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How much do plant guarantees reduce perceived risk?

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ABSTRACT

Consumers do perceive risk in purchase decisions and seek to reduce both uncertainty and probability of loss. Risk also varies across persons and purchasing situations. Retailers promote product guarantees as risk reducers, but the quantitative evidence is lacking. They offer guarantees to help resolve outcomes from post-purchase problems mainly, product performance. We used an online survey to investigate the role of risk mitigation by money-back guarantees (MBGs) on a live product: plants. We obtained online responses from 504 US residents ≥ age 18 years who had made at least one live plant purchase in the six months prior to the study. As MBG length increased, perceived risk (PR) decreased. PR was higher for men than for women and declined as income increased. Subjects with a higher level of product involvement, expertise, delight, repurchase intentions, and regret had a higher level of PR. We conducted separate Chow tests for annual and perennial plants by price and MBG length and found several break points. As price increased from $5 to $10, a 30-d MBG reduced PR for annual plants while the reduction in PR was incrementally decreased for all guarantee lengths when annuals were priced over $20. With perennial plants, the MBG had an increasingly larger effect on reducing PR for each $10 increase in price. Overall, for each day increase in MBG length, we observed a 0.0337 decrease in PR, which meant that a 90-d MBG on a plant would reduce PR by 3%. This quantitative evidence of reduction in PR should encourage the use and communication of MBGs which have the potential to improve purchases, customer retention, and profitability.

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1. Introduction

We make product choices every day and sometimes the products we buy fail. Consumer choice has some inherent risk and risk perception theory argues that consumers seek to mitigate their uncertainty and likelihood of loss. Risk perception varies across individuals and products (Stone and Grønhaug 1993), yet product failure may result in consumer dissatisfaction or, worse, regret (Zeelenberg and Pieters 2004). Regret is a powerful negative emotion that promotes switching to another product or retailer with the implication that a better alternative is available (Dennis et al. 2004; Zeelenberg and Pieters 2004). For plant purchases, product failure may result in plant death. Negative occurrences, like plants dying, or lack of experience with the product may elevate a consumer's perceived risk (PR) for the next purchase. Consumers may want some recourse

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from a money-back guarantee (MBG) when things do not perform well or may want to know that they have the potential for recourse *if* things do not perform well. Additionally, MBGs may serve as an important cue to help mitigate PR because they are an indication of product quality (Kukar-Kinney and Walters 2003).

While some work has quantified the willingness to pay (WTP) for MBGs, to date, no published studies on MBGs have quantified their effect on PR. Using a single dimension of PR, we sought to quantify the effects of MBGs on PR. If MBGs mitigate risk, how large is their effect? We sought to quantify the effect of MBGs in reducing PR in the context of the purchase of a live product: plants. We developed several research questions: (1) How does MBG length affect overall PR? (2) How does product price influence overall PR? (3) What role do product involvement, expertise, delight and regret play? (4) How do demographic characteristics affect PR? (5) Is the relationship between price, MBG length and overall PR linear?

1.1. Perceived risk

One of the definitions of risk in Merriam-Webster dictionary (2017) is, 'the chance of loss or the perils to the subject matter of an insurance contract or the degree of probability of such loss.' Consumer purchases involve choice which inherently has some risk. PR as a construct entered the marketing literature with Bauer's (1960) work and has become a pivotal construct predicting consumers' choice (Dowling 1986; Wood and Scheer 1996; Mitchell 1999; Chang and Chen 2008). Taylor (1974) reported that 'the evidence that consumers do perceive risk is extensive' (p. 57). The construct has been operationalized with two (Taylor 1974; Peter and Ryan 1976), four (Derbaix 1983), five (Laforet 2007; Beneke et al. 2012), and six dimensions (Jacoby and Kaplan 1972; Stone and Grønhaug 1993). Rational arguments posit that consumers seek to reduce PR and are most prevalent (Bauer 1960; Jacoby and Kaplan 1972; Derbaix 1983; Mitchell 1999) but other theories (Chaudhuri 1997; Taylor 1974) contend there are also emotional components of PR including anxiety and self-esteem, and (Chang and Chen 2008) trust.

