Lifestyles impact intensities per dollar and behavioral rebound effects. We show that the link between individual preferences and impacts greatly depends on the impact intensities of lifestyles, i.e., on which lifestyle pollutes the most per dollar spent on its consumption, in line with the two versions of Assumption 4. Under 4A., increasing environmental concern α always leads to lower individual impacts, whatever the image concern β, as we formalize in Result 7 below. By contrast, under Assumption 4B., one obtains different patterns, as evidenced by Figure 3 below: with positional lifestyles polluting less than their discreet counterparts due to budget effects, minimal impacts are found among consumers adopting conspicuous conservation practices (GP lifestyles), and not among the most environmentally-conscious ones anymore. By the same token, the dirtiest choice is now to consume BD only, making image concerns environmentally beneficial not only when combined with high environmental concern (Result 4), but also when combined with low environmental concern.

Both heatmaps show how lifestyle choice areas evolve with preference parameters. They illustrate a much larger gap in environmental impacts between lifestyles (lowest for full GD consumption in green, highest for exclusive BP in brown) than within each lifestyle, where impacts vary gradually with the mix of goods consumed. This highlights the importance of crossing a minimal threshold in environmental concerns α to shift from brown to green baskets—given the stark impact differences around that divide. The following result summarizes how both preference parameters substitute in driving green behavior—and the subsequent impact patterns.

Result 7 (Complex effects of individual preferences on impacts)
i) Under Assumption 4A., an increase in environmental concerns α always triggers a reduction in individual environmental impacts, regardless of image concerns β.

[32] Numerical computation simplifies the exposure of consumer behavior in the whole preference square, including mixed consumption zones, which we partly characterized analytically in Section 2, but which cannot be fully done in a concise way given the structure of the model-the exact consumption patterns and levels within mixed zones depending on conditions involving many preference parameters (Result 1).

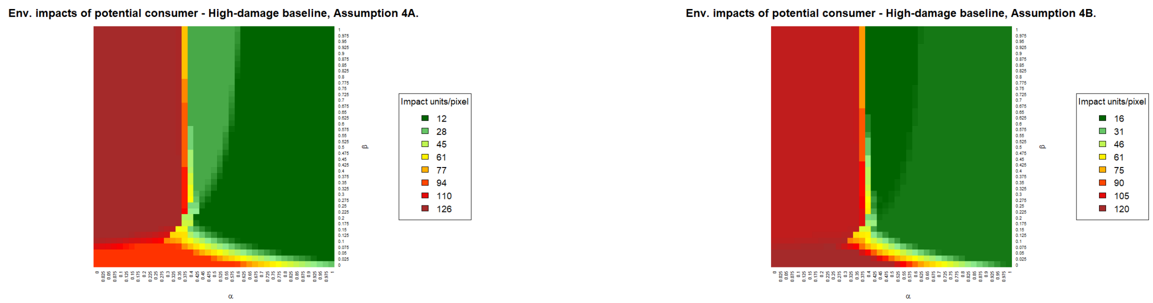


Figure 3: Impacts per consumer basket in the high-damage baseline for parameters satisfying Assumption 4A. (left) and Assumption 4B. (right). This illustrates the environmental impacts of optimal lifestyle choices for different values of the preference parameters. For readability, impacts are rounded to the nearest integer in the legend panel.

ii) Under Assumption 4B., an increase in environmental concerns α can have contrasting effects on individual impacts, depending on the level of image concerns β.
(Proof in Appendix A.1.6)

Similarly, increasing image concerns (β) can have contrasting effects on individual impacts, depending on α. Under Assumption 4A., raising β reduces emissions for consumers with sufficiently high environmental concern but not for those with low α. Under Assumption 4B., image concerns tend to reduce emissions more broadly.

These results emphasize the critical role of lifestyle impact intensities: in a world where conspicuous goods pollute less per dollar than their discreet counterparts, consumption of GD goods can lead to rebound effects, due to an income effect triggered by lower prices of GD and higher consumption quantities (a *volume effect*).[33] This also shows that the display of moral consistency can lead to *behavioral rebound effects*: even when it is not the cleanest choice anymore, the perception of GD as a frugal lifestyle allows it to remain the optimal choice of consumers with high α and high β, because both their damage and image functions in their well-being depend on absolute (γ_k) and not relative (γ_k/p_k) impact intensities. This highlights how the psychological interplay between environmental and image concerns shapes the environmental impact of consumer choices, depending on the context. If GD goods are less pollution-intensive than GP ones, one should always try to increase environmental concerns, whereas one should keep them moderate while spurring image concerns for social validation when GP goods pollute less.

4.2 Collective impacts strongly depend on preferences

Motivation and method. Tackling aggregate impacts implies studying the influence of the distribution of preferences on lifestyle choices. This distribution is likely to dif-

[33] Empirical works show that even consumers internalizing the damage do not consider rebound effects when buying goods (Kaufmann et al., 2024), especially for cheap green options (Alpizar et al., 2024). Note that the magnitude of such effects depends on the income elasticity of the green goods. For the sake of parsimony, we do not formalize this aspect of the discussion.

fer—e.g., between two countries, with different meanings attached to green consumption (i.e., interpretations of specific consumption behaviors). Indeed, conspicuous conservation practices are known to spread as the environmental commitment of the surrounding community increases (Sexton and Sexton, 2014). This should not be interpreted as a peer effect when consumers do not interact, but as an illustration that green behaviors are more widespread in societies with pro-environmental preferences. This shows the importance of examining the context of consumer choices, even regardless of social norms.

From now on, each pixel in the preference grid $[0,1]^2$ is populated with a portion $pop(\alpha, \beta)$ of the considered group, according to different scenarios. We consider a uniform distribution as a benchmark and define nine other scenarios in which consumers concentrate around a combination of low (l), medium (m), or high (h) value for each preference parameter.[34] For instance, (α_l, β_h) represents a group of consumers that on average do not care much about the environment (low α) but care a lot about their image (high β).

The proportion of a good i corresponds to the "market share" of that good in total consumption, defined as $\frac{Q_i}{\sum_{j\in\{\text{GP,GD,BP,BD}\}} Q_j}$, where

$$Q_i = \textstyle\sum_{[\alpha]} \sum_{[\beta]} \; pop(\alpha, \beta) q_i^*(\alpha, \beta) \tag{19}$$

is the total consumption of good i over the whole population (see Appendix A.3.1 for details). For several cases and scenarios (Figure 4),[35] we also compute the average impact of one consumer over the range of preferences, referred to as "average impacts" and defined as:

$$P(\alpha, \beta) = \sum_{[\alpha]} \sum_{[\beta]} \; pop(\alpha, \beta)\Gamma(\alpha, \beta) \tag{20}$$

The key influence of the distribution of preferences. We now investigate the effect of the distribution of preferences in a population by plotting the environmental outcomes in our nine population scenarios, as represented in Figure 4. For each case, the rounded point corresponds to the environmental impact for the low damage baseline,[36] while the triangle represents the effect of a tax, and the square that of a decrease of income.

First, this shows high heterogeneity in impacts across population scenarios, which is driven by differences in the distribution of preferences—even more so when preferences are more homogeneous inside each group (Appendix A.5.4). The most favorable scenarios are those with highly morally motivated consumers.[37] This means that groups with a higher average prevalence of pro-environmental attitudes may overall pollute less, even if

[34] The scenarios are modeled using population matrices stemming from products of independent Beta laws whose shape parameters change according to the scenario (see Appendix A.4). In the sensitivity analysis (Appendix A.5.4), we vary these shape parameters to assess the robustness of our results.

[35] Market shares in the six cases for a uniform distribution are reported in Figure 8 in Appendix A.3.2.

[36] Comparing the same distributions in the high damage baseline yields similar results and only minor differences in the ranking of scenarios, as evidenced by Figure 10 in Appendix.

[37] This ranking is only slightly sensitive to the sub-case of Assumption 4, as seen in Appendix A.5.3.

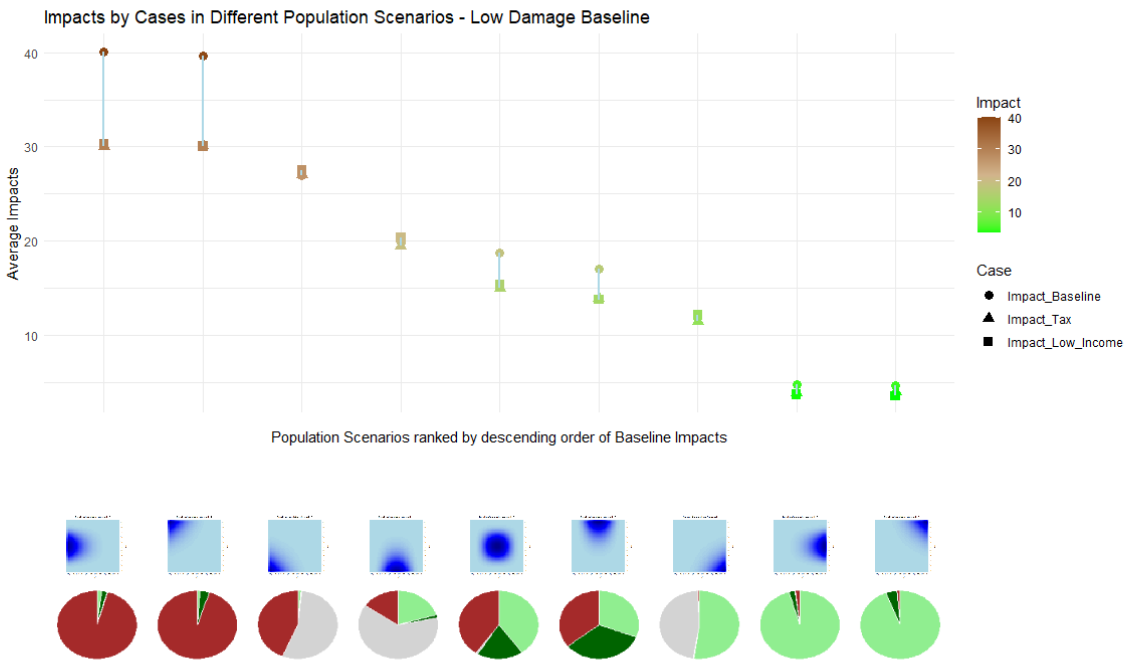


Figure 4: Impacts in baseline, tax and low income cases for each scenario (low damage). The nine squares below the figure represent the preference distributions. For each scenario, the underlying baseline market shares of the goods are displayed in the pie charts (BP in red, BD in grey, GD in light green, GP in plain green).

this is partly driven by image concerns. In groups with high moral concerns, low impacts are consistently driven by a larger market share of GD and a smaller share of BP—the latter playing an even more decisive role in the ranking of scenarios, as illustrated by the pie charts in the bottom right-hand corner of the figure.

