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# Does sustainability sell? The impact of sustainability claims on the success of national brands' new product introductions<sup>☆, ☆ ☆</sup>

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## ABSTRACT

In the hope of benefiting from the increasing focus on sustainability in Western markets, national brands are introducing new sustainable products. We investigate the success of new sustainable products with a unique dataset combining household panel data, consumer survey data, expert panel survey data, and advertising expenditure data. We show that sustainable new product introductions achieve lower sales than their conventional counterparts. Investing in corporate social responsibility activities compensates for this negative effect and is therefore a viable strategy to boost sales of new sustainable products. Importantly, making sustainable new products clearly innovative mitigates the negative effect of a sustainability claim on new product sales, whereas price promotions aggravate the negative effect. We furthermore caution that the negative effect of sustainability may not decrease as sustainability becomes more mainstream, even if our data covers a period before the currently increased interest in sustainability.

## 1. Introduction

Many brand manufacturers and retailers in the fast-moving consumer goods (FMCG) market are increasingly focusing on sustainability (e.g., Vadakkepatt et al., in press). The number of sustainable products offered in the supermarket is increasing annually (International Supermarket News, 2015) and sustainability is an important issue for consumers (Martins 2019; Reints, 2019; Rosmarin, 2020). In the USA products that had a sustainability claim on-pack accounted for 16.6% of the market in 2018, up from 14.3% in 2013 (Whelan & Kronthal-Sacco, 2019). Despite the introduction of new products being one of the most important marketing activities for consumer packaged goods manufacturers, a large majority of new products fail in their first year (Gielens & Steenkamp, 2007). For the growing number of companies developing their new products to be sustainable, evidence that this strategy mitigates high failure rates is therefore important. Some recent market insights suggest that sustainable strategies can be very beneficial for brand manufacturers (e.g., Sustainable Brands, 2018), despite that a decade ago there were strong doubts on the success of sustainable products (e.g., Van Doorn & Verhoef, 2011).

While research has given substantial attention to drivers of consumption and market share of existing sustainable products (e.g.,

Bezawada & Pauwels, 2013; Van Doorn & Verhoef, 2015) and new product success (e.g., Steenkamp & Gielens, 2003), studies have given limited attention to the *introduction* of sustainable new products (see Fig. 1). However, a national brand's decision to introduce a new product with a sustainability claim is of strategic importance as a sustainability claim implies a different sourcing of raw materials and investments in the supply chain (e.g., Porter, 2011; Whelan & Kronthal-Sacco, 2019). Top management must discuss sustainable strategies extensively with numerous stakeholders (Whelan & Fink, 2016) as stakeholders may expect higher costs due to sourcing issues and lower sales.

While all new products inherently carry a risk for consumers (e.g., Steenkamp & Gielens, 2003), the risk may be greater for sustainable new products as a sustainability claim on a new product can backfire: consumers may assume that a company sacrifices quality for sustainability and may have lower purchase intentions for sustainable new products than for their conventional counterparts (Newman, Gorlin, & Dhar, 2014). While recent research confirms negative quality inferences of sustainability claims regarding new products (Van Doorn, Verhoef, & Risselada, 2020), it does not reveal the effect on product sales. Our study therefore focuses on sales of new sustainable products, where our first goal is to uncover whether making a new product sustainable helps or hinders its sales.

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Although research has documented negative quality connotations surrounding sustainable products (Newman, Gorlin, & Dhar, 2014; Usrey et al., 2020; Van Doorn & Verhoef, 2011), anecdotal examples of successful sustainable brands exist and include Ben & Jerry's ice cream and Tony Chocolonely (e.g., Sustainable Brands, 2018). Conceivably, the response to sustainable new products is not uniform, but is instead affected by marketing measures surrounding the new product that support its introduction and may counter potential negative quality inferences (e.g., White, Habib, & Hardesty, 2019). Previous literature has for instance shown that advertising that downplays a product's sustainability can alleviate performance concerns (Usrey et al., 2020). Therefore, our second goal is to investigate whether and how marketing measures that support a new product introduction strengthen or mitigate negative quality inferences triggered by a sustainability claim and affect the success or failure of sustainable new products. We therewith respond to a recent call to provide insights into the "predictors of sustainable consumption" (White et al., 2019).

As marketing measures can act as a positive quality cue and therewith counter negative quality inferences, we expect that a *high price* and *clear innovativeness* of the sustainable new product may signal quality, therefore lessening quality concerns (Newman, Gorlin, & Dhar, 2014). Quality concerns may also be less of an issue if brands introducing the new sustainable product have a *strong CSR reputation* and an established track record of successful sustainable product introductions. In addition, marketing measures may induce trial, increasing familiarity with the sustainable new product and making negative quality inferences less of an issue. As *price promotions* facilitate consumers' experience of new products, providing a discount on a new sustainable product may reduce the potential negative impact of a sustainability claim on new product success (Bezawada & Pauwels, 2013).

Importantly, studies on sustainable products have given no attention to the potentially changing effects of the sustainability claim over time. These so-called dynamic effects have gained ample attention within the general marketing literature, and evidence shows that marketing effects can change throughout the product lifecycle (e.g., Leeflang et al., 2009; Osinga et al., 2010). While consumers may initially hold unfavorable beliefs about sustainable new products (e.g., Newman, Gorlin, & Dhar, 2014), whether those beliefs alter as consumers gain experience with these new products is not clear. Quite possibly the negative quality inferences revealed in previous literature may become less pronounced over time, as consumers become more familiar with either the newly introduced product itself or sustainable new products in general as they become more mainstream as recent industry reports show (Usrey et al., 2020). Therefore, our third goal is to investigate whether the potential negative sales effect of marketing a new product as sustainable is mitigated over time. Given our focus on new sustainable product introductions, we can investigate whether the effect of a sustainability claim is affected by the time elapsed since introduction. Moreover, as we have data for new product introductions in different years, we can also investigate whether the effect of sustainability claims changes over calendar time, as sustainable products become more mainstream.

Summing up, we have three objectives for this study. First, we assess whether making new products sustainable is a suitable strategy for national brands to overcome the high failure rates of new products, or whether sustainability actually aggravates the problem. Second, we investigate to what extent high prices, product innovativeness, price promotions, and consumers' perceptions of brand CSR reputation are viable marketing measures to support the introduction of a new sustainable product and boost its sales by countering potential negative quality inferences. Third, we investigate whether the impact of a sustainability claim on new product sales may actually wear off over time. We explore potential dynamic effects of the sustainability claim on sales, distinguishing between time since introduction effects and calendar time effects.

To achieve our objectives, we analyze 883 new product introductions of national brands and the sales development of these products over a

year with data around 2010, using propensity score matching to account for endogeneity. We study new product introductions with and without sustainability claims to assess their impact on sales. Our data covers a period before the current suggested stronger interest and preference for sustainability, implying that in particular Millennials and Gen Z consumers with a stronger interest in sustainability may be underrepresented in our data. Yet, quality concerns about sustainable products are also shown in recent research (e.g., Usrey et al. 2020), hence likely also extend to these consumer segments. Therefore, our findings about how marketing measures can mitigate these concerns are still valuable, even if based on somewhat older data.