Much of the research regarding PR investigates how consumers handle information, especially toward the goal of minimizing uncertainty and loss probability (Bauer 1960; Jacoby and Kaplan 1972; Taylor 1974; Derbaix 1983; Mitchell 1999), especially for brand choice (Peter and Ryan 1976) but also other purchase decisions (Stone and Grønhaug 1993; Wood and Scheer 1996; Chang and Chen 2008; Beneke et al. 2012). Identifying the necessary information to facilitate a purchase is crucial to consumer choice. Attention to relevant cues must occur before any information is cognitively processed to arrive at a purchase decision (Lin and Chen 2006), as posited in cue utilization theory (Olson and Jacoby 1972). Attention to the information is cited as one of the first steps in the consumer decision process (Olson and Jacoby 1972); individuals who use information to reduce PR have a higher purchase intention (Wood and Scheer 1996).

1.2. Guarantees and risk

Over a century ago, L.L. Bean instituted a 100-percent guarantee, considered by many as setting the highest standard for customer satisfaction (Evans, Clark, and Knutson 1996). At the time, entrepreneurs hoped to gain the confidence, trust, and eventual purchases of consumers new to the company with the offer of a MBG. To some, L.L. Bean's actions may be considered one of the first large-scale experiments to reduce consumers' PR.

The MBG directly addresses the financial risk and may alleviate some of the psychological risk (e.g. dissatisfaction or regret).

MBGs can be a pre-purchase cue or piece of information which helps reduce the likelihood of an occurrence or rectify post-purchase problems that may arise with a product. MBGs mainly

targeting its performance and are offered more often by retailers than manufacturers (Davis, Gerstner, and Hagerty 1995). Previous work showed that MBGs protect consumers from unforeseen negative outcomes, provide a firm with a competitive advantage, signal higher product quality to consumers, and provide value to businesses and consumers (Kukar-Kinney and Walters 2003; Lee and Khan 2012). Retailers offer MBGs in an effort to reduce consumers' PR (Davis, Gerstner, and Hagerty 1995), increase the perception of brand quality (Desmet 2014), and to increase their market share (Desmet 2014). Those authors suggested that the magnitude of the effects that MBGs had on product quality perceptions, preference, and choice depended greatly on product price and brand name. Retailers also attempt to signal higher product quality through a higher price (Bagwell and Riordan 1991) or the presence of MBGs (Moorthy and Srinivasan 1994). Together, higher prices and MBGs are considered an optimal combination to reflect product quality (Sheih 1996). Moorthy and Srinivasan (1995) reported that MBGs served as a signal of high quality by exploiting the higher probability of product returns for a lower priced, lower quality product.

The quantification of MBG effects on a variety of dependent variables is sparse, mainly focused on purchase intention or likeliness to buy (LTB) but not risk reduction. Fu and Chen (2011) showed that auctions of used camera lenses without guarantees attracted more bidders and bids, but these were from individuals with high expertise. Suwelack, Hogreve, and Hoyer (2011) empirically showed MBGs positively impacted WTP and purchase intentions, more so for experience goods than search goods. Alencastro (2004) demonstrated that hobbyist tropical buyers fish were more LTB a fish with an extended survival guarantee compared to one with a limited warranty. Furthermore, the survival guarantee was preferred more than a certification (Alencastro 2004).

Flowers and plants are live products, just as likely (or perhaps more likely because they are alive) to fail compared to non-living products. Behe and Barton (2000) reported that the presence of MBGs on rooted plants increased consumer satisfaction. Rihn et al. (2014) showed that the presence of a cut flower MBG reduced PR (but did not quantify that reduction) and improved consumers' experience with floral products. The *Guarantee Seekers* segments were more likely to choose cut flower arrangements with MBGs while the other two groups were interested in both MBGs and floral longevity indicators. The authors recommended that retailers could successfully employ MBGs to increase consumer purchases. Furthermore, flowers and plants are experience goods for which Suwelack, Hogreve, and Hoyer (2011) showed MBGs had a greater impact on WTP and purchase intentions compared to search goods. These analyses support the presence of linear relationships between MBGs and price, but do not investigate the presence of break-points or non-linear relationships.