Besides, the effect of varying the distribution of image concerns on environmental impacts depends on the overall moral concern of the group of consumers. Indeed, the three left plots corresponding to low α values in Figure 4 show that higher image concerns reinforce impacts among consumers with low moral motivation (by increasing the market share of BP goods, as can be seen by comparing the pie charts), while the next two groups of three bars show such an increase can become environmentally beneficial when moral motivation is stronger. Yet, this does not hold anymore for higher levels of damage (see Figure 10 in Appendix), since average impacts are then slightly lower for medium levels of image concern than for higher levels (except in groups with low moral motivation), due to a lower share of BP goods when d is higher. Thus, the negative relationship between environmental concerns and environmental impacts identified at the individual level in Result 7 does not necessarily apply to average effects at the collective level.[38]

Lastly, given the position of the GP-exclusive consumption zone in the preference

[38]Yet, this could have been different had we accounted for social norms and peer effects that may reinforce the image benefits of green consumption in groups where most people care sufficiently about the environment (see discussion in Section 5 below).

square (see Figure 1), the effect of conspicuous conservation behaviors on total environmental impacts is especially strong when preferences are concentrated on medium values of environmental concerns α and sufficiently high values of image concern β.

These insights highlight the importance of considering the distribution of individual preferences when designing targeted policies to promote greener consumption patterns.

The need for targeted public policies. Plotting average impacts under varying economic conditions for all scenarios (as in Figure 4) shows that a given public policy (e.g., a uniform environmental tax without revenue recycling)[39] can lead to very different outcomes depending on the distribution of preferences. This shows the importance of targeting green policies to groups of consumers by taking their preferences into account.

Thus, it may actually be more promising to aim for a shift in preferences than solely relying on changes in the economic context (e.g., taxes). Figure 4 shows that differences in impacts between scenarios are generally much bigger than between economic cases. In other words, under our assumptions, moving the distribution of preferences (e.g., with a moral nudge, as defined by Carlsson and Johansson-Stenman, 2019) could be more effective in reducing impacts than changing the economic context[40] without changing intrinsic preferences, as the former ultimately determines the relative effectiveness of market-based instruments. The most promising approach would thus be to aim for an increase in overall environmental concern α (the rationale of *green nudging*), as this always leads to lower impacts, especially in wealthier societies[41] and even, albeit to a smaller extent, under Assumption 4B. (Appendix A.5.3), regardless of the level of image concerns. Under Assumption 4B. of positional goods having lower impact intensity, it could also be relevant to nudge the social image preferences (the β parameter) of some consumers, following the logic of Result 7. Finally, recalling the insight from Section 3.2 on a world without brown positional goods, this suggests that high taxes on polluting conspicuous consumption (e.g., luxury combustion cars) could foster greener choices through image concerns. Depending on the distribution of preferences and income levels of targeted consumers, such a measure may reduce environmental impacts more effectively than a standard environmental tax on all goods.

[39] Thus we can't say much about tax effectiveness between scenarios, part of the differences being driven by the effects of income losses rather than by preference-based behavioral responses to the policy. This choice is made for simplicity, as our paper is not about finding the optimal policy but about the behavioral implications of a given policy under our assumptions, hence the absence of a welfare analysis.

[40] The effects of income reduction are also displayed here. This cannot be considered as modeling degrowth policies *stricto sensu*, but only as simulating a negative income shock, leading to positive environmental effects through lower quantities consumed (what we could call *forced degrowth*).

[41] Appendix A.5.2 shows indeed that nudge effectiveness can be boosted by higher income levels, as this allows consumers to relax their budget constraint and be true to their values, as explained in Section 3.4.

5 Discussion and conclusion

5.1 Proposals for testing our central assumption

Our model posits that environmental and image motives interact in consumption choices, making moral and reputational concerns substantial drivers of lifestyle choices due to pride and shame feelings attached to specific consumption behaviors.

This central assumption could be tested by investigating real-life choices to assess the relevance of our theoretical framework to explain actual behaviors in several fields. Lab, field experiments (and a mix of both) can be used to study image concerns, as shown by willingness-to-pay elicitation for green products in public versus private lab settings (Teyssier et al., 2014). Food choice experiments, for example, already explore the impact of observability on sustainable decisions (Takahashi, 2021), and future work could test the influence of the preferences we model[42] on meat consumption or recycling, for instance. This could help identify whether our predictions align with real data. Is there a clear correlation between moral environmental preferences and the type of goods people consume to gain status or image benefits? Such an experiment could compare situations with and without GP goods, and see whether shifts in behavior when making GP available are mostly observed for consumers with median environmental concerns and high image concerns. Alternatively, we could also test if the influence of social image concerns on consumption choices is primarily shaped by the social context (e.g., conformity to social norms) rather than by preferences.

A second avenue for empirical research concerns the role of income, treated as exogenous in our model but that may influence intrinsic preferences (Phillips and Zuckerman, 2001; Chen, 2023). Exploring this link could inform the policy implications of our framework—particularly regarding inequality as a potential barrier to environmental policy, the adoption of greener lifestyles and the role of conspicuous consumption.

5.2 Limitations and research avenues

A major limitation of our analysis is the absence of interaction between consumers. In this final section, we successively consider two possible extensions adding interactions to this simple model.

5.2.1 Integrating beliefs to take the present framework one step further

In the paper, we have sometimes referred to important behavioral concepts such as *reputational incentives* or the *crowding-out effect* these can have on motivation for pro-

[42]The easiest way to go would be to measure stated preferences, with the challenge of properly eliciting such preferences to avoid biased results. This is not an easy task, especially with environmental and image/status concerns respectively, which have been proved to be respectively overreported and underreported in previous studies like Johansson-Stenman and Martinsson (2006).

environmental behaviors, drawing on seminal work by Bénabou and Tirole (2006). Yet, we took such mechanisms as given (exogenous to the model but rationalizing some of our assumptions) without explicitly accounting for their origin. Indeed, we did not model consumer beliefs on other consumers and on their perception of their own choices (which are *second-order beliefs*, i.e., beliefs on others' beliefs, whose integration greatly complexifies the analysis). However, such beliefs may allow us to understand what could motivate consumers to prioritize some choices more than others, especially when moral elements are part of the picture. On the one hand, consumers with environmental concerns can form motivated beliefs (Bénabou and Tirole, 2011) to rationalize their own choices when these do not primarily follow moral consistency. For instance, moral concerns can cause compensation effects within lifestyle choices, like the *moral licensing effect* (Merritt et al., 2010), where a previous green choice can make polluting actions more acceptable in the eyes of some consumers: after avoiding flying for a given period, people might think it becomes less important for them to be a strict vegetarian. On the other hand, consumers may care about how others perceive their choices—this is, by definition, what constitutes social image concerns. Thus, they might adjust their choices to their perception of beliefs held by others on specific behaviors (Bursztyn and Jensen, 2017). The aforementioned crowding-out effect[43] (Bénabou and Tirole, 2006) illustrates this mechanism: if salient social image concerns create a doubt about the genuine reason for buying green goods—the climate or their image?—then some consumers might want to avoid showing off their green choices after all, which could partly reduce the popularity of GP choices compared to our model. Working on beliefs may thus improve the accuracy of our theoretical predictions.

5.2.2 Integrating consumption norms and feedback loops to collective results

Moral motivation for green consumption is likely to be reinforced by perceived social norms: for instance, adopting a greener lifestyle should seem more important as the proportion of green consumers grows (Nyborg and Brekke, 2006). Other consumers may thus exert an influence beyond static image concerns and contribute to shifting social norms, particularly *descriptive norms*, i.e., individuals' perceptions of typical behavior in a given context (Nyborg and Rege, 2003). However, our image function v does not explicitly integrate these norms, preventing us from modeling conformism, distinction, and what Nyborg and Brekke (2006) call *socially contingent moral motivation*. Considering such dynamics would allow incorporating systemic factors alongside individual preferences. A dynamic analysis based on social norms could thus capture feedback loops tied to image concerns. Indeed, social norms may have a greening virtue but may also drive a race for status, perpetuating social pressure to consume more, albeit greener (Bursztyn and Jensen, 2017). Extensions of our work could explore these dynamics. Introducing

[43] Taxes may also crowd out motivation by reducing image gains: lower prices can reduce warm-glow (Abbott et al., 2013) or status gains (Griskevicius et al., 2010), possibly fading the desired price effects.

a quadratic (Brekke et al., 2003) or cubic term into v could account for penalties or bonuses tied to deviations from the norms. This would help study whether norms are more effective than signaling motives in reducing consumption (Dasgupta et al., 2015).