## 2. Prior literature and hypotheses

### 2.1. Sustainability

In line with earlier work, we define sustainable products as products with a positive impact on society and/or the environment, for instance by securing fair labor practices and reducing environmental impact (Luchs et al., 2010; Phipps et al., 2013). On the basis of our definition and in line with previous literature, we consider new products with an eco-friendly and/or fair trade claim to be sustainable (Luchs et al., 2010; Newman, Gorlin, & Dhar, 2014). Prior work empirically shows that consumers of sustainable products indeed purchase both eco-friendly and fair trade products (Verhoef & Van Doorn, 2016), signaling that consumers categorize eco-friendly and fair trade brands in a similar way that fits the lifestyle of socially conscious consumers (Webster, 1975).

### 2.2. Prior literature

Multiple studies have investigated the success of existing sustainable products (e.g., Bezawada & Pauwels, 2013; Van Doorn & Verhoef, 2015). These studies have derived insights mainly related to the determinants of purchase behavior of sustainable products that have already survived in the market. Although recently some scholars have started to focus on innovating in a sustainable way (e.g., Katsikeas, Leonidou, & Zeriti, 2016), these studies do not study new product sales and focus solely on brand attitudes (e.g., Olsen, Slotegraaf, & Chandukela, 2014). There is also extensive research on new product success (e.g., Gielens & Steenkamp, 2007). In Fig. 1 we show the studies on existing sustainable products and new products. Our study contributes to the literature, as this is the first study having an in-depth investigation on the effect of sustainability claims on new product sales using actual new product sales over time. As we have data from around a decade ago, this study can also explain in hindsight why sustainable products at that time faced strong difficulties and how that is mitigated. By studying dynamic effects, we are the first study considering how the effect of sustainability claims may vary over time, thereby providing a greater understanding their success.

### 2.3. Effect of a sustainability claim on new product sales

For consumers, purchasing a new product is inherently risky owing to lower product knowledge and uncertainty about a new product's quality (Steenkamp & Gielens, 2003; Sustainable Brands, 2018). A sustainability claim could be an important differentiator for new products and contribute to higher sales because by purchasing a sustainable alternative, consumers can contribute positively to society and/or the environment. This can be an important motivation for consumers to purchase these products especially for specific market segments (Luchs et al., 2010; Phipps et al., 2013; Sustainable Brands, 2018; White et al., 2019). Thus, one could argue in favor of a positive effect of sustainability on new product sales.

However, for sustainable new products, consumers may follow a lay theory that firm resources are zero-sum and assume that resources invested in creating a sustainable product are diverted from efforts

		Scope of study in terms of conventional vs. sustainable products	
		Conventional Brands/Products	Sustainable Products
Scope of study in terms of existing vs. new products	Existing Products	Nijs et al. (2001); Van Heerde et al. (2013); Mela et al. (1997), etc.	Bezawada & Pauwels (2013), Ngobo (2011), Van Doorn & Verhoef (2015); Verhoef & Van Doorn (2016), Juhl et al. (2017)
	New Products	Gielens & Steenkamp (2007); Steenkamp & Gielens (2003), Ataman et al. (2008)	This Study + Exploration of Dynamic Effects of Sustainability Claim

Fig. 1. Contribution to literature on FMCG and new product sales. (See above-mentioned references for further information.)

aimed at improving its quality (Chernev, 2007; Newman, Gorlin, & Dhar, 2014). As a consequence, uncertainty about the efficacy of the new product may be enhanced rather than reduced if the new product is sustainable (Usrey et al., 2020). Therefore, quality concerns may be a prominent issue when a new product is sustainable (Luchs et al., 2010). Previous literature indeed shows that consumers have quality concerns regarding both eco-friendly and fair trade products (Baggini, 2019; De Janvry, McIntosh, & Sadoulet, 2015; Van Doorn & Verhoef, 2011; Van Doorn, Verhoef, & Risselada, 2020), although advertising tactics may reduce these concerns (Usrey et al., 2020).

On the basis of the above argument that consumers attribute lower quality to sustainable products, we therefore expect the sales potential of a new sustainable product to be lower than that of its conventional counterpart. While we acknowledge that this effect may differ between introduced products and brands, as a main effect we hypothesize:

**H1.** A sustainability claim on a new product has a negative effect on its sales.

2.4. Price as a quality cue for new sustainable products

Higher prices of sustainable compared to conventional products are seen as an important reason for consumers to not purchase more of them (Van Doorn & Verhoef, 2011). However, previous literature theorizes and shows that price is an important marketplace cue and that consumers interpret high prices as a signal of high product quality. This relationship is particularly strong for FMCG and for products consumers are not familiar with, implying that price is a relatively more important quality signal for new products (Völckner & Hofmann, 2007).

We argue that price may be an even more important quality signal for sustainable new products than for their conventional counterparts (Völckner & Hofmann, 2007). First, in most product categories, sustainable products are the exception rather than the rule, implying that consumer familiarity with these new products is even lower than consumer familiarity with new products in general (Bezawada & Pauwels, 2013). Second, consumers are more inclined to use price as a surrogate for product quality when the quality of a product is uncertain and the purchase is risky (Völckner 2008). Given that quality concerns may be more pronounced for sustainable new products than for their conventional counterparts, price as a quality signal rises in importance for this category of new products (Newman, Gorlin, & Dhar, 2014). Third, given the higher production and certification costs of sustainable products, introducing a sustainable product at a low price may not be a sound strategy, especially since consumers expect price markups for sustainable products (Habel et al., 2016). We therefore expect a higher price to mitigate the negative effect of a sustainability claim on the sales of a new

product.

**H2.** A higher price reduces the negative effect of the sustainability claim on the sales of the new product (positive interaction effect).

2.5. New product innovativeness

We conceptualize product innovativeness on the category level in terms of how innovative a new product is relative to all existing products currently in the category. In line with prior literature, we focus on the perceived uniqueness and newness of the new product relative to existing products in the market that can be based on for example, new ingredients, new taste, new packaging and other product attributes (e.g., Gielens & Steenkamp, 2007). In accordance with our definition and following previous literature (e.g., Newman, Gorlin, & Dhar, 2014), theoretically we conceptualize innovativeness independent from whether a new product is sustainable. However, we acknowledge that a sustainability claim may influence perceived innovativeness.<sup>1</sup>

Prior research is inconclusive as to how product innovativeness affects new product success. Several studies report that moderate innovativeness leads to the highest success rate of new products (e.g., Gielens & Steenkamp, 2007; Goldenberg, Lehmann, & Mazursky, 2001; Steenkamp & Gielens, 2003), given that only slightly innovative products offer too little advantage and highly innovative products are perceived as too complex. We focus on the moderating impact of product innovativeness regarding the introduction of new sustainable products.<sup>2</sup>

We argue that product innovativeness may be particularly important if a new sustainable product is introduced. Concerns that the company may have sacrificed quality for sustainability in developing the new products may be less pronounced when the sustainable new product is clearly innovative (Newman, Gorlin, & Dhar, 2014). Conspicuous innovation may also explain why some sustainable brands are actually successful (White et al., 2019). For example, the chocolate brand Tony Chocolonely is considered successful because of its innovative product design as well as its novel taste (Aziz, 2020). By developing a new

<sup>1</sup> We empirically control for this by including the share of sustainable new products in the category as a measure of the extent to which sustainability is a new feature in this category.