1.3. Customer retention, delight, and regret

Minimizing switching behavior is a mechanism for customer retention. Nadeem (2006) indicated that a 5% improvement of customer retention can result in a 75% increase in profitability. While regret promotes switching behavior (Dennis and Behe 2007; Ortony, Clore, and Collins 1988), delight promotes repurchases (Hicks et al. 2006; Rust and Oliver 2000), which contribute to customer loyalty. Hicks et al. (2006) tested the role of customer delight, a positive emotion stronger than satisfaction, and showed that delight was the factor that influenced customers to make a subsequent purchase, not customer satisfaction. Delighted consumers have the prior positive emotion and experience that may positively influence future purchases. Thus, we hypothesize that delighted consumers will have a lower PR compared to less delighted consumers (H1a) and that consumers that express more regret will have a higher level of PR (H1b).

1.4. Product involvement and expertise

Involvement level influences how a consumer views product choices and which, if any, products they buy (Behe et al. 2013; Behe et al. 2015). Three different types of product involvement (personal, physical, and situational) have been identified (Bloch and Richins 1983; Zaichkowsky 1985). Several studies (Dowling 1986; Patterson 1993; Pires, Stanton, and Eckford 2004) proposed that consumers perceive greater risk for product choices that are high involvement. In this study, we used the construct of product involvement, defined as personal relevance to the product based on inherent interests, values, or needs, to motivate one toward the product (Petty and Cacioppo 1986; Petty, Cacioppo, and Schumann 1983). Given their keen interest in plants and in line with Dowling (1986), Patterson (1993), and Pires, Stanton, and Eckford (2004), we hypothesize that if a person is more highly involved with plants, they may have a lower PR (H2).

Consumer expertise is often characterized as product familiarity or prior knowledge (Bettman and Park 1980; Sujan 1985; Alba and Hutchinson 1987). In this study, we defined expertise as the combination of prior knowledge, past experience, and familiarity with plants. Expertise does not interact with product involvement because involvement is a motivational construct, whereas expertise represents a person's knowledge or ability (Batra and Ray 1986; Zaichkowsky 1985). Accumulated expertise developed through memory, product-related experiences, or product knowledge can also influence the information consumers seek and use in the purchase decision because experts and novices process information differently and often make different product choices (Batra and Ray 1986; Maheswaran, Mackie, and Chaiken 1992; Joo et al. 2016). Fu and Chen (2011) showed that experts bid more for camera lenses without refund guarantees in experimental auctions. Thus, we hypothesize that experts may have less PR compared to novices because of their greater product knowledge (H3).

Davis, Gerstner, and Hagerty (1995) reported that scant work has been conducted on the retailer's role in offering MBGs and, to date, no studies have quantified how much MBGs mitigate PR. Our objectives were to (1) quantify the magnitude of MBG on PR reduction; (2) determine if the reduction was linear or had break-points where the MBG increased its effects; and (3) describe how price and guarantee length affect PR, and (4) understand the relationship between several factors (demographic characteristics, product expertise, product involvement, delight, and regret) and PR in the context of a potentially risky purchase (herbaceous annual and perennial plants).

2. Materials and methods

We adopted questions from the surveys used by Behe et al. (2015), Dennis and Behe (2007), Hicks et al. (2006), and Joo et al. (2016) and obtained approval for the instrument and protocol from the university committee on research involving human subjects. The survey instrument had several parts. In the first part, subjects were asked about plant purchases in the six months prior to the study and then were asked to focus on one specific container of plants for a subsequent series of questions. Next, they were asked to respond to the 27 attitudinal statements measuring delight and regret adapted from Hicks et al. (2006) and Dennis and Behe (2007) while considering that one specific plant container. We used SPSS 22.0 (SPSS, Chicago, IL) principal component analysis with a Promax rotation to identify the key factors.

The next section contained questions about the PR in purchasing specific plants with a specific price and guarantee length. We constructed a 4 (price) $\times$ 2 (plant) $\times$ 3 (MBG length) between-subject design yielding 24 complete combinations. Those 24 combinations were developed into questions, identical in format, and randomized at presentation. Only text was provided; no images of products were supplied. The questions posed were preceded with the instructions: 'Over the next set of questions, we are trying to understand how risky you believe each purchase is (or would be, if you were in the situation where you wanted to buy the plant).