5.3 Conclusion and policy implications

Our research examines how social image concerns and moral environmental motives may influence green consumption. Assuming that consumers try to align their moral values with the image they convey through their consumption choices, we find that both drivers can substitute in lifestyle choices through the consumption of positional green goods over specific ranges of preferences that depend on the economic context (e.g., prices, income...). This aligns with recent contributions from the sustainable consumption literature, and in particular with the idea of "conspicuous conservation" (Griskevicius et al., 2010), following which people can make green choices to enhance their image.

However, this should be qualified. On the one hand, image concerns may encourage green choices when marginal damage or income is not too low and green goods are not too expensive, as validation-seeking can provide strong psychological incentives for green consumption. On the other hand, the environmental impacts of such motivations can be ambiguous. First, they depend on *the relative impact intensities of lifestyles*- i.e., which lifestyle pollutes the most per dollar spent (and not per unit of good). In this case, both the warm glow and the social prestige of going green may shift focus from actual impacts to image rewards, possibly entailing *behavioral rebound effects*. Second, changes in the socioeconomic context (e.g., prices) both alter the consequences of consumption choices while also reshaping lifestyle choices, which can lead to complex collective outcomes. For instance, cheaper green goods or higher income can encourage green choices but may trigger volume effects driven by higher purchasing power, offsetting part of the environmental gains. For example, while promoting electric vehicles reduces pollution at a constant level of use, both the budget savings and the associated "moral licensing effect" (Merritt et al., 2010) may lead to higher vehicle use. This is consistent with the conclusions of Alpizar et al. (2024): the overall environmental impact of green consumption depends on the relative strength of *direct* substitution effects and *indirect* rebound effects. While not specific to image concerns—though likely reinforced by them—this highlights the need for targeted green policy based on the preferences. Yet, implementing this theoretical insight is challenging, as policymakers rarely have access to intrinsic motivations.[44]

While *Eco* and *Ego* do not always overlap, green positional goods may thus contribute to bridging the gap between those two behavioral drivers. When consumers aim for moral consistency between their intrinsic moral values and their reputational motives, conspicuous conservation may smooth lifestyle switches along the α distribution and reduce

[44] They may instead rely on proxies such as income or education, drawing on a growing literature linking these variables to environmental (Chen, 2023) and image concerns (Phillips and Zuckerman, 2001).

differences in impacts. This adds a nuanced insight to the debate on green consumption and sufficiency. Besides, fine-tuned policies could help reconcile *Eco* and *Ego*. Policies playing on the context (e.g., taxes) only shift the frontiers between consumption zones, making them effective for specific ranges of intrinsic preferences, whereas nudging could move the distribution of preferences, playing a key role in environmental impacts. The main policy implication of our model is that shifting preferences may be the most crucial aspect of green policies, which may thus increasingly rely on social norm nudging to complement standard price incentives like the Pigovian tax. *Green nudges*, altering the decision-making environment to encourage sustainable choices (Schubert, 2017), could help reshape individual choices and social norms. These could draw attention to environmental implications of consumption and/or play on image concerns, triggering psychological reactions favoring green choices (Carlsson and Johansson-Stenman, 2019). Addressing economic conditions and preferences together can drive preference shifts harvesting environmental and image concerns to foster green consumption while reducing environmental impacts.

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A Appendices

A.1 Mathematical appendix

A.1.1 Necessary conditions for mixed lifestyles

Let $i \in \{GP, GD, BP, BD\}$. We denote B_i as the image contribution of good i, with $B_{GP} = \beta$, $B_{GD} = \beta\alpha$ and $B_{BP} = \beta(1-\alpha)$. We set the marginal damage to an exogenous level d. Whenever good i is consumed in equilibrium ($q_i > 0$ and $\mu_i = 0$), the FOC reads $u' - \alpha d\gamma_i + B_i - \lambda p_i = 0$, equating to $\lambda = \frac{u' - \alpha d\gamma_i + B_i}{p_i}$, where λ is interpreted as the marginal value of the numéraire in utility terms. If two goods i and j, with $p_j > p_i$, are consumed jointly, equalizing the two equations leads to $\frac{u' - \alpha d\gamma_i + B_i}{p_i} = \frac{u' - \alpha d\gamma_j + B_j}{p_j}$, implying $u' = \frac{(\alpha d\gamma_i - B_i)p_j - (\alpha d\gamma_j - B_j)p_i}{(p_j - p_i)}$.

We define $\Gamma_i = \alpha d\gamma_i - B_i$ as the "extra utility cost" of consuming good i, which corresponds to the effect of good i on perceived damage (moral cost) minored by the effect of the good on image (moral benefit).[45] Assuming that marginal utility is strictly positive, the right-hand side (rhs) must be positive, which implies for $p_j > p_i$ that

$$\begin{aligned} & (\alpha d\gamma_i - B_i)p_j - (\alpha d\gamma_j - B_j)p_i > 0 \\ \Leftrightarrow\ & \Gamma_i/p_i > \Gamma_j/p_j && (21) \\ \Leftrightarrow\ & \alpha d\gamma_i/p_i - B_i/p_i - \alpha d\gamma_j/p_j + B_j/p_j > 0 \\ \Leftrightarrow\ & B_j/p_j - B_i/p_i > \alpha d\left(\gamma_j/p_j - \gamma_i/p_i\right) && (22) \end{aligned}$$

Separating the elements, we get a element by element interpretation: The left-hand side (lhs) corresponds to the potential image gain per dollar of consuming the more expensive good compared to the less expensive one. The rhs corresponds to the change in pollution per dollar of consuming the more expensive good compared to the less expensive one. This is a *necessary* condition for the two goods to be possibly consumed together.[46]

From Eq. (11), we can define a Proposition (see Result 1) regarding the existence of a mixed consumption zone: For any two goods with $p_j > p_i$, the range of possible consumption levels for these two goods is $[R/p_j; R/p_i]$, each level being associated with a single combination of the two goods, yielding a range of possible marginal utility $[p_i/R; p_j/R]$. The two goods are consumed jointly (possibly combined with other goods) in any (α, β) area such that Eq. (11) is satisfied for a $u' \in [p_i/R; p_j/R]$. Note that, at the boundaries, we get the exact same conditions as those for the exclusive zones. [47]

[45] Note that "cost" Γ_{BD} is positive (because good BD generates internalized environmental damage but no image benefits), but that Γ_i can be negative (perceived overall benefit, i.e., negative extra cost).

[46] This condition may be used to rule out some consumption bundles, in line with assumptions on parameters values. It is linked to conditions for exclusive zones.

[47] Also, for any (α, β), this equation gives a unique u' that works (a marginal condition), and thus a unique total consumption $q_i + q_j = 1/u'$, which can be combined with the budget constraint $p_iq_i + p_jq_j = R$ (a global condition) to find the exact level of each good.

A.1.2 Necessary condition for joint consumption of three goods

For any two goods consumed together, with $p_j > p_i$, we have (see previous Appendix):

$$u' = \frac{p_i(\alpha d\gamma_j - B_j) - p_j(\alpha d\gamma_i - B_i)}{p_i - p_j} \tag{23}$$

The range of possible consumption levels for these two goods is $[R/p_j; R/p_i]$, each level being associated with a single combination of the two goods. The range of corresponding marginal utility is $[p_i/R; p_j/R]$ for the particular case of $u(q) = ln(q)$.[48]

Now, consider a third good k, such that $p_j > p_k > p_i$, implying that the consumption of k does not impact the range of consumption as it is always the convex combination of the two goods with extreme prices. Then, we must have both $u' = \frac{p_i(\alpha d\gamma_k - B_k) - p_k(\alpha d\gamma_i - B_i)}{p_i - p_k}$ and $u' = \frac{p_k(\alpha d\gamma_j - B_j) - p_j(\alpha d\gamma_k - B_k)}{p_k - p_j}$. Equalizing the two previous conditions yields

$$\begin{aligned} & \Gamma_k(p_i - p_j) + \Gamma_j(p_k - p_i) + \Gamma_i(p_j - p_k) = 0 \\ \Leftrightarrow \quad & \Gamma_k = \Gamma_j\left(\frac{p_k - p_i}{p_j - p_i}\right) + \Gamma_i\left(\frac{p_j - p_k}{p_j - p_i}\right) \end{aligned}$$

or equivalently

$$\begin{aligned} & p_i(\Gamma_k - \Gamma_j) + p_j(\Gamma_i - \Gamma_k) + p_k(\Gamma_j - \Gamma_i) = 0 \\ \iff \quad & p_k = \frac{\Gamma_k - \Gamma_j}{\Gamma_i - \Gamma_j} p_i + \frac{\Gamma_i - \Gamma_k}{\Gamma_i - \Gamma_j} p_j \end{aligned}$$

As, by assumption, $p_k \in [p_i, p_j]$, we can interpret the first condition as the requirement that, for the three goods to be consumed jointly, one needs to have the (absolute, per good unit) intermediate cost to be exactly equal to the weighted sum of the "extra cost" of the two others, weighted by the ratio of the distance between the intermediate and each extreme price divided by the gap between the extreme prices. Otherwise, it is either more interesting to consume the convex combination of the two extreme goods only or only the middle good.[49] Thus, a necessary condition for joint consumption of the three is that if $p_j > p_k > p_i$, we must have Γ_k inbetween Γ_i and Γ_j, but the direction of the inequalities depends on the ranking of Γ_i and Γ_j (as these are "absolute" terms (per unit of good) and not relative ones (per dollar), we cannot infer anything from Eq.(21)). This provides two conditions to be checked to exclude the consumption of three goods.[50]

[48]Yet, the functional form does not matter.

[49]The second condition has a symmetric interpretation.

[50]In general, one can check that the price ranking is similar or opposite to the "benefits" ranking.

A.1.3 An example of incompatible lifestyles: GD, BP and BD.

Using the previous necessary conditions, the 3-goods zone excluding GP appears not to exist in the baseline.