<sup>2</sup> We tried to include nonlinear effects and the corresponding interactions with the sustainability claim in the model, but this was not feasible with our data. We estimated a simplified model without any of the focal interactions but with a nonlinear effect of innovativeness. Those results suggest a nonlinear effect, but only for the products with a sustainability claim, and the effect is U-shaped instead of the expected inverted-U shape. Results are available upon request.



product that is not only sustainable but also innovative, a company signals that it has invested substantial resources in improving the product on dimensions in addition to developing its sustainability. Therefore, the expected negative effect of a sustainability claim on sales may be less pronounced if the sustainable product is higher in innovativeness.

**H3.** Innovativeness of the new product reduces the negative effect of a sustainability claim on new product sales (positive interaction effect).

## 2.6. Price promotions induce trial of sustainable new products

While price promotions create new product awareness and induce trial of the new product, thereby increasing sales (Steenkamp & Gielens, 2003), researchers have theorized that price promotions are less suited to increasing sales of existing organic products because purchasing organic is an ongoing commitment that is less susceptible to temporary promotions. While previous research could not identify a significant difference in the effectiveness of price promotions between existing organic and conventional products (Bezawada & Pauwels, 2013), we argue that price promotions are of particular importance for sustainable new products. First, a reduced price may motivate consumers to purchase a new product because it reduces the financial risk of trial. Price promotions enable consumers to evaluate the quality of the new product through experience instead of relying on external quality cues or lay theories regarding a company's allocation of resources (Newman, Gorlin, & Dhar, 2014). Second, the ongoing commitment to a sustainable product Bezawada and Pauwels (2013) refer to has not been established if a product is newly introduced to the market. Therefore, for sustainable new products, price promotions may be a tool suited to inducing trial and contribute to the ongoing commitment of purchasing sustainable products. We therefore hypothesize:

**H4.** Price promotions reduce the negative effect of a sustainability claim of a new product on sales (positive interaction effect).

## 2.7. Brand CSR as a quality indicator

CSR can be defined as a firm's commitment to ensure societal and stakeholder well-being through discretionary business practices and contributions of corporate resources (e.g., Du, Bhattacharya, & Sen, 2007). In line with prior research our study focuses on consumers' perceived CSR (e.g., Ailawadi et al., 2014), which is influenced theoretically by multiple CSR strategies and tactics (i.e., sustainability, society well-being activities). We assert that the negative effect of a sustainability claim on the success of a new product can be mitigated when the products are introduced by brands with a strong CSR reputation. First, brands high in CSR have secured a position in the market and have already proven themselves as deliverers of products of sufficient quality. Prior studies have indeed found positive effects of perceived CSR reputation on consumers' perceived quality, brand attitudes, brand equity, and self-reported consumer share-of-wallet (e.g., Ailawadi et al., 2014; Van Doorn et al., 2020). Given that consumers may have already had positive quality experiences with these brands, concerns about the quality of the new sustainable product are mitigated (Van Doorn et al., 2020). Second, research has shown that a low fit between a firm's image and a CSR initiative harms consumers' beliefs, attitudes, and intentions to purchase (Becker-Olsen, Cudmore, & Hill, 2006). This is not the case for sustainable new products introduced by a brand with a strong CSR record. Hence, we hypothesize:

**H5.** Brand CSR reputation reduces the negative effect of the sustainability claim on the sales of the new product (positive interaction effect).

## 2.8. Dynamic effects of a sustainability claim on sales

For new products, marketing effects change over the product life cycle because marketing functions as an information source. For new pharmaceutical products, the effect of detailing decreases over time (Narayanan et al., 2005; Osinga et al., 2010). Similarly, the effects of direct marketing decrease over time, while social influence effects also decline (Risselada et al., 2014). So far, knowledge is limited regarding the dynamic effects of a sustainability claim.

In line with previous literature, we also expect the negative effect of a sustainability claim on sales to change over time. In particular, we hypothesize that uncertainty regarding quality issues surrounding new sustainable products will become less pronounced as consumers become more familiar with the products and have received information via advertising and social influence. Importantly, two types of dynamic effects can emerge. First, familiarity can concern a particular new product (Osinga et al., 2010; Risselada et al., 2014). While consumers may hold certain beliefs regarding the unsatisfactory quality of a sustainable new product, they may alter their beliefs as they gain experience with the product. This response implies a smaller negative effect of the sustainability claim as time passes after introduction of the new product.

Second, familiarity can concern a group of new products on the level of the entire market. We study multiple new product introductions over several years and can therefore also examine the effect of calendar time. The general acceptance of sustainable products increases as more and more sustainable products are introduced and these products become more mainstream (e.g., Iannuzzi, 2017). As a consequence, negative quality inferences of sustainable products might lessen over time or even disappear, suggesting that the negative effect of a sustainability claim on sales diminishes. This expectation is in line with literature on the adoption of innovations that has shown that adoption can be accelerated if a new product or service is promoted by several parties, even if these parties compete with each other—the market-making effect (e.g., Prins & Verhoef, 2007). Another explanation for a decreasing negative effect of sustainability claims over time could be that increasing attention for environmental issues, such as climate change and the carbon footprint, has made sustainability a more important attribute for consumers.

**H6.** The negative effect of the sustainability claim on the sales of the new product reduces (a) as time since introduction passes and (b) over calendar time.

Based on the above hypotheses we test the following conceptual model as depicted in Fig. 2.

## 3. Data

To address our research questions, we combined four data sources: household panel data, consumer survey data, expert panel survey data, and advertising expenditure data. Our dataset contains monthly sales data of 883 new product introductions in 14 categories in the Dutch FMCG market in the years 2008–2011. For every product, we have 12 months of data starting at the month of introduction. A period of 12 months is generally seen as critical for new product success or failure in the FMCG market (Nielsen et al., 1999; Steenkamp & Gielens, 2003). In the data collection process, we did not use product success as a criterion in any way, to avoid a potential survival bias. The products belong to 14 categories and 76 different brands. Table 1 shows the number of (sustainable) new product introductions per category. Of the 883 introduced products, 58 (6.6%) are sustainable. As noted, we label a product as

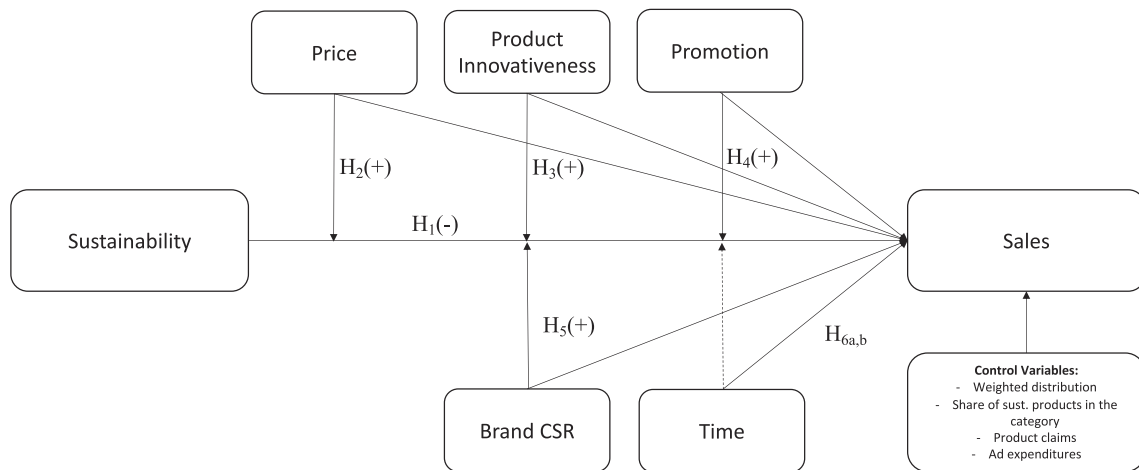


Fig. 2. Conceptual model.