A high number means the purchase is very risky (you would lose a lot of money) while a low number means you are more confident about the plant living, making that a less risky purchase. Annuals are plants like petunia, tomatoes, impatiens, and parsley. Perennials are plants like hosta, coneflower, and daylily.' The specific question was, 'How risky is the purchase of "x" plant(s) which costs $x with an x day money-back or replacement guarantee?' The product attributes were varied in a complete factorial design which included two plant types (annual or perennial), four prices ($5, $10, $20, and $40 for annuals; $10, $20, $30, and $40 for perennials), and three MBG lengths (0, 30, or 60 d for annuals; 0, 90, or 365 d for perennials). Price ranges for the two plant types differ to simulate a realistic range of prices by leading plant retailers across the US Responses for PR were on a sliding scale from 0 to 100 to assess a holistic construct of risk. To assess the overall effect of all the variables in the study including demographic characteristics (age, gender, number of adults and children in the home, and income), the six attitudinal factors (*Delight*, *Regret*, *Responsible*, *Repurchase*, *Involvement*, and *Expertise*), and plant type, price, and guarantee length on PR, we first examined correlations then used a multiple regression model. The regression equation was:

$$\begin{aligned}\text{Risk}_i = b_0 + b_1 P\text{Type}_i + b_2\text{Price}_i \ + b_3 G\text{Length}_i + b_4\text{Age}_i + b_5\text{Gender}_i + b_6\text{Adult}_i \\ + b_7\text{Child}_i + b_8\text{Income}_i + b_9\text{Delight}_i + b_{10}\text{Regret}_i + b_{11}\text{Responsible}_i \\ + b_{12}\text{Repurchase}_i + b_{13}\text{Involvement}_i + b_{14}\text{Expertise}_i + e\end{aligned} \quad (1)$$

b_0 = intercept
$b_1 \ \ldots \ b_i$ = regression coefficients
Risk = consumer risk perception
P_{Type} = plant type (annual or perennial)
G_{Length} = guarantee length
Gender = male (0) and female (1)
Adult = number of adults in the household
Child = number of children in the household

To dive deeper into the relationship between price, MBG length, and PR, we employed a series of standard Chow tests since the potential breakpoints were predetermined and known. The Chow test is used to determine whether the estimated coefficients over one section of a dataset are different from the coefficients estimated over another section of the same dataset. In other words, the test determines whether two sets of observations can be described by the same regression model or identify points where the slope of the line changes significantly, indicating a significant shift, change or 'break point' in the regression line. The 'break point' would mean that the relationship between the two variables abruptly changes, shifts, or breaks since the slopes of the two portions of the regression line are not similar. It was originally developed as an econometric model by Gregory Chow (1960) to determine whether certain economic relationships remained constant over time, or whether they held true over two sets of economic units by testing whether regression coefficients remained constant across two groups of observations. While some studies on PR employ structural equation modeling (SEM) (e.g. Suwelack, Hogreve, and Hoyer 2011), this study can identify points where the relationship between variables is not linear whereas SEM cannot.

The model can be readily applied to any questions regarding the stability of a relationship between variables either over time or between different variable levels. An example of stability over time can be found in Graham, Hall, and Schuhmann (2007) who used a Chow test to document the substantial decline in real estate prices after hurricane events in N.C. Another example is in Perez et al. (2016) who identified three structural breaks in the growth of the horticulture industry in 1986, 2003, and 2008 using plant sales from the US Bureau of Economic Analysis. In this study, we used the Chow test to examine whether breakpoints in consumer PR existed, based on different (1) price points and (2) MBG lengths. The Chow test is an appropriate

method, since we were addressing the stability of the relationship between these independent variables and risk perception. The general formula of the Chow test is:

$$F_{(k,N_1+N_2-2k)} = \frac{(SSE_f - SSE_1 - SSE_2)/k}{(SSE_1 - SSE_2)/n_1 + n_2 - 2k} \quad (2)$$

where
SSE_f = sum of squared error for full model
SSE_1 = sum of squared error for Section 1
SSE_2 = sum of squared error for Section 2
K = number of estimated parameters
n_1 and n_2 = number of observations for each section.