First, we always have $\Gamma_{GD} < \Gamma_{BD}$ as this equates to $\beta > d(\gamma_{GD} - \gamma_{BD})$ which is always satisfied since we assume in the model that $\gamma_{GD} < \gamma_{BD}$ (and $d > 0$).

Hence, under Assumption 2A. on prices, the 3-goods zone exists iff we have $\Gamma_{BD} > \Gamma_{BP} > \Gamma_{GD}$, which yields two inequalities. The second condition $\Gamma_{BP} > \Gamma_{GD}$ writes

$$\beta > \frac{\alpha d(\gamma_{GD} - \gamma_{BP})}{2\alpha - 1} \tag{24}$$

and it is satisfied only for rather low values of α (below 1/2), which is incompatible with the other condition. Indeed, this is $\Gamma_{BD} > \Gamma_{BP}$, which equates to

$$\beta < \frac{\alpha d(\gamma_{BP} - \gamma_{BD})}{1 - \alpha} \tag{25}$$

Studying the right-hand side, one can easily show that such condition is only satisfied for high values of α and/or tiny values of β. Denoting the right-hand side of respectively equations (24) and (25) as functions r_1 and r_2, we show that for all $\alpha \in [0, 1]$ such that $r_1(\alpha)$ and $r_2(\alpha) \in [0, 1]$, we always have $r_1(\alpha) > r_2(\alpha)$. To do so, we compute the difference between both functions:

$$\begin{aligned}(r_1 - r_2)(\alpha) &= \frac{\alpha d(\gamma_{GD} - \gamma_{BP})}{2\alpha - 1} - \frac{\alpha d(\gamma_{BP} - \gamma_{BD})}{1 - \alpha} \\ &= \frac{(1-\alpha)\alpha d(\gamma_{GD} - \gamma_{BP}) - (2\alpha - 1)\alpha d(\gamma_{BP} - \gamma_{BD})}{(2\alpha - 1)(1 - \alpha)}\end{aligned}$$

Looking at the denominator, three cases must be considered:

i) If $\alpha > 1/2, r_1(\alpha) < 0$ as the denominator of $r_1(\alpha)$ is positive while the numerator is negative as $\gamma_{GD} < \gamma_{BP}$. Hence $r_1(\alpha) \geq 0$ not being satisfied, and this case can be ruled out (as the necessary condition does not apply for negative parameter values).

ii) If $\alpha = 1/2$, the difference $r_1 - r_2$ is undefined (null denominator), but since $\lim_{\alpha \to 1/2} r_1(\alpha) = +\infty$ while $r_2(\alpha) < +\infty$, it is clear that we have $r_1 > r_2$ around 1/2.

iii) Whenever $\alpha < 1/2$, the denominator is negative. We thus need to show the numerator is also negative so that the difference is positive. The numerator writes $d[\gamma_{GD}\alpha(1-\alpha) + \gamma_{BP}\alpha(-\alpha) + \gamma_{BD}\alpha(2\alpha - 1)]$.

As marginal damage is strictly positive, this has the same sign as the polynom R_α defined for $2\gamma_{BD} - (\gamma_{GD} + \gamma_{BP}) \neq 0$ by $R_\alpha = \alpha[\alpha(2\gamma_{BD} - (\gamma_{GD} + \gamma_{BP})) + \gamma_{GD} - \gamma_{BD}]$. An obvious root of R_α is zero, while the sign of the second root $\alpha_2 = \frac{\gamma_{BD} - \gamma_{GD}}{2\gamma_{BD} - \gamma_{GD} - \gamma_{BP}}$ depends on the relative distance between the γ parameters.

More precisely, since $\gamma_{GD} < \gamma_{BD}$, this root is positive whenever $2\gamma_{BD} - \gamma_{GD} - \gamma_{BP} > 0$, that is to say (as $\gamma_{BP} > \gamma_{BD}$) provided that $|\gamma_{GD} - \gamma_{BD}| < |\gamma_{BP} - \gamma_{BD}|$. In this case, the denominator is smaller than the numerator, which implies that the root is superior to one (since both numerator and denominator are of the same sign). Thus, for $\alpha \in]0, 1]$ (i.e. lying between the roots of the polynom), the sign of the polynom is the opposite of that of $a = 2\gamma_{BD} - \gamma_{GD} - \gamma_{BP}$, namely it is negative. When $|\gamma_{GD} - \gamma_{BD}| > |\gamma_{BP} - \gamma_{BD}|$, the second root of the polynom is negative, thus the sign of the polynom for $\alpha \in]0, 1]$ (i.e. outside its roots) is the sign of $a = 2\gamma_{BD} - \gamma_{GD} - \gamma_{BP}$, namely it is also negative.

Lastly, when $|\gamma_{GD} - \gamma_{BD}| = |\gamma_{BP} - \gamma_{BD}|$, i.e. $2\gamma_{BD} - (\gamma_{GD} + \gamma_{BP}) = 0$, we only have a single-order polynom, and the quantity we study (numerator of the r1-r2 difference) has the same sign as $\alpha(\gamma_{GD} - \gamma_{BD}) < 0$.

Conclusion: for all $\alpha \in]0, 1], R_\alpha < 0$, implying the denominator of $(r_1 - r_2)(\alpha)$ is negative too, which implies in turn that $(r_1 - r_2)(\alpha) > 0$ for all $0 < \alpha < 1/2$. This proves that, for all $\alpha \in [0, 1]$ such that $r_1(\alpha)$ and $r_2(\alpha) \in [0, 1]$, we always have $r_1(\alpha) > r_2(\alpha)$.

The last step of the proof consists in remarking the incompatibility between this conclusion and the necessary conditions being satisfied together: on the one hand, $r_1(\alpha)$ being above $r_2(\alpha)$, and, on the other hand, β being both above $r_1(\alpha)$ and below $r_2(\alpha)$. Thus, under our assumptions, the necessary conditions (24) and (25) cannot be satisfied simultaneously.

We can thus rule out the existence of the 3-goods zone excluding GP. This has an important corollary. Since, for those parameter values, it is never optimal for a consumer to spend money in GD, BP and BD at the same time, and as this impossibility does not stem from the marginal utility bounds, this implies it is never optimal for any consumer to combine all four lifestyles under those assumptions.

A.1.4 Shapes of consumption frontiers - A detailed example

After deriving inequalities characterizing trade-offs between two goods[51] (as we did in Section 2.2 for the GP vs. GD example), we represent the corresponding trade-offs in the preference square, so as to represent choices graphically. We recall that preference for GP over GD was given by Equation (13). We thus study the function defined[52] on the [0,1] interval (barring $\alpha^* = p_{GD}/p_{GP}$ where it has a vertical asymptote) by
$f_1(\alpha) = \frac{\frac{p_{GP}}{R}(\frac{p_{GP}}{p_{GD}} - 1) + \alpha d(\gamma_{GP} - \gamma_{GD}\frac{p_{GP}}{p_{GD}})}{1 - \alpha\frac{p_{GP}}{p_{GD}}}$.
The denominator is negative when $\alpha > \alpha^*$ (and thus positive when the inequality is reversed). By Assumptions 1 and 2A., GP is more expensive and dirty than GD, which implies $p_{GP}/p_{GD} > 1$ and $\gamma_{GP}/\gamma_{GD} > 1$. Since d is relatively small by Assumption 3 (and

[51]Since marginal utility u' depends on total consumption and is endogenous to the optimization problem, it would differ according to consumer preferences and corresponding consumed goods. The condition on the parameters implying that a given good, say GP, is strictly preferred to another one, say GD, will be different from the condition implying that GD is strictly preferred to GP. This difference explains the existence of zones where both are consumed.

[52]Similarly, resp. f_2 and f_3 are defined to study tradeoffs between GP and resp. BP and BD.

p_{GP}/p_{GD} not very large), this implies that the numerator is positive too. As a result, f_1 is positive when $\alpha \in [0, \alpha^*[$ and negative for higher α.[53]

Furthermore, we have $f_1(0) = (p_{GP}/R)(p_{GP}/p_{GD} - 1)$, which increases in the price of GP, and decreases in that of GD as well as in R. Computing the first derivative of this function, we get that f_1 is strictly increasing in α, given that we have:
$f_1'(\alpha) = \frac{\frac{p_{GP}}{p_{GD}}\frac{p_{GP}}{R}(\frac{p_{GP}}{p_{GD}}-1)+d'(\gamma_{GP}-\gamma_{GD}\frac{p_{GP}}{p_{GD}})}{(1-\alpha\frac{p_{GP}}{p_{GD}})^2} > 0$ due to our model assumptions.

Besides, this function is convex:
$f_1''(\alpha) = 2\frac{\frac{p_{GP}}{p_{GD}}\frac{p_{GP}}{R}(\frac{p_{GP}}{p_{GD}}-1)+d'(\gamma_{GP}-\gamma_{GD}\frac{p_{GP}}{p_{GD}})}{(1-\alpha\frac{p_{GP}}{p_{GD}})^3} > 0$ for the same reasons.

Figure 5 represents its shape for baseline parameters (low damage baseline). The actual shape of the frontier depends on the value of the exogenous parameters. The higher p_{GP}, γ_{GP} and/or d, the more convex it becomes, and thus, looking at the representation below, this implies that the area where GP>GD (above the frontier) gets smaller. The opposite happens when p_{GD}, γ_{GD} and/or R increase. This is very intuitive: the higher the monetary and/or (perceived) environmental costs of a given lifestyle, the smaller the area where it is strictly preferred to another. The higher the marginal damage, the lower the area where the relatively more polluting lifestyle is preferred. The higher the individual income, the bigger the area where the most expensive lifestyle is preferred.