**Table 1**  
Number of (sustainable) new product introductions per category.

Category	# NPIs	# Sustainable NPIs
Baby food	104	6
Buttermilk	3	2
Chocolate bar	53	19
Coffee	48	1
Drinking yoghurt	66	2
Icecream	35	6
Ketchup	24	1
Liquid detergent	67	3
Liquid laundry detergent	163	2
Meal boxes	99	3
Milk	18	4
Regular yoghurt	63	4
Soup	126	4
Sugar	14	1
Total	883	58

sustainable when it carries an eco-friendly or fair trade claim, given that empirical prior research shows that fair trade and eco-friendly products are from a consumer perspective considered sustainable (Luchs et al., 2010; Phipps et al., 2013; Verhoef & Van Doorn, 2016).<sup>3</sup>

We acknowledge that in some product categories sustainable products may be more common than in others and include the share of sustainable products in the category at the time of introduction and its interaction with the sustainability claim. We also control for the presence of other claims, which we coded on the basis of the product descriptions in our data. We categorized the claims as product-related claims (e.g., 100% Arabica coffee beans), taste claims (e.g., delicious), healthy additives claims (e.g., extra vitamins), nutrient content claims indicating reduced levels of a certain nutrient (e.g., less salt), and functional health claims (e.g., for improved resistance). We include dummies for all these claims in our model.

The dataset also provides information on the introductory price, sales promotion, and distribution (Table 2). The price variable we include is the ratio of the introductory price and the average introductory price within the matched group—that is, the treated case and its three control cases combined (we provide details on the matching

<sup>3</sup> In our main effects model, we also distinguish between the effect of eco-friendly and fair trade claims. However, given the scarce number of sustainable new product introductions in our dataset, this more fine-grained distinction is not feasible for the models also examining moderating effects.

procedure below). The price ratio variable is constant over time and indicates whether a new product introduction was relatively expensive or cheap compared to a relevant set of competing products at the time of introduction.<sup>4</sup> The use of price ratios to account for price differences across categories is common in these types of models (e.g., Bezawada & Pauwels, 2013). The promotion variable captures the average depth (the percentage discount relative to the base price) of the promotion per product per month. We use the average of all observed promotions per month because different retailers may use different promotion prices in the same month. We use mean-imputation per new product introduction (NPI) for missing values in this variable. The distribution variable is a weighted variable. It reflects the number of retail chains where the new product is available weighted by the average market share of the retailer in the category (measure between 0 and 1) at the time of introduction. Like the price variable, this variable is fixed at the time of introduction and is thus not affected by aggregation.

We complemented the dataset with survey data on perceived corporate social responsibility of the brands that we collected through a Dutch online panel in November 2014. The panel consisted of 1085 consumers, 612 of whom participated (a response rate of 56.4%). From an initial list of 20, each participant answered questions for a maximum of five randomly assigned brands known by the respondent. After removing incomplete responses from the data, we had 451 usable responses for the CSR measure. To measure CSR, we slightly adapted the product social responsibility scale of Brown and Dacin (1997). Table 2 shows the items of the scale.

We collected data on product innovativeness through a panel of 18 FMCG experts with a diverse set of expertise areas who rated an average of 10 products (e.g., Steenkamp & Gielens, 2003). The data collection

<sup>4</sup> We use price at the time of the introduction because we do not have complete price data for all NPIs throughout the observation period. We used all available price data on the NPIs in the matched sample and estimated a linear time trend for the prices over the first 12 months after introduction for each NPI. We omitted the missing observations and simply used consecutive available prices per NPI. We then applied a meta-analytic test to the estimated time trends to assess the direction and significance of the overall time trend across all NPIs. We find that 13 of the 216 time trends are positive and significant and 22 are negative and significant. The remaining 181 time trends are not significantly different from 0. A meta-analytic test on the correlations between price and time trend shows that the average effect size is negative and significant (-0.098,  $p = 0.0001$ ), but quite small, suggesting that the prices of NPIs decrease slightly over the first year after product introduction. Given the small magnitude of the effect, we think the somewhat limited price data do not substantively affect our key findings.

**Table 2**  
Measures and descriptive statistics.

Variable	Variable name	Explanation	Mean	SD	Min.	Max.	Cronbach's alpha
<i>Dependent variables</i>							
Sales		Monthly unit sales of the new product	28.807	56.810	0	875	n.a.
<i>Independent variables</i>							
Sustainability	<i>Sustainability</i>	Dummy variable taking the value of 1 if the product has a sustainability (i.e. eco-friendly or fair trade) claim	0: 825 1: 58				n.a.
Price ratio	<i>priceratiomatchedgroup</i>	The ratio of the introduction price & the average introduction price within the matched group	100	68.357	10.493	324.392	n.a.
Brand CSR	<i>Brandcsr</i>	Average of the items completely (disagree (1) – completely agree (7)) “[brand] is a socially responsible brand”; “[brand] is acting responsibly toward the environment”; “[brand] contributes something to society”	3.227	0.170	2.773	3.594	0.88
Product innovativeness	<i>Prodinno</i>	Average of the items “at the time of its introduction, product × was new in its category”; “at the time of its introduction, product × was unique in its category”; “at the time of its introduction, product × offered original, new benefits to the category”; “at the time of its introduction, product × could be considered a radically new product within the category”	3.465	1.440	1	6.750	0.95
Sales promotion	<i>Promotion</i>	Average depth (the percentage discount relative to the base price) of the promotion per product per month.	5.784	9.286	0	99.052	n.a.
<i>Control variables</i>							
Sustcatintros	<i>sustcatintros</i>	The share of sustainable products in the category at the time of introduction.	2.285	2.175	0.474	25	n.a.
Weighted Distribution	<i>weighted_distribution</i>	Number of retail chains where the new product is available weighted by the average market share of the retailer in the category (measure between 0 & 1).	0.851	0.175	0.210	1	n.a.
Introduction date	<i>Introd</i>	Number months between introduction & Jan 2008	20.094	9.689	4	35	n.a.
Ad expenditures	<i>Advertising</i>	Advertising spend in millions per brand	0.176	0.406	0	3.522	n.a.
Other claims	<i>claimproduct</i>	Product-related claim:	121	n.a.			n.a.
	<i>claimtaste</i>	Taste claim:	33	n.a.			n.a.
	<i>claimhealthadd</i>	Healthy additives claim:	38	n.a.			n.a.
	<i>claimreducnutr</i>	Reduced nutrient claim:	129	n.a.			n.a.
	<i>claimhealthfunc</i>	Health functional claim:	10	n.a.			n.a.

took place in May and June 2014.<sup>5</sup> Panel members rated products within their area of expertise on product innovativeness on a scale of 1 = strongly disagree to 7 = strongly agree on four items (see Table 2; Cronbach’s alpha = 0.95). Our measure of innovativeness may partly measure consumer perceptions of the sustainability claim, but we remedy this by including the share of sustainable NPIs in the category and as such adjust for familiarity with sustainability claims in the market. We obtained monthly advertising expenditure data on a brand level from AC Nielsen. Table 2 provides more detail about our data and descriptive statistics. In Table 3 we show the correlations between the included independent variables.