Since annuals and perennials have substantially different biological life-cycles, we analyzed them separately. Then, for each sub-dataset (annuals and perennials), we examined whether breakpoints existed in consumer PR as either product price or guarantee length increased, for each level of the other variable as well as all levels of the second variable combined. For example, when testing for a breakpoint in risk perception at the point where the price of an annual increases from $10 to $20, a separate model was run to test for these breaks for (1) all guarantee lengths, (2) 0 d guarantee, (3) 30 d guarantee, and (4) 90 d guarantee. The model for both annual and perennial plants took the following general form:

$$Risk_i = b_0 + b_1 PP_i + b_2 GL_i \quad (3)$$

where
b_0 = intercept
b_1 and b_2 = regression coefficients
Risk = consumer risk perception
PP = price point
GL = guarantee length

The next survey section included 19 attitudinal questions adapted from Behe et al. (2015) to measure plant involvement and from Joo et al. (2016) to determine plant expertise. We used SPSS 22.0 (SPSS, Chicago, IL) principal component analysis with a Promax rotation to identify the key components of those items.

The final section of the survey included demographic questions including as age, gender, household income, and number of adults and children in the home.

Lightspeed GMI (Warren, NJ) provided potential survey respondents > age 18 from their pool of >1.269 million. We sought online responses from a sample of US residents ≥ age 18 years. To qualify for the study, the respondent must have made at least one plant purchase in the six months prior to the study. Data were collected online from 15 to 19 September 2016.

3. Results

We had 3183 potential subjects recruited for the study which resulted in 504 plant purchasers (individuals who spent > $0 in the six months prior to the study) with complete and useful responses (15.8%).

3.1. Demographic characteristics

Respondent age ranged from 20 to 87 years with a mean age of 56.3 years. The sample included 48.3% females and 90.3% were Caucasian. Nearly 60% had completed some college education or more, 50% had a 2-year college degree or more education, and 19.8% had completed a four-year degree or more. Of the total, 55.9% had two adults in each household and 26.8% did not

have any children under age 18 living in the home. Median income was in the $60,000 to $79,999 category and 51.2% lived in a suburban (versus rural or urban) region.

3.2. Plant purchases

To qualify for the survey subjects must have spent at least $1 on plants or gardening related purchases in the six months prior to the survey, thus there were no participants who made <$1 in purchases. The median category for purchases of plants and gardening related supplies, but excluding gardening equipment, was $50 to $99. Of the 12 types of plants listed (multiple responses were permitted), 63.8% had purchased an annual plant, 49.2% had purchased a vegetable transplant, 34.6% had purchased herbs, and 30.0% had purchased a perennial plant. Only 18% had purchased flowering shrubs, 20.4% had purchased an indoor flowering plant, 13% purchased a succulent, and 11.9% purchased an indoor foliage plant. Less than 10% had purchased either non-flowering shrubs, fruit trees, evergreen trees or shrubs, or shade trees.

Butterfield and Baldwin (2015) reported that average household lawn and gardening activity expenditures were $317, but this amount included lawn and landscape maintenance as well as equipment purchases. They reported that 29% of American households participated in flower gardening with average household expenditures on flower gardening of $59. For vegetable gardening, Butterfield and Baldwin (2015) reported that 25% of American households participated spending $56 on average. Thus, spending by this sample was similar to Butterfield and Baldwin (2015) but our sample had a higher percentage of households purchasing annuals and vegetables, most likely because the entire sample had to have made at least one plant purchase in the six months prior to the study.

3.3. One plant container focus

We asked each participant to think about and focus on one plant purchase (a single plant or container of plants) they made in the six months prior to the study, and keep that container in mind for a series of questions including the expertise, involvement, delight, and regret items. The highest percentage of subjects thought about or focused on an annual flowering plant (28.5%) followed by a vegetable plant (25.1%) with 10.5% focused on a flowering perennial. All other plant categories accounted for less than 8.5% of the focus for the next set of questions. We asked how much they paid for the plant/container and respondents paid an average $42.54. Nearly one-third (30.0%) were purchased from an independent garden center while 38.6% were purchased from a home improvement store and 14.9% from a mass-merchant. Only 26.1% knew for sure there was a MBG in place (35.2% were unsure and 38.7% were sure there was no MBG). A mere 6.5% (33 respondents) had returned the plant/container with 30% of those making a return within 3 weeks and 60% making a return within 4 weeks. The plant was replaced with a new plant similar to the one they returned for 72.7% ($n = 24$), in-store credit for 15.2% ($n = 5$), cash refund of purchase price for 12.1% ($n = 4$).