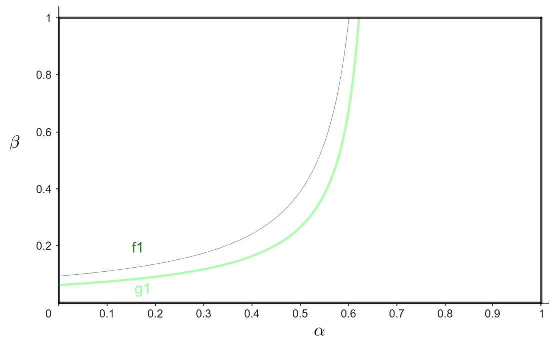

Figure 5: Trade-offs between green goods in the low damage baseline

A.1.5 Exclusive consumption zones: the GD example (compared to GP)

In Subsection 2.2, we have characterized exclusive GP consumption, that corresponds to the neon green zone in Figure 6 below. Let us now compare with consumers of the other green good. GD's exclusive consumption zone is the intersection of three different areas: that where GD is preferred to GP, that where it is preferred to BP, and that where it is preferred to BD. With the same method as previously, we find that those preferring it to GP should satisfy $\frac{u'+\alpha(\beta-\gamma_{GD}d)}{p_{GD}} > \frac{u'+\beta-\alpha\gamma_{GP}d}{p_{GP}}$.

We know besides that green consumers preferring consuming only goods GD over other lifestyles would have a marginal utility of total consumption equal to p_{GD}/R, hence the

[53](in which case this frontier does not matter anymore, as α and β range between 0 and 1)

condition rewriting

$$\beta < \frac{\frac{p_{GD}}{R}(\frac{p_{GD}}{p_{GP}} - 1) + \alpha d(\gamma_{GD} - \gamma_{GD}\frac{p_{GD}}{p_{GP}})}{\alpha - \frac{p_{GD}}{p_{GP}}} \equiv g_1(\alpha) \tag{26}$$

for each α such that the denominator is negative.[54] This condition requires the image parameter to be below a 'frontier' expressed by the right-hand side of (26).

Now we prove that the exclusive consumption zone of GD is as appears in Figure 6 below, by characterizing preferences for this composite good over BP and over BD. [55]

Using the same method as before, consumers who prefer GD to BP satisfy $\frac{u'+\alpha(\beta-\gamma_{GD}d)}{p_{GD}} > \frac{u'+\beta(1-\alpha)-\alpha\gamma_{BP}d}{p_{BP}}$, which is equivalent to

$$\beta < \frac{\frac{p_{GD}}{R}(\frac{p_{GD}}{p_{BP}} - 1) + \alpha d(\gamma_{GD} - \gamma_{BP}\frac{p_{GD}}{p_{BP}})}{\alpha - (1-\alpha)\frac{p_{GD}}{p_{BP}}} \equiv g_2(\alpha) \tag{27}$$

These consumers are under the increasing g_2 curve (in light green) in Figure 6.

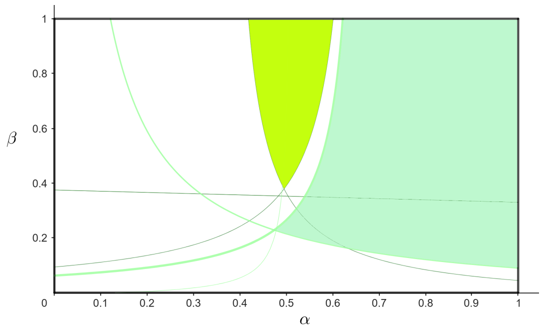

Figure 6: Graphical representation of both exclusive green consumption zones (GP and GD) in the low damage baseline

Similarly, those who prefer GD to BD are characterized by

$$\beta > \frac{\frac{p_{GD}}{R}(\frac{p_{GD}}{p_{BD}} - 1) + \alpha d(\gamma_{GD} - \gamma_{BD}\frac{p_{GD}}{p_{BD}})}{\alpha - (1-\alpha)\frac{p_{GD}}{p_{BD}}} \equiv g_3(\alpha) \tag{28}$$

as the numerator (hence the whole function) is always positive when d satisfies Assumption 3. These consumers are thus to be found above the g_3 light green decreasing curve in Figure 6, in which parameter values are the same as in Figure 5.

Putting conditions (26), (27) and (28) together, we finally obtain the exclusive consumption zone we represented in light green in the same figure. This constitutes an example of Result 8 for particular values of the exogenous parameters.

[54]This condition is expressed this way to ensure the ratio remains positive, as the numerator is always negative due to the model's assumptions about prices and marginal damage. When the denominator is positive, the right-hand term is negative (according to our price hypothesis), i.e. the frontier no longer plays a role in the tradeoff (since $\beta \in [0, 1]$).

[55]This is also the building block of the proof of Result 8 below.

A.1.6 Threshold conditions on model parameters (sketches of proof)

1. Conditions on damage for high α to imply green consumption. In Section 3, we show that when marginal damage is small, part of the environmentally-sensitive consumers (those with low β) consume only BD, which is a quite polluting lifestyle. For this not to happen, marginal damage should be above a certain threshold, which is given by the intersect between the curve of the function representing the tradeoff between BD and GD (namely function i_2)[56] and the $\alpha = 1$, since exclusive consumption of BD is verified for all values under this curve, when α is large - hence the following condition:

$$i_2(1) \leq 0 \Leftrightarrow \frac{\frac{p_{BD}}{R}\left(1 - \frac{p_{BD}}{p_{GD}}\right) - d(\gamma_{BD} - \gamma_{GD}\frac{p_{BD}}{p_{GD}})}{\frac{p_{BD}}{p_{GD}}} \leq 0 \tag{29}$$

$$\Leftrightarrow d \geq \frac{\frac{p_{BD}}{R}(p_{GD} - p_{BD})}{\gamma_{BD}p_{GD} - \gamma_{GD}p_{BD}} = \bar{d} \tag{30}$$

where $\bar{d}$ denotes the damage threshold above which maximum environmental concern translates into some green consumption behaviors. We can rewrite the previous condition on damage as a threshold condition on income:

$$R > \left\lceil \frac{p_{BD}\left(1 - \frac{p_{BD}}{p_{GD}}\right)}{d\left(\gamma_{BD} - \gamma_{GD}\frac{p_{BD}}{p_{GD}}\right)} \right\rceil = \bar{R} \tag{31}$$

where $\lceil x \rceil$ denotes the upper integer part of x (if R is always an integer, as in our cases).

The second threshold on marginal damage, above which maximal levels of environmental concern necessarily imply exclusive consumption of the GD lifestyle, is derived from another condition. The g_3 curve has to cross the $\alpha = 1$ axis under zero:

$$g_3(1) \leq 0 \Leftrightarrow d \geq \frac{\frac{p_{GD}}{R}(p_{GD} - p_{BD})}{\gamma_{BD}p_{GD} - \gamma_{GD}p_{BD}} = \bar{\bar{d}} > \bar{d} \tag{32}$$

with the second threshold on damage being higher due to $p_{GD} > p_{BD}$.

2. Switch thresholds for extreme preference values. Threshold conditions derived in Section 3.2 are computed in a similar manner.

Starting with Result 2 on image-indifferent consumers, the $\hat{\alpha}$ and $\hat{\hat{\alpha}}$ are respectively obtained from intersecting the $\beta = 0$ axis with the curves represented respectively by the aforementioned functions i_2 and g_3, i.e. these are defined by $i_2(\hat{\alpha}) = 0 = g_3(\hat{\hat{\alpha}})$.

[56] Similarly as g_1, g_2 and g_3 in the previous Appendix, functions h_1, h_2, h_3 are defined to study preferences for the BP good over the others, and i_1, i_2, i_3 for BD preference, with the indices always corresponding to other goods ranked in descending order of prices (from GP to BP or BD, depending which good we study preference for).

Result 3 on consumers overlooking environmental issues draws on image concern thresholds that are obtained simply by setting $\alpha = 0$ in the expression of the relevant functions, which are h_3 (BP preferred to BD) and i_3 (BD preferred to BP). In other words, those thresholds are given by $\beta_1 = i_3(0)$ and $\beta_2 = h_3(0)$.

Concerning consumers with maximal environmental concern (Result 4), the logic is very close to that of Result 2 (as consumer behavior is characterized by the same functions). Image thresholds $\hat{\beta}$ and $\hat{\hat{\beta}}$ are respectively obtained from intersecting the $\alpha = 1$ axis with the same curves as in Result 2, i.e. these are defined by $g_3(1) = \hat{\beta}$ and $i_2(1) = \hat{\hat{\beta}}$.

Lastly, maximal image concern (Result 5) is characterized by four thresholds obtained by intersecting the $\beta = 1$ axis with the relevant curves, which amounts to finding the values of α satisfying respectively: $h_1(\alpha_1) = 1 = f_2(\alpha_2) = f_1(\alpha_3) = g_1(\alpha_4)$.

3. Relationship between individual preferences and impacts (Result 7). Let's first explain how individual optimal choices vary with preference parameters in general, and then draw the implications of making either Assumption 4A. or 4B.

Results 2 and 5 show that as α increases, consumers shift from more polluting to cleaner lifestyles (following Assumption 3), regardless of β. For high β, low-α consumers choose BP, then shift to GP+BP, then GP, and eventually GD as α passes successive thresholds. For low β, the same pattern holds, though some may not switch at all if d is too low to offset the utility loss from damage (Result 6). Beyond the edge of the square, this is also verified, by continuity. Overall, higher α increases the weight of environmental concerns in utility, pushing choices toward cleaner lifestyles—provided d is large enough. Importantly, no increase in α ever leads to dirtier choices, due to image costs tied to α.