**4. Methodology**

The dependent variable in our model is the natural logarithm of unitsales—that is, the number of units of the new product purchased

within our panel in a given month. We use a log transformation such that we can interpret the parameter estimates as percentage changes of the unitsales, which are comparable across categories. We use  $\ln(\text{unitsales} + 1)$  to deal with the 0s in the data. We account for differences in sales across categories by including category-specific intercepts. We also include interaction terms of the sustainability claim and the category dummies to account for potential heterogeneity in the effect of a sustainability claim across categories. The model accounts for both calendar time as well as time since introduction. Additionally, we include squared terms of both to adjust for a flexible and parsimonious time trend in sales. We mean-centered all moderating variables that did not include 0 (price, innovativeness, and brand CSR) to facilitate the interpretation of the moderating effects.

The equation below shows the econometric model with all interaction terms (i.e., Model IV).

Given that the sustainability claim, our treatment, is not randomized over NPIs, we apply propensity score matching to account for this potential selection bias (see the Web appendix for more detail on the procedure). By creating a balanced set of treated and untreated cases that have the same propensity to be treated, we are able to estimate an unbiased effect of the treatment. For 55 of the 58 treated observations, we managed to find three matching controls. We exclude the three cases

<sup>5</sup> The 18 experts did not rate all 883 products because some brands introduced similar new product variants simultaneously. For example, a brand may have launched a new multi-purpose cleaner in three different scents at the same time. In these cases, the experts rated the new multi-purpose cleaner only once. Furthermore, we did not have measures of product innovativeness and brand CSR at the time of introduction. We use the so called confound approach (Frank, 2000; Xu et al., 2019) and find that 57.86% of the estimate would have to be due to bias to invalidate the inference we made on the impact of brand CSR. That is, to invalidate the inference 57.86% (1500) of the cases would have to be replaced with cases for which there is an effect of 0. We therefore conclude that our results are robust against this potential weakness of our data. We thank an anonymous reviewer for this suggestion.

**Table 3**  
Correlations.

	1	2	3	4	5	6	7	8	9
1. ln(unitsales)	1.000								
2. Brand quality	0.098***	1.000							
3. Brand CSR	0.089***	0.621***	1.000						
4. Product innovativeness	-0.010	0.122***	0.041***	1.000					
5. Sales promotion	0.189***	-0.062***	-0.083***	0.063***	1.000				
6. Weighted distribution	0.367***	0.109***	0.070***	0.086***	0.160***	1.000			
7. Sustcatintrosare	0.018*	-0.175***	-0.090***	-0.066***	-0.047***	-0.148***	1.000		
8. Introduction date	0.014	-0.033***	-0.014	0.020**	0.019*	-0.001	0.004	1.000	
9. Ad expenditures	0.057***	0.206***	0.173***	0.151***	0.030***	0.086***	-0.118***	0.119***	1.000

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

$$\begin{aligned}
 \ln(\text{unitsales}_{pbtic}) = & \beta_0 + \beta_1 \text{category1}_c + \dots + \beta_{13} \text{category13}_c \\
 & + \beta_{14} \text{sustainability}_p + \beta_{15} \text{category1}_c X \text{sustainability}_p + \dots \\
 & + \beta_{27} \text{category13}_c X \text{sustainability}_p + \beta_{28} \text{priceratiomatchedgroup}_p \\
 & + \beta_{29} \text{prodinnov}_p \\
 & + \beta_{30} \text{promotion}_{pt} + \beta_{31} \text{brandcsr}_b + \beta_{32} \text{weighted\_distribution}_p \\
 & + \beta_{33} \text{sustcatintrosare}_{ct} + \beta_{34} \text{claimproduct}_p + \beta_{35} \text{claimtaste}_p \\
 & + \beta_{36} \text{claimhealthadd}_p + \beta_{37} \text{claimreducnutr}_p + \beta_{38} \text{claimhealthfunc}_p \\
 & + \beta_{39} \text{advertising}_{bt} + \beta_{40} \text{advertising}_{b,t-1} + \beta_{41} \text{introdote}_p \\
 & + \beta_{42} \text{introdote}_p^2 + \beta_{43} \text{time}_{pt} + \beta_{44} \text{time}_{pt}^2 \\
 & + \beta_{45} \text{sustXpriceratiomatchedgroup}_p + \beta_{46} \text{sustXprodinnov}_p \\
 & + \beta_{47} \text{sustXpromotion}_{pt} + \beta_{48} \text{sustXbrandcsr}_{pb} \\
 & + \beta_{49} \text{sustXSustcatintrosare}_{pct} + \epsilon_{pbtic}
 \end{aligned}$$

without matches from the matched sample.<sup>6</sup> We use bootstrapping (B = 500) in our model estimations to account for the uncertainty because of the matching (Stuart, 2010).

**5. Results**

**5.1. Estimation procedure**

We estimate six versions of the model on the matched sample (Models I–VI). We use a hierarchical approach and start with Model I containing the category fixed effects and only the main effects. Model II is an alternative to Model I where we estimate separate effects for eco-friendly and fair trade claims to shed light on the differential impact of the two claims. Model III is an extension of Model I where we add the interactions between the sustainability claim and the category dummies. Model IV contains all interactions as shown in our conceptual model. Models V and VI contain the main effects, category fixed effects, and

<sup>6</sup> Even after applying the matching procedure, unobserved common factors may be driving the introduction of sustainable products and consumers' response to those introductions. We use the method proposed by Frank (2000) and Xu et al. (2019) for our main effects model (Model I) to assess how large the impact of the unobserved common factors should be to invalidate our main conclusion on the impact of a sustainability claim on the sales of NPIs. We find that 75.38% of the estimate would have to be due to bias to invalidate our inference on the impact of a sustainability claim. In other words, to invalidate the inference 75.38% (1954) of the cases would have to be replaced with cases for which there is an effect of 0. We thus conclude that hidden bias is not a major concern after applying the matching procedure. We thank an anonymous reviewer for this suggestion.

dynamic effects of the sustainability claim in the first 12 months and over calendar time. Table 4 shows the estimation results and model fit criteria of all models<sup>7</sup>. Regarding the model fit, Table 4 shows that the BIC of Model III (8111.503) is substantially lower than the BIC of Model I (8131.604), providing support for including the interactions with the category dummies. A likelihood ratio test comparing those two models also shows that the interaction terms jointly contribute significantly to the model ( $\chi^2(11) = 106.562, p < 0.001$ ). In turn, the BIC of Model IV (8085.861) is substantially lower than the BIC of Model III and the likelihood ratio test comparing these models confirms that the five key interactions also jointly contribute significantly to the model ( $\chi^2(5) = 64.944, p < 0.001$ ).

**5.2. Hypotheses testing**

Model I reveals a negative and significant parameter estimate of the sustainability claim ( $\beta = -0.477, p = 0.023$ ), supporting H1. Model II shows that both eco-friendly ( $\beta = -0.512, p < 0.001$ ) and fair trade claims ( $\beta = -0.393, p = 0.001$ ) negatively affect new product sales. The category-specific parameter estimates of the impact of a sustainability claim on ln(unitsales) in Model IV are predominantly negative; seven of the 12 estimated parameters (58%) are significantly negative, two are not significantly different from 0, and only three are significantly positive. We apply a meta-analytic fixed-effects regression model with only an intercept in which we specify the variance-covariance matrix to quantitatively summarize these results (e.g., Schmidt & Bijmolt, 2020). The results show that the mean effect size is negative as we expected, but not significant ( $\beta = -0.182, p = 0.233$ ). These results suggest that a

<sup>7</sup> We also estimated the marginal effects of the sustainability claim for each of the categories in Models III and IV. These results can be requested from the authors.