3.4. Factor analysis

We factor analyzed the 27 attitudinal questions adapted from Hicks et al. (2006) and Dennis and Behe (2007). Results showed that the four-factor solution was significant and explained 76.8% of the variance (Table 1). The *Delight* factor was comprised of seven items about the subject's level of positive emotion related to the plant or container performance. The *Regret* component was comprised of eight items relating to the subject's negative emotions regarding the plant or container purchase. The *Repurchase* component was defined with four items that related to the likelihood of repurchasing a similar plant or container. Unlike Hicks et al. (2006) and Dennis and

Table 1. Principal component analysis of 27 delight, regret, and repurchase items adapted from Hicks et al. (2006) and Dennis and Behe (2007) from 504 respondents to an online survey who were asked to focus on a single plant or container they had purchased in the year prior to the survey.

			Factor loadings	
Item	Delight	Regret	Repurchase	Responsible
Container performance (very dissatisfied to very satisfied)	**0.969**[a]	0.016	−0.053	−0.024
Container performance (very displeased to very pleased)	**0.959**	−0.032	−0.047	−0.062
Container performance (frustrated to contented)	**0.944**	−0.032	−0.064	−0.065
Container performance (terrible to delighted)	**0.990**	−0.056	−0.139	−0.041
The outcome of buying this plant was (not at all desirable to very desirable)	**0.695**	−0.047	0.209	0.085
The outcome of buying this plant was (very unexpected to very expected)	**0.696**	0.060	0.153	0.067
The outcome of buying this plant was (not at all excited to very excited)	**0.644**	0.167	0.271	0.078
Feel a sinking feeling about this plant purchase (strongly disagree to strongly agree)	0.001	**0.882**	0.005	−0.059
Feel that I made a mistake (strongly disagree to strongly agree) with this purchase	−0.025	**0.770**	−0.217	−0.058
Think about a lost opportunity because the purchase was made (strongly disagree to strongly agree)	−0.028	**0.865**	−0.055	−0.057
Feel like correcting your mistake with regard to this plant. (strongly disagree to strongly agree)	−0.100	**0.874**	0.004	0.000
Want to do something differently. (strongly disagree to strongly agree)	−0.075	**0.829**	−0.043	0.013
Want a second chance with your plant purchase. (strongly disagree to strongly agree)	−0.127	**0.847**	0.091	0.044
How much happier would you have been if you had made a different decision (not at all happier to much happier)	0.170	**0.826**	−0.041	0.061
To what extent was the guarantee a deciding factor to shop at this location (very little to very much)	0.199	**0.631**	0.288	0.019
The likelihood that I will purchase this plant again is (very low to very high)	0.005	0.020	**0.959**	−0.053
The probability that I will consider buying this plant again is (very low to very high)	−0.010	−0.015	**0.956**	−0.053
My willingness to buy this plant again is (very low to very high)	0.010	−0.062	**0.928**	−0.024
I will purchase a plant like this the next time I need a plant (strongly disagree to strongly agree)	0.019	0.023	**0.907**	0.032
I was (1) someone else was (7) responsible for the decision to buy this plant (reverse coded)	−0.115	−0.074	0.129	**0.609**
With regard to the performance of this plant, I was (7)/someone else was (1) totally responsible.	−0.004	0.011	−0.086	**0.934**
(Someone else (1) or I (7) was totally responsible for the performance of this plant	0.053	0.035	−0.073	**0.935**

[a]Factor loadings in bold indicate the factor with which the item most strongly loaded.

Behe (2007) a fourth factor, *Responsible*, emerged and was defined with three items that reflected who the subject believed was responsible for the outcome of the container or plant purchase. A low score for *Responsible* reflected the subject's perspective that someone else was responsible for the outcome while a high score reflected their attitude that they were responsible for the outcome. With the exception of the emergence of the *Responsible* factor, the three other factors were consistent in item loadings to both Hicks et al. (2006) and Dennis and Behe (2007).