A direct consequence emerges under Assumption 4A.- which preserves the impact order between lifestyles when accounting for income effects: increasing α can never lead to an increase in environmental impacts, hence i) from Result 7. However, under Assumption 4B., this does not translate into a similar decreasing pattern for actual individual impacts precisely due to the reversal of the impact order, namely, for each 'color' (G or B), between the positional and the discreet variant. All else being equal, the latter is still chosen for higher α (as damage and image functions involve absolute impacts and not those weighted by prices), but its price may lead to a volume effect making it more polluting than a good supposed to have lower absolute impacts, hence ii) from Result 7.

A.2 Secondary results

A.2.1 Preferred lifestyle for α=β=1

Result 8 (Preferred lifestyle for α=β=1) *Under our modeling assumptions on image benefits and environmental impacts, the combination of high environmental and image concerns leads to an exclusive green discreet lifestyle.*

The proof of this secondary result can be sketched as follows. We already know from Appendix A.1.5 above that exclusive consumption of GD goods is characterized by the intersection of conditions (26), (27) and (28). Let us now show that exclusive consumers of GD are consumers with sufficiently high α and β.

First, we show that, regardless of the value of the exogenous parameters, function g_1 is strictly increasing in α, so that the first condition (exclusive GD consumers being those with β below the associated curve) necessarily implies high levels of environmental concern. Indeed, starting with g_1 (defined in Appendix A.1.5), which has a vertical asymptote in p_{GD}/p_{GP}, the derivative of this function can be written as follows:

$$g_1'(\alpha) = \frac{\frac{p_{GD}}{p_{GP}} d(\gamma_{GD} - \gamma_{GP}\frac{p_{GD}}{p_{GP}}) - \frac{p_{GD}}{R}(\frac{p_{GD}}{p_{GP}} - 1)}{(\alpha - \frac{p_{GD}}{p_{GP}})^2} > 0$$

As the denominator is obviously positive, the positivity of the derivative stems from that of the numerator, hence the numerator being positive under Assumption 2A. on the price relationship between green lifestyles, and Assumption 3, that ensures damage is close to zero and the first term of the numerator is negligible compared to the second, which is positive as a product of negative quantities. Thus, g_1 strictly increases in α. Similarly, the derivative of g_2 writes

$$g_2'(\alpha) = -\frac{[\frac{p_{GD}}{p_{BP}} d(\gamma_{GD} - \gamma_{BP}\frac{p_{GD}}{p_{BP}}) + \frac{p_{GD}}{R}((\frac{p_{GD}}{p_{BP}})^2 - 1)]}{(\alpha - (1-\alpha)\frac{p_{GD}}{p_{BP}})^2}$$

Here, the numerator can be both positive or negative, depending on the value taken by the damage parameter, because the prices of GD and BP are so close that $((\frac{p_{GD}}{p_{BP}})^2 - 1)$ can be very close to zero. Thus the damage term is not necessarily negligible compared to the other anymore (unlike for the derivatives of the other two functions we study), this only happens if damage is high enough for the numerator to be positive (or the term between brackets negative, because we have a minus sign in front), i.e. provided we have:

$$d > \frac{\frac{p_{GD}}{R}[(\frac{p_{GD}}{p_{BP}})^2 - 1)]}{\frac{p_{GD}}{p_{BP}}(\gamma_{BP}\frac{p_{GD}}{p_{BP}} - \gamma_{GD})} \tag{33}$$

For baseline parameters, this threshold is around 0.001, which is below the values we affect to damage, hence g_2 increasing in those cases. Thus, when damage is not too small but still satisfies Assumption 3, g_2 is also strictly increasing in α.[57]

Lastly, g_3 is unambiguously strictly decreasing in α as its derivative writes:

$$g_3'(\alpha) = -\frac{\frac{p_{GD}}{R}(\frac{p_{GD}}{p_{BD}} - 1)}{\alpha^2} < 0$$

[57]Otherwise (i.e, for tiny damage levels), it is strictly decreasing, but then the corresponding condition is β being above the curve to ensure sign consistency with β being positive. This does not change the general idea of the proof: GD exclusive consumers would then be above a strictly decreasing function, hence still being located in the East of the square.

and the numerator is negative because $p_{GD} > p_{BD}$.

Thus, this last condition for exclusive GD consumption (β being above this decreasing function, corresponding to the tradeoff between discreet goods), combined with the first two conditions, mean exclusive GD consumers are those with high environmental concern α, coupled with high image concern β, regardless of the value we give to exogenous model parameters - except the constraints imposed by Assumptions 1, 2, 3, and 4.

A.2.2 Income and size of exclusive consumption zones.

We examine the effect of increasing income, showing that this reduces the range of preferences for exclusive BD consumption while it increases that for exclusive GP consumption.

To start with, switch thresholds below which consumers choose BD exclusively computed in Results 2 to 4 ($\hat{\alpha}, \beta_2$ and $\hat{\beta}$) are all strictly decreasing in R, implying that BD is consumed alone for smaller portions of segments from the edge of the square when R goes up. Conversely, applying the same logic with thresholds α_2 (above which we have exclusive GP consumption and which decreases in R) and α_3 (below which we have exclusive GP consumption and which increases in R) from Result 5 shows that the reverse happens for exclusive consumption of GP on the edge of the square when R goes up.

We generalize to the whole preference square by looking, for each of these two goods, at the three conditions whose intersection defines exclusive consumption. This implies studying the relationship between the R parameter and the position of the frontiers delineating each exclusive consumption zone. Exclusive consumption of GP being defined by β being located above frontiers represented by functions f_1, f_2, f_3 that are all strictly decreasing in R (hence those frontiers moving towards the origin of the square when R goes up) imply that higher income means a wider intersection of the three conditions, i.e. a bigger GP exclusive consumption zone. Conversely, exclusive BD consumption is associated to β being below three frontiers i_1, i_2, i_3 that are all strictly decreasing in R as well, hence a smaller intersection and corresponding exclusive zone when R goes up.

This yields the following secondary result:

Result 9 (Income and size of exclusive consumption zones) *Increasing individual income widens the range of preferences for exclusively consuming the most expensive good (GP), while it reduces that leading to consuming only the cheapest (BD). Effects on exclusive consumption zones of goods with intermediate prices are more ambiguous.*

A.3 Budget and market shares, environmental outcomes

A.3.1 Method

To determine lifestyle market shares across the preference square, we discretize it into hundreds of pixels using a rasterization method in R. A parallelized optimization algorithm then computes, for each (α,β) pair, the utility-maximizing consumption basket under the budget constraint. These optimal baskets are mapped to pixels, forming matrices of quantities and pollution levels. The conversion of (α,β) preference parameters into (x,y) coordinates is made so as to obtain in the matrix a "digital image" of the square: for instance, the matrix coefficient [1,1] is associated with parameters (0,0)-the origin of the square. From the optimal quantities, we compute budget shares and environmental impacts, producing the heatmaps in Figures 7 and 9. Summing optimal quantities obtained for each good over all possible values of (α,β) and dividing for each good by the sum of quantities consumed of all goods, we finally recover their market shares, depending on model parameters (prices, income, emissions coefficients, and marginal damage). These are displayed in the different cases in Figure 8.

For all tax cases, prices have decimal values, thus the algorithm artificially allocates tiny budget remainders to the last good tested (i.e., BD), especially in pixels that theoretically belong to exclusive consumption zones. When this happens, we ignore this artefact and round very small quantities to zero. To avoid underestimating impacts, the budget remainder is reallocated to the preferred lifestyle in the corresponding pixel.

A.3.2 Budget allocation (Fig. 7) and market shares (Fig. 8 below)

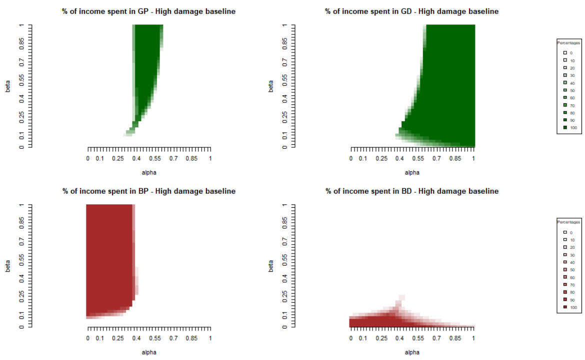

Figure 7: Budget allocations in the higher damage baseline

A.3.3 Heatmaps of individual impacts by preferences (Figure 9 below)

A.4 Population concentration scenarios

A.4.1 Method

We model population distributions using a matrix based on discrete Beta densities over a finite support, with coefficients summing to 1. In the uniform case, all pixels have equal weight. Concentration scenarios use Beta laws with varying shape parameters to alter distribution shapes. Independent Beta distributions are defined for each axis (α and β), and the overall population density is obtained by multiplying them.