**Table 4**  
Estimation results.

Model Variables	I		II		III		IV		V		VI	
	Estimate	p	Estimate	P	Estimate	p	Estimate	p	Estimate	p	Estimate	p
Intercept <sup>†</sup>	−0.434**	0.023	−0.427**	0.025	−0.368*	0.073	−0.587***	0.007	−0.435**	0.039	−0.556**	0.010
Sustainability claim <sup>††</sup>	−0.477***	<0.001							−0.471**	0.013	0.554**	0.027
Eco-friendly claim			−0.512***	<0.001								
Fairtrade claim			−0.393***	0.001								
Price ratio	−0.125***	0.009	−0.127***	0.008	−0.110**	0.041	−0.080	0.175	−0.125**	0.010	−0.133***	0.009
Product innovativeness	−0.040*	0.040	−0.043**	0.030	−0.007	0.759	−0.039	0.101	−0.040**	0.044	−0.025	0.212
Sales Promotion	0.029***	<0.001	0.029***	<0.001	0.027***	<0.001	0.034***	<0.001	0.029***	<0.001	0.032***	<0.001
Brand CSR	1.092***	<0.001	1.046***	<0.001	0.817***	0.002	0.856***	0.001	1.092***	<0.001	1.043***	<0.001
<i>Control variables</i>												
Sustcatintrosahre	−0.113***	0.001	−0.115***	0.001	−0.072**	0.024	−0.008	0.810	−0.113***	0.001	−0.092***	0.008
Weighted distribution	3.063***	<0.001	3.080***	<0.001	2.944***	<0.001	3.017***	<0.001	3.063***	<0.001	2.974***	<0.001
Claim product-related	−0.073	0.315	−0.076	0.300	−0.095	0.253	−0.101	0.230	−0.073	0.333	−0.071	0.353
Claim taste	0.777***	<0.001	0.757	<0.001	0.796***	<0.001	0.804***	<0.001	0.777***	<0.001	0.722***	<0.001
Claim healthy additives	−0.209*	0.084	−0.210*	0.082	−0.019	0.877	−0.020	0.868	−0.209*	0.084	−0.190	0.104
Claim reduced nutrient	0.068	0.424	0.059	0.498	0.205**	0.032	0.214**	0.025	0.068	0.432	0.105	0.265
Claim health functional	−0.730***	<0.001	−0.739***	<0.001	−0.981***	<0.001	−0.962***	<0.001	−0.729***	<0.001	−0.676***	0.001
Ad expenditures (in millions)	0.147**	0.015	0.153**	0.012	0.139**	0.018	0.137**	0.023	0.146**	0.012	0.134**	0.022
Lagged ad expenditures (in millions)	−0.003	0.960	0.003	0.962	−0.008	0.881	−0.015	0.797	−0.003	0.954	−0.020	0.731
Introduction date <sup>†††</sup>	0.023**	0.040	0.022*	0.052	0.023*	0.069	0.024*	0.056	0.023**	0.040	0.039***	0.002
Introduction date squared	−0.001***	0.001	−0.001***	0.002	−0.001***	0.002	−0.001***	0.002	−0.001***	0.001	−0.001***	<0.001
Time since introduction (months)	0.091***	0.002	0.091***	0.002	0.094***	0.001	0.099***	0.001	0.095***	0.008	0.088***	0.003
Time since introduction squared	−0.008***	0.001	−0.008***	0.001	−0.008***	<0.001	−0.008***	<0.001	−0.008***	0.003	−0.007***	0.001
<i>Interactions</i>												
Sustainability × Price ratio							−0.235*	0.059				
Sustainability × Product innovativeness							0.276**	0.028				
Sustainability × Promotion							−0.032***	<0.001				
Sustainability × Brand CSR							16.459***	<0.001				
Sustainability × Sustcatintrosahre							−0.024	0.847				
Sustainability × Time since introduction									−0.016	0.806		
Sustainability × Time since introduction squared									0.002	0.707		
Sustainability × Introduction date											−0.099***	<0.001
Sustainability × Introduction date squared											0.002***	0.006
Log likelihood	−3940.039		−3939.662		−3886.758		−3854.286		−3939.827		−3930.499	
BIC	8131.604		8138.711		8111.503		8085.861		8146.901		8128.244	
N	2592		2592		2592		2592		2592		2592	

## NOTES

Model I: Model including only main effects.

Model II: Main effects model without interactions between the sustainability claim & the categories, with eco-friendly & fair trade claims instead of the combined sustainability claim.

Model III: Model including main effects & category specific effects of the sustainability claim.

Model IV: Model including main effects, category specific effects of the sustainability claim, & the interactions of interest.

Model V: Model including main effects & dynamic effects of the sustainability claim in the first 12 months after introduction.

Model VI: Model including main effects & dynamic effects of the sustainability claim over calendar time.

\*p < 0.1; \*\*p < 0.05; \*\*\*p < 0.01.

<sup>†</sup> To increase clarity, we do not display the category fixed effects for Models I, II, III, & IV; They can be requested from the authors. In models V & VI, we did not include category-specific intercepts for parsimony.

<sup>††</sup> We display the parameter estimates of the sustainability, eco-friendly & fair trade claim only for the models without the interactions between the sustainability claim & the categories (Models I & II).

<sup>†††</sup> Introduction data: number of months between introduction of the product & January 2008.

sustainability claim negatively affects new product sales in some categories, but not in all, which does not fully support H1.

The results of Model IV show that the interaction effect of a sustainability claim with the price ratio variable (Table 4,  $\beta = -0.235, p = 0.059$ ) is negative and marginally significant, which does not support H2. The interaction effect of a sustainability claim and product innovativeness ( $\beta = 0.276, p = 0.028$ ) is positive and significant, which supports H3.<sup>8</sup> The interaction effect of a sustainability claim and price promotion is negative and significant ( $\beta = -0.032, p < 0.001$ ), which does not support H4. Instead, this result suggests that price promotions strengthen the negative effect of a sustainability claim. The interaction with brand CSR ( $\beta = 16.459, p < 0.001$ ) is positive and significant, which supports H5. To facilitate interpretation of the significant interaction effects with product innovativeness, price promotions, and brand CSR, we in Table 5 show the mean impact of a sustainability claim across categories for products with low or high values for the significant moderators (product innovativeness, price promotion, and brand CSR). We use the meta-analytic mean of the category specific effects as a baseline. The values in the table show the impact of a claim on the DV, ln (unitsales). The percent change in sales when comparing products with and without a sustainability claim is  $(\exp(\beta)-1) \times 100\%$ .

### 5.3. Dynamic effects of sustainability claims

We consider the two potential dynamic effects: (1) time since introduction of the new product and (2) time since year of introduction. To investigate these dynamic effects, we included interaction effects between the sustainability claim and the linear and squared term of these time variables<sup>9</sup> to the model with only main effects (Model II in

**Table 5**  
Simulated impact of a sustainability claim for low/high values of the significant moderators.

	Sustainability claim impact on ln(unitsales)	Impact on sales ((exp(β)-1) * 100%)
Innovativeness low (-1SD)	-0.222	-20%
Innovativeness high (+1SD)	-0.142	-13%
Promotion low (0)	-0.182	-17%
Promotion high (+1SD)	-0.664	-49%
Brand CSR low (-1SD)	-2.980	-94%
Brand CSR high (+1SD)	2.616	1268%

Note: For the promotion variable (M = 5.784, SD = 9.286) we use the lowest possible value, 0.