We subjected the 19 questions relating to plant involvement and plant expertise to a separate factor analysis and two factors emerged (Table 2). Similar to prior work (Joo et al. 2016), the *Involvement* factor contained attitudinal items indicating an affinity for plants with increasing involvement. The *Expertise* factor had questions that related to the subject's knowledge of plants, with items loading in a similar manner to the findings in Behe et al. (2015). A higher score reflected more self-reported knowledge.

Table 2. Principal component analysis of 19 attitudinal items related to expertise and involvement adapted from Behe et al. (2015) and Joo et al. (2016) when 504 respondents to an online survey were asked to focus on a single plant or container they had purchased in the year prior to the survey.

	Factor loadings	
Item	Expertise	Involvement
I think plants are (1—'unimportant' to 5—'important')	0.214	**0.817**[a]
I think that plants (1—'mean nothing to me' to 5—'are of great importance to me')	0.321	**0.820**
I think that plants are (1—'uninteresting' to 5—'interesting')	0.206	**0.865**
I think plants are (1—'boring' to 5—'exciting')	0.307	**0.788**
I think that plants are (1—'unappealing' to 5 –'appealing')	0.105	**0.829**
I think that plants are (1—'mundane' to 5—'fascinating')	0.265	**0.784**
I think that plants are (1—'of no concern to me' to 5—'of great concern to me')	0.229	**0.768**
I keep current on the most recent developments about plants[b]	**0.718**	0.280
I consider myself knowledgeable about plants[b]	**0.817**	0.310
My knowledge of plants helps me to understand very technical information about them[b]	**0.806**	0.220
I can recall many plants from memory[b]	**0.829**	0.194
I can recognize many types of plants[b]	**0.821**	0.201
I can recall specific attributes about plants[b]	**0.838**	0.211
I can recognize many names of plants[b]	**0.775**	0.179
I am knowledgeable about plants[b]	**0.861**	0.249
In general, I know a lot about plants[b]	**0.869**	0.259
I know a lot about plants[b]	**0.888**	0.278
I am a plant expert[b]	**0.829**	0.165
I automatically know which plants to buy[b]	**0.742**	0.252

[a]Factor loadings in bold indicate the factor with which the item most strongly loaded.
[b]Measured using a 5-point Likert scale 1 = strongly disagree and 5 = strongly agree.

3.5. Correlations

We first wanted to understand the relationships between the variables (Table 3). Plant type and price were mildly correlated (0.24545), whereas plant type and MBG were modestly correlated (0.4433); thus the longer the plant was expected to survive, the consumer's PR increased. Price and MBG length were mildly correlated (0.10889) so that as price increased so should guarantee length.

There were many relationships among the demographic variables. Age was negatively related to the number of children (−0.59677) and adults (−0.22923) in the home. Number of children in the home was also negatively related to the percentage of females in the home (−0.01514) but positively related to the number of adults in the household (0.19072). Income was negatively related to age (−0.1995) but positively related to the number of children (0.25624) and adults (0.17542) in the household.

In terms of the relationship between the demographic characteristics and attitudinal factors, we observed that *Delight* had a mild negative relationship to age (−0.03167), being male (−0.05729), and the number of adults in the household (−0.05239); younger females with fewer persons in the household had a higher level of delight with their plant purchase. *Delight* was positively related to the number of children in the home (0.09123) and income (0.05879). *Regret* was moderately negatively related to age (−0.34255) and being male (−0.18093) but was positively related to the number of children (0.38973) and adults (0.14975) in the household, and income (0.14663). *Repurchase* was negatively associated with age (0.07453) but positively related to the number of children (0.14811) and adults (0.07453) in the household, and income (0.06883); younger persons with higher income and children and adults in the household were more likely to make a repeat purchase. *Responsible* was mildly related to age (0.04117) and being female (0.10294) but negatively correlated with the number of children (−0.06402) and adults (−0.08202) in the household. *Expertise* was mildly related to age (0.07726) and being female (0.11411) but negatively related to the number of children (−0.01821) and adults (−0.04514) in the home as well as income (−0.01514). *Involvement* was weakly related to the number of

children in the household (0.04344) but negatively related to age (−0.02706), the number of adults in the home (−0.02518), and income (−0.2891).