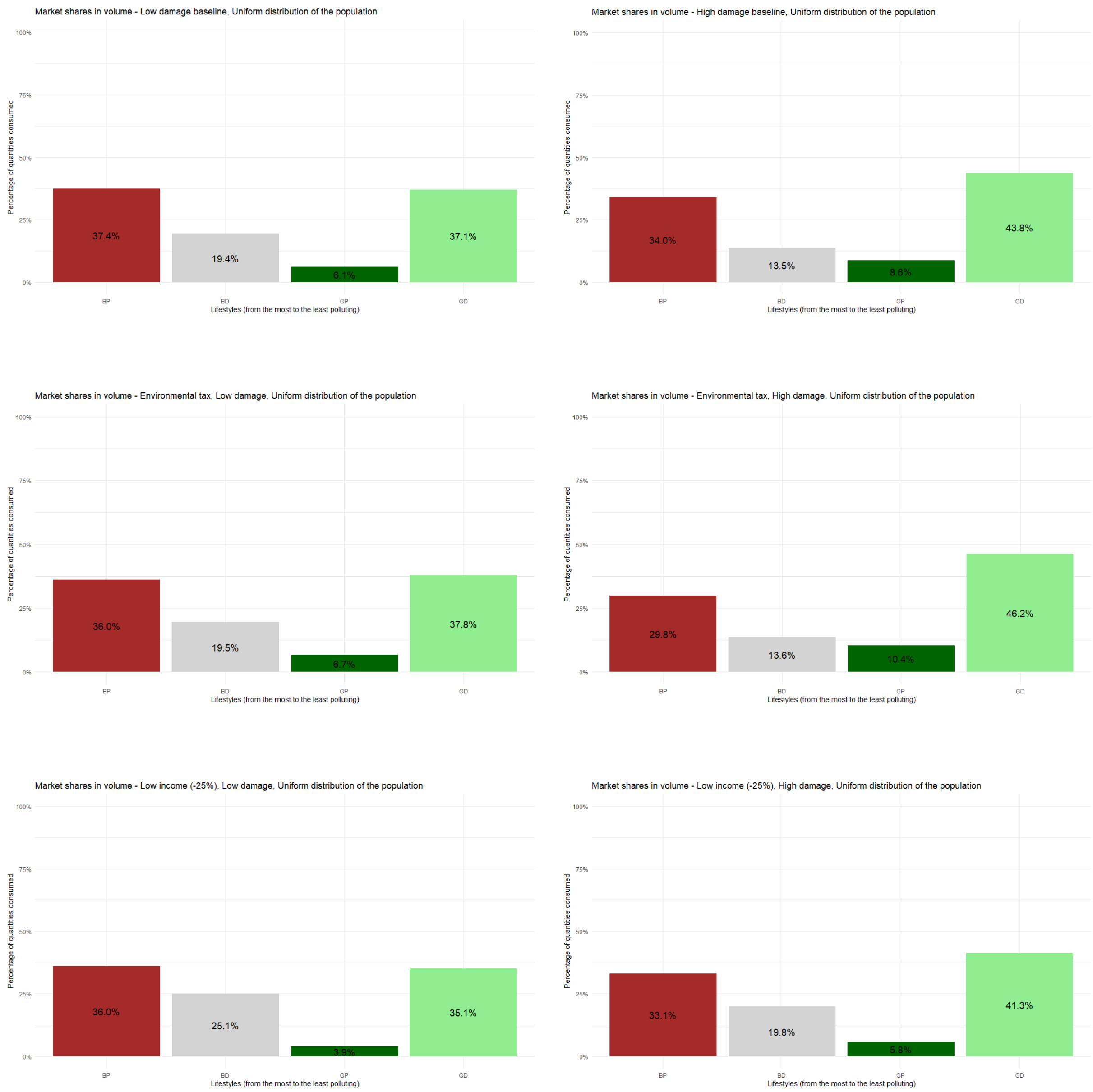

Figure 8: Market shares (in volume) of the different lifestyles by cases (from Table 1 in Section 3) when consumers are uniformly distributed in the preference square

The densities are discretized so that we can assign probabilities to pixels and not to areas unlike for "conventional" densities. We discretize them by calculating the rates of increase of the distribution functions between two pixels. After multiplying our two densities, we obtain a population matrix, with different probabilities depending on the location in the matrix.[58] For example, for the scenario of central concentration, the highest values in the population matrix are the central coefficients (and the smallest close to the corners of the square). In Figure 4, we represent all our scenarios in the form of

[58]Some pixels may contain more than one individual, and others none, depending on the distribution of preferences. Mathematically, the number of individuals per pixel is determined by rescaling the population matrix, i.e., multiplying the probability of an individual being located in each pixel by the matrix size.

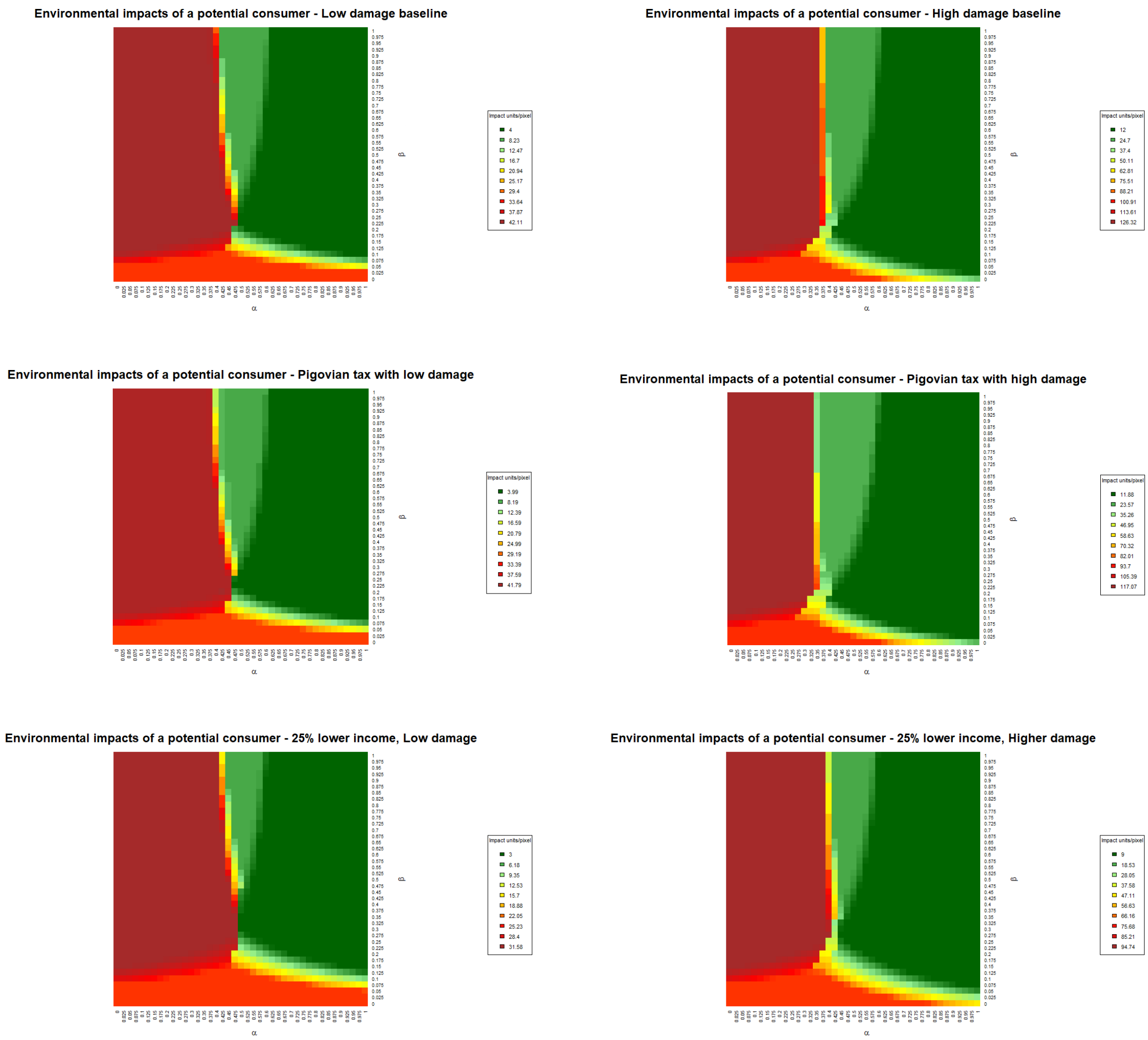

Figure 9: Impact of each potential consumer according to their intrinsic preferences in different economic cases (rows) and damage levels (columns), under Assumption 4A.

population heatmaps, where each gradient of color represents densities of population in the preference square, from low density (lightest blue) to higher density (darkest blue). The pie charts below those heatmaps finally show that collective outcomes, in particular aggregate market shares, greatly depend on the population scenario.

A.4.2 Impacts by scenario for high damage levels

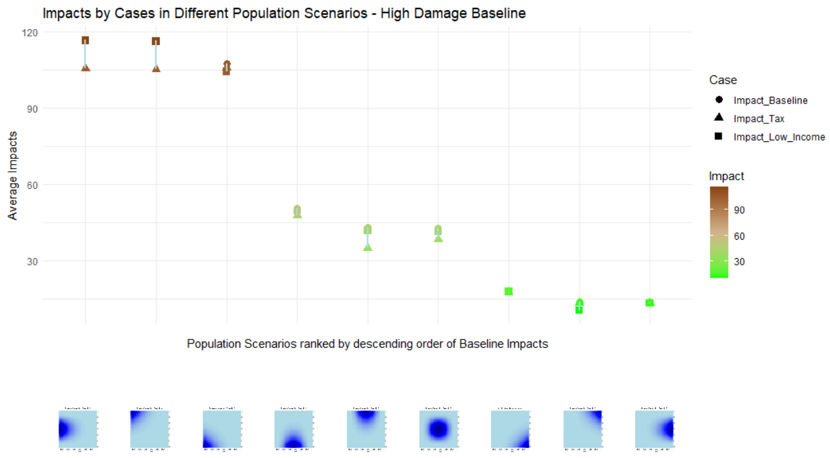

Figure 10: Impacts in different cases when varying preferences (high damage)

A.5 Sensitivity analyses: When does conspicuous conservation lead to lower environmental impacts?