Table 4).

<sup>8</sup> We have compared the mean innovativeness of sustainable NPIs and regular NPIs and found that sustainable NPIs are perceived as significantly more innovative than their conventional counterparts (M<sub>sust</sub> = 4.081 en M<sub>conventional</sub> = 2.421;  $p < 0.01$ ) It is not fully clear how that would influence our results. We would expect our results to become more significant when these differences in innovativeness are less strong. We included the share of NPIs in the category that should to some extent remedy the effects of the found difference in innovativeness. We also compared differences in innovativeness for other claims and found that the NPIs with other claims have a lower level of innovativeness, suggesting that these claims are considered as less novel than a sustainability claim. More results can be requested from the authors.

<sup>9</sup> We did not include these interaction effects in our main model because with inclusion our model became overparameterized. We also considered other specifications to account for these dynamics, including logarithmic, spline and polynomial specifications (e.g., Risselda, Verhoef & Bijmolt, 2014). The results of the discussed specifications outperformed these other specifications. Detailed results can be requested from the authors.

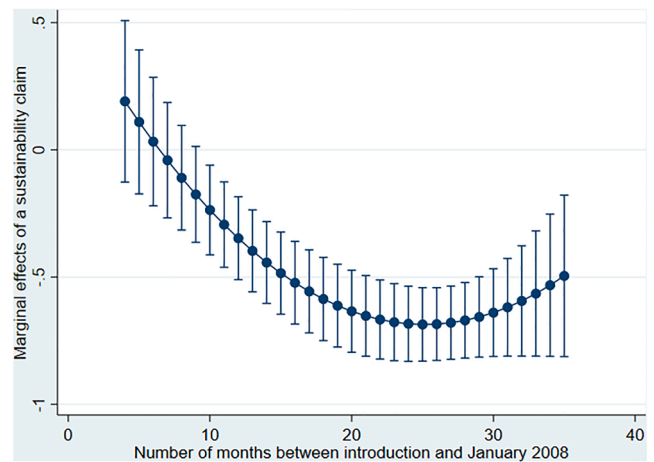


Fig. 3. Dynamic effect of a sustainability claim on sales over calendar time.

In Model V the interaction with time since introduction is shown. Although the log-likelihood decreases compared to Model II, the BIC is slightly higher with a value of 8146.901. In this model the sustainability claim still has a negative significant effect ( $\beta = -0.471, p = 0.013$ ). As we do not find any significant interaction effects between the sustainability claim and the linear and squared time since introduction, our results do not support H6a.

The BIC of Model VI (calendar time) is with 8128.24 slightly higher than the BIC of Model II, suggesting a worse fit. However, in this model we find a positive parameter estimate for sustainability claim ( $\beta = 0.0554; p = 0.027$ ), a negative interaction effect between linear calendar time and the sustainability claim ( $\beta = -0.099; p < 0.001$ ), and a positive interaction effect squared calendar time and sustainability claim ( $\beta = 0.002; p = 0.006$ ). We further assess this dynamic effect of calendar time by plotting the marginal effect of sustainability claim over calendar time with a 95% confidence interval in Fig. 3. In the first months after the first observed introduction, the effect of a sustainability claim on sales is positive, although not significantly different from zero. However, over time this effect becomes negative and increasingly so over time. Between months 20 and 30, the minimum negative effect is reached and the effect tends to increase again and become less negative. Hence, our results provide some evidence for a dynamic effect of the sustainability claim over calendar time. However, the nature of this effect is not in line with the expectation that the negative sustainability effect would disappear and counters H6b.

### 5.4. Control variables

As most of the parameter estimates of the control variables in the model are in line with previous work, we discuss them in a concise way here. We find that brand CSR for regular NPIs positively influences new product sales ( $\beta = 0.856, p < 0.001$ ), which supports research showing that CSR reputation has a positive effect on purchase behavior (e.g., Ailawadi et al., 2014). As expected, sales promotions for regular NPIs have a strong positive effect on sales (0.034,  $p < 0.001$ ). Not surprisingly, the effect of distribution on sales is positive and significant ( $\beta = 3.017, p < 0.001$ ).

The effect of the price ratio variable for regular NPIs is negative as expected, but not significant ( $\beta = -0.080, p = 0.175$ ). Some of the introduced products in our data that generate high sales figures despite having high price ratios are from unique brands, such as Nespresso, which may have lessened the expected negative impact of price. We find no significant effect of the variable that captures the proportion of sustainable products in the category at the time of introduction (sustacintroshare;  $\beta = -0.008, p = 0.810$  for regular NPIs,  $\beta = -0.032, p = 0.794$  for NPIs with a sustainability claim). Products with taste claims (e.

g., delicious) ( $\beta = 0.804, p < 0.001$ ) and reduced nutrient claims (e.g., less salt) ( $\beta = 0.214, p = 0.025$ ) enjoy higher sales, while products with functional health claims (e.g., for improved resistance) are sold less ( $\beta = -0.962, p < 0.001$ ).

### 5.5. Robustness checks and additional analyses

The hierarchical approach of estimating our Models I to VI shows the robustness of our findings with respect to the model specification. We also conducted multiple other robustness checks with regard to the matching procedure and the role of advertising (available upon request) which confirm the robustness of our results.

## 6. Discussion

Large brand manufacturers have embraced sustainable products as part of their strategy and are increasingly developing new products with sustainability claims. However, experimental consumer research suggests consumers respond unfavorably to sustainable new products given negative quality associations (Newman, Gorlin, & Dhar, 2014; Van Doorn & Verhoef, 2011; Van Doorn et al., 2020). We therefore investigate the effect of sustainability claims on the sales of new products, going beyond previous experimental research that has relied on attitudinal or intentional measures.

Interestingly, there are multiple examples of successful sustainable products, such as Ben & Jerry's ice cream, raising the question whether the success of sustainable new products may be dependent on other factors. Adding to previous literature, we investigate whether marketing measures are suited to mitigate a potential negative effect of a sustainability claim on sales by countering negative quality cues. Furthermore, we also consider how the effect of a sustainability claim on the success or failure of a new product develops over time when consumers become more familiar with sustainable products, rendering negative quality inferences less of an issue.

We find that sales of newly introduced products with a sustainability claim are lower than those of their conventional counterparts. Therefore, we support evidence obtained in experimental studies that consumers might consider the addition of a sustainability claim to be a signal of lower quality that heightens their uncertainty about the functionality of a new product (e.g., Newman, Gorlin, & Dhar, 2014).