Many of the factors were significantly correlated. Consistent with findings in Hicks et al. (2006), *Delight* and *Repurchase* had the highest positive relationship among the factors (0.6116). Similar to Dennis and Behe (2007), *Regret* was moderately and negatively related to *Repurchase* intention (−0.30148). *Delight* and *Regret* had a moderately negative relationship (−0.38005). *Regret* was negatively related to *Responsible* (−0.21252) indicating that the person who experienced high regret was likely to blame someone else for the bad product outcome. *Expertise* was mildly and negatively related to *Regret* (−0.21252) meaning that individuals who know more were had a lower level of regret. However, *Expertise* was slightly and positively related to *Responsible* (0.0338) meaning that individuals who know more were more likely to attribute the outcome to their own efforts. However, *Expertise* was not related to *Repurchase* intention. *Involvement* was only mildly related to *Responsible* in a negative manner (−0.054) meaning that with a higher level of involvement they were more likely to attribute the outcome to someone else.

3.6. Multiple regression

The multiple regression model was significant ($p < .001$) with an adjusted $R^2 = 0.2361$, thus all of the variables combined explained nearly one-quarter of the variation in risk perception (Table 4). As plant price increased, PR also increased. Generally, as MBG length increased, PR decreased. Increasing levels of *Delight*, *Regret*, *Repurchase*, and *Involvement* had higher PR levels associated with them. The findings did not support H1a (consumers with higher *Delight* would experience less PR) or H2 (consumers with greater *Involvement* would have less PR compared to consumers with a lower level of *Involvement*) but did support H1b (consumers with a higher level of *Regret* would experience higher PR compared to consumers with a lower level of *Regret*). Furthermore, *Regret* had the largest coefficient; the more *Regret* a person experienced the magnitude of their PR was substantially higher. *Expertise* was negatively associated with PR level; the more plant knowledge an individual had, the lower their PR. This finding supported H3. *Responsible* had no effect on PR level; it did not matter whether the respondent was responsible for the outcome or someone else was. Subjects who were more likely to *Repurchase* the product expressed greater PR, perhaps because their expectations had been elevated so that a second positive outcome did not seem as attainable as the previous positive outcome.

Age had no effect on PR level, but PR was higher for men than for women. PR also increased with an increased number of adults and children in the household. Income and PR were negatively related; the higher the person's income the lower their PR.

3.7. Structural break point analyses

Annual and perennial plants have different biological life cycles (annual plants are expected to survive only one year whereas perennial plants are expected to persist in the landscape for several years). Thus, we divided the dataset into two sections by plant type, with one set containing all observations for annual plants ($n = 5887$) and the other containing all observations for perennial plants ($n = 5892$). Price and MBG length combined predicted ∼5% of the variation in consumer risk perception (Table 5). However, the effect was significant and documented for the first time that MBGs quantitatively reduce PR. For both plant types, as price increased so did PR. Furthermore, as MBG length increased, PR decreased for both annuals and perennials.

Table 3. Correlation matrix of plant, price, and guarantee with selected demographic characteristics and five factors when 504 respondents to an online survey were asked to focus on a single plant or container they had purchased in the year prior to the survey.

	Plant[a]	Price[b]	Guarantee[c]	Age	Gender[d]	Adults[e]	Children[f]	Income	Delight	Regret	Repurchase	Responsible	Expertise
Price	0.24545	–	–	–	–	–	–	–	–	–	–	–	–
	<0.0001	–	–	–	–	–	–	–	–	–	–	–	–
Guarantee	0.4433	0.10889	–	–	–	–	–	–	–	–	–	–	–
	<0.0001	<0.0001	–	–	–	–	–	–	–	–	–	–	–
Age	0	0.00003	0.00013	–	–	–	–	–	–	–	–	–	–
	1	0.9974	0.9886	–	–	–	–	–	–	–	–	–	–
Gender	0	−0.00001	−0.00004	0.04701	–	–	–	–	–	–	–	–	–
	1	0.9995	0.9967	<0.0001	–	–	–	–	–	–	–	–	–
Adults	0	0	0	−0.22923	−0.01514	–	–	–	–	–	–	–	–
	1	0.9998	0.9997	<.0001	0.0962	–	–	–	–	–	–	–	–
Children	