A.5.1 Calibration of emissions intensities

Absence of data on emission intensities of lifestyles imply using orders of magnitude to calibrate the γ parameters. We get these orders of magnitude from per capita consumption-based CO2 emissions data in 2022.[59] Countries, such as the US, where the BP lifestyle is prominent (with widespread status-seeking) display emissions around 16 tons per capita, while per capita consumer expenditure is around 44k USD[60], which gives an emission intensity coefficient around 0.4. Smaller rich European countries, such as Switzerland display a γ around 0.7; thus, we take $\gamma_{BP} = 0.5$. Turning to the BD lifestyle, our calibration is based on emissions intensities from France and the EU, where this type of lifestyle is more widespread. In both cases, we find coefficients around 0.3; but this is based on mean emissions, that are partly driven upwards by high emitters (those with a BP lifestyle), thus we take a slightly smaller value for γ_{BD}, namely 0.2. Finally, for green lifestyles, calibration is even more complicated because no country has a dominant 'green population' and because values must also be based on emissions linked to production (as many green goods do not pollute during consumption). Thinking about GP as the average lifestyle of green consumers in developed countries (electric cars, vegetarian but not vegan...), we take γ_{GP} lower but voluntarily close to γ_{BD}, namely the former is set to 0.15; while γ_{GD}, that represents the intensity of an even more frugal lifestyle (cycling,

[59] https://ourworldindata.org/grapher/consumption-co2-per-capita

[60] https://en.wikipedia.org/wiki/List_of_countries_by_household_final_consumption_expenditure_per_capita

veganism...) is approximated to be around 10 times lower than γ_{BP}, i.e. 0.05.

A.5.2 Changing income levels to mimic richer countries (R=24)

To calibrate baseline income, we used consumer spending data from the World Bank,[61] giving a range of values for annual disposable income per capita, with the world mean (higher than the median, unavailable in the data) and OECD median being 6.9 and 23.8 thousand USD. We thus consider $R = 16$ as a benchmark, an upper value of $R = 24$ (+50% compared to the benchmark; see Appendix A.5.2 for the sensitivity analysis) to mimic richer countries and a lower value of $R = 12$ (-25% compared to the benchmark) to be also relevant for less wealthy countries. While in Section 3.4 we have focused on the case of lower income to study a negative shock on purchasing power, the case of increased income allows to consider lifestyle choices within richer countries (corresponding to the median consumer spending per capita in the OECD, see Section 3.1).[62]

The overall mechanisms emerging from this case are symmetrical to the case of reduced income. First, the substitution effect means more expensive lifestyles get a higher share of consumption, as they are optimal for wider ranges of preference parameters. Exclusive conspicuous conservation is chosen above a lower threshold of minimal image concern β (Result 9), provided environmental concern α is moderate. Second, the income effect again creates a discrepancy between the share of green lifestyles and the environmental impacts, as the latter get bigger when consumers enjoy greater purchasing power. Those two effects combined, with the income effect still dominating, lead to higher impacts (+42% relative to the baseline) but increasing less than income (+50%).

The ranking of impacts across preference distributions stays unchanged with higher income ($R = 24$), as Figure 11 illustrates. However, differences between scenarios shift slightly. In richer societies, Scenario (α_l, β_l) becomes more polluting, nearing the worst cases, while (α_h, β_l) gets closer to the cleanest ones. This stems from reduced BD consumption (Result 9): richer consumers either upgrade to BP for image or to GD for environmental reasons. This implies a greater effectiveness of green nudges with higher purchasing power, as small shifts in α (e.g., from α_l to α_m) yield larger impact reductions.

A.5.3 Changing impact-intensities of lifestyles: collective implications

At the collective level, aggregate impacts are less sensitive than individual ones to switching from Assumption 4A. to Assumption 4B. For instance, in the high-damage baseline, impacts rise by 24% when assuming GD is more polluting per dollar than GP, mainly

[61] https://www.macrotrends.net/global-metrics/countries/OED/oecd-members/consumer-spending and https://www.macrotrends.net/global-metrics/countries/WLD/world/consumer-spending

[62] We then focus on the low damage world, as Assumption 3 implies that, for this new level of income, the upper value of damage gets smaller than the value we had chosen for the high damage cases.

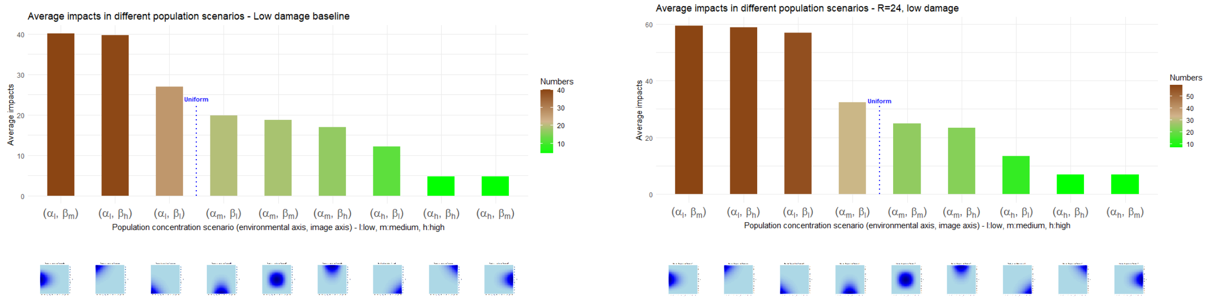

Figure 11: Scenarios ranking' stability under different income levels (left:baseline/ right:R=24 (+50%)) in a low damage setting.
Note: Be careful when comparing both figures, scales are not the same: they are not normalized to avoid reducing the visilibity of differences between scenarios.

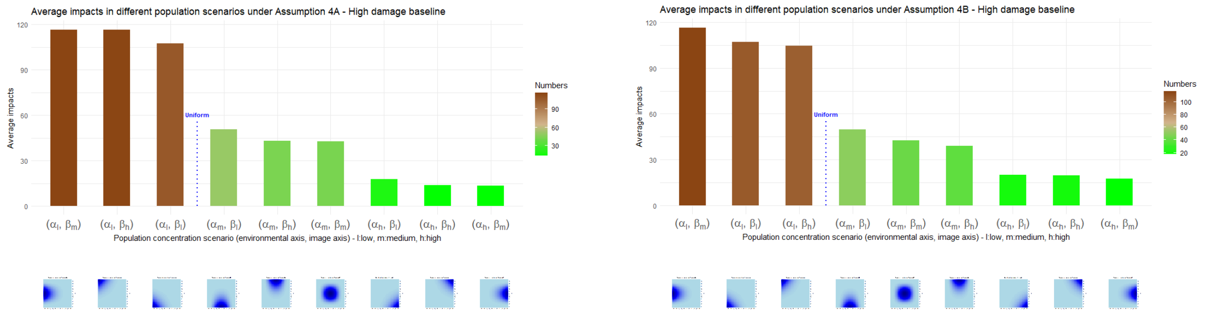

Figure 12: Scenarios ranking' stability under Assumption 4A. (left) and 4B. (right), for baseline income and prices, high damage

because GD has a much larger market share than GP—though the gap narrows under Assumption 4B. Yet, Figure 12 shows that the ranking of preference scenarios remains largely unchanged: the main difference is that under Assumption 4B, consumers who care neither about the environment nor about their image now pollute more than those caring only about image, due to BP becoming dirtier than BD.

This overall stability stems from two factors. First, our population distributions remain spread out, so each scenario includes diverse consumer types—making high-GP scenarios still more polluting than high-GD ones, albeit to a lesser extent under 4B. Second, as already mentioned and more fundamentally, consumers optimize based on absolute, not relative, impact intensities. Since they don't internalize rebound effects, collective outcomes might remain stable despite shifts in scenario-modeling, what we now look at.

A.5.4 Changing the form of population densities in scenarios

We test alternative specifications by varying the shape parameters of the Beta laws, thereby altering the preference distribution.[63] We examine cases where preference concentrations are tighter (less spread) or looser (more spread). Figure 13 below illustrates

[63] Correlated distributions—e.g., bivariate Beta laws—could offer further insights.

this for scenario (α_l, β_h): in $(\alpha_l, \beta_h)_2$, preferences are more extreme and homogeneous, while in $(\alpha_l, \beta_h)_3$, they are more dispersed, overlapping more central values.

Figure 13: Population concentrations in alternative (α_l, β_h) scenarios

Compared to the baseline (low-damage) scenarios, results remain remarkably consistent, with identical impact rankings across modified scenarios, as shown in Figure 14. When preference distributions are less dispersed, impact differences across scenarios widen. For example, $(\alpha_l, \beta_h)_2$ yields higher impacts than (α_l, β_h) due to more BP consumption. The main difference is a sharp rise in impacts for low-image-concern scenarios where BD dominates: reduced preference dispersion limits lifestyle diversity, raising average impacts. Conversely, the collective gains from green choices—especially conspicuous conservation—are clearer when preferences are more homogeneous within groups.

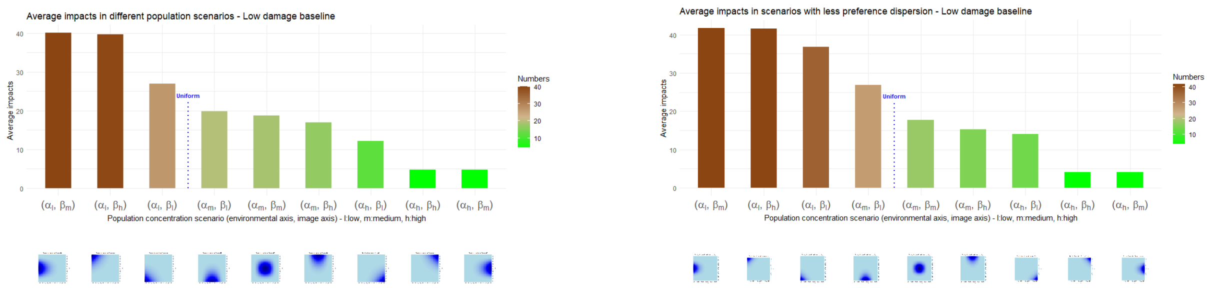

Figure 14: Comparing scenarios ranking in the low damage baseline when moving to scenarios with less dispersed /more homogeneous preferences (right)