We find that a sustainability claim is less harmful for the sales of a newly introduced product if the brand is high in perceived CSR. We confirm that a company's reputation regarding CSR may be vital in shaping consumer responses to its new sustainable product introductions. Table 5 reveals that a high perceived CSR reputation can compensate for the negative effect of a sustainability claim on new product sales and is therefore an important way in which sales of new sustainable products can be boosted. Table 5 also reveals that perceived CSR reputation has by far the strongest effect compared to the other marketing strategies we examine. A company high in perceived CSR ( $> +1$  SD) can realize around 1,268% higher sales on a new sustainable product compared to a conventional product. For a company low in perceived CSR ( $< -1$ SD), sales are 94% lower for a sustainable new product than for a conventional one. This large difference in the sales of sustainable new products between low and high CSR companies may be due to the high variance in sales, with some new sustainable products being very unsuccessful and some being very successful. We note that introducing sustainable products can also be a way to invest in and build up a perceived CSR reputation. However, the limitations of our dataset do not allow us to study this possibility in more detail. We also show a positive effect of brand CSR reputation on new product sales, which not only confirms previous literature on the positive effects of CSR reputation, but also shows that CSR perceptions might affect new product performance, an outcome that has not received much attention in the current CSR literature.

More innovative new sustainable products also enjoy higher sales

than less innovative new sustainable products. We generalize findings from experimental studies to actual sales data and confirm that for clearly innovative products, consumers' concern that the company is sacrificing quality for sustainability in developing the new products may be less pronounced (Newman, Gorlin, & Dhar, 2014). While we acknowledge that a sustainability claim may influence our more general measure of perceived innovativeness, our findings confirm the notion put forward in literature that sustainability and innovativeness can be reinforcing constructs (White et al., 2019). However, Table 5 also reveals that high product innovativeness (operationalized as 1 SD above average) is not able to fully compensate for the negative effect of a sustainability claim.

Interestingly, we find that price promotions are a less effective tool for stimulating the sales of sustainable new products than for conventional new products. This finding does not support our reasoning that price promotions are important to induce trial of new sustainable products to familiarize consumers with these products and overcome potential quality concerns. However, our finding is in line with the reasoning of Bezawada and Pauwels (2013) that purchasing sustainable products is an ongoing commitment and that therefore promotions are less effective for increasing organic sales. While those researchers could not detect differences in the effectiveness of price promotions between existing organic and conventional products and therefore they did not find empirical support for this hypothesis, we in fact do find evidence. Again, these diverging findings illustrate the importance of distinguishing between consumer responses to new versus established sustainable products.

We find that high prices are not well suited to overcoming the negative effect of a sustainability claim on sales of a new product. Instead, lowering prices is a better strategy to boost the sales of sustainable products—an approach in line with findings of Bezawada and Pauwels (2013) that lowering prices leads to higher sales of existing organic products, but counter to the findings of Ngobo (2011). Given that we find only a marginally significant effect of price ratio on sales of new sustainable products, the effects of price should be interpreted with caution.

We also explore potential dynamics in the sustainability claim effect. Our results do not suggest that the negative effect of a sustainability claim on a new product changes as time since introduction passes. The effect remains negative for the observed period of 12 months. Hence, the negative effect of a sustainability claim on a new product is not mitigated by consumers' familiarity with the product. Our results therefore deviate from previous marketing literature showing dynamic effects. One potential explanation is that the sustainability claim is a product attribute that is incorporated in the evaluation of the new product, whereas the dynamic effects of marketing frequently involve advertising that varies over time and focuses on providing new information to the market.

However, our results show that the effect of the sustainability claim varies over calendar time, with the negative effect actually becoming more pronounced. This result contrasts with our reasoning that as sustainability becomes more mainstream, the negative effect should disappear since negative quality associations should also vanish. The pattern of results suggests that in the beginning of our observation period, adding a sustainability claim to a new product at least does not harm its sales, as perhaps at that point a product with a sustainability claim still stands out from competition, countering potential negative quality inferences. As sustainability becomes more mainstream, achieving a competitive advantage with a sustainability claim becomes more difficult.

Our results also indicate that within our studied time period, after around 25 months the negative effects tend to become smaller. Given recent experimental research showing that the negative quality inference for sustainable products persists (Van Doorn, Verhoef, & Risselada, 2020), we speculate that the negative effect may still be there in the present. We also note that the extent to which sustainable products are

already present within a product category does not affect the success or failure of a new sustainable product. Hence, we conclude that the negative effect of a sustainability claim does not vanish over time, and that more research is required regarding the effect of time.

## 7. Management implications

First and foremost, managers must realize that making new products sustainable is not a viable strategy for preventing new products from failing. Instead, adding a sustainability claim to a new product leads to a higher likelihood of product failure—an effect that does not vanish over time. However, managers can employ various strategies to make sustainability more beneficial. Investing in a strong CSR reputation is by far the most effective strategy to boost sales of new sustainable products. If a brand's CSR reputation is low, the success of new sustainable products will be low and the product is unlikely to succeed in the market. However, as a strong brand CSR reputation has positive effects on new product sales, further investment in CSR actions is likely to benefit sales of all new products. In light of our results, we might expect that firms like Unilever that have heavily invested in corporate social responsibility actions might be more successful in introducing new sustainable products than firms like Procter & Gamble or Kraft Heinz, which have a less explicit CSR strategy.

Making a new product unmistakably innovative also helps to overcome negative sales effects due to a sustainability claim, although this strategy is less effective than investing in company-level CSR actions. While lowering prices is also effective in promoting sustainable products, price promotions can be counterproductive and do not help the sales of sustainable new products. Lastly, managers should be cautious to expect the negative effect of a sustainability claim on new product sales to wear off over time, even when sustainable products become more common within a product category.

## 8. Research limitations

This study has several limitations. First, despite the richness of our sales data, the number of sustainable product introductions is still limited in the analyzed data relative to the size of our conceptual model. Therefore, we could only distinguish between eco-friendly and fair trade products in our main effects model and could not engage in more fine-grained analyses with respect to moderating effects. Second, our sales data span the period 2008–2011 and some sources suggest that consumer preferences may have changed since then especially among the younger generations (Nielsen, 2015; Unilever, 2017; Reints, 2019; Rosmarin 2020). Recent market research also suggests that in the USA, sustainable brands nowadays account for 50% of CPG growth from 2013 to 2018. We expect that changes in preferences may mitigate the negative main effect of a sustainability claim, but would not affect the moderating effects that are the focus of our study. Furthermore, recent empirical findings suggest that sustainability claims are still viewed unfavorably (e.g., van Doorn, Verhoef, & Risselada, 2020; Ursey et al., 2019). However, the changing market conditions and stronger preferences for sustainable products require more recent data, including more Millennials and Gen Z consumers, in future research.

Third, our measure of product innovativeness reflects the perspective of category experts and is a general measure that neither captures consumer perceptions of product innovativeness nor the innovativeness of specific attributes (i.e., taste). Fourth, data limitations unfortunately prevented us from including promotional activities for competing brands in our model. Fifth, some of our explanatory variables are related and affect each other in the long run, introducing endogeneity. However, we think these effects do not affect our results substantially for two reasons. First, Table 3 shows that the correlations between the independent variables of interest are all below an absolute value of 0.198, which is only small to moderate. Second, we believe that these effects will be relatively small in our study given that we have a limited time

frame of only 12 months. It would therefore be interesting to account for and analyze these effects using a longer observation period. Sixth, similar to the previous point, our current data do not allow us to provide insights on the buildup of CSR reputation over time and the dynamic interplay between variables like sustainability claims and CSR reputation. Seventh, the sales data for this study span one country only, which limits the generalizability of our findings. Eighth, our data did not support more complex models and therefore we could not study dynamics of the moderating effects by including three-way interactions between the sustainability claim, the variable of interest, and time since introduction.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jbusres.2021.08.032>.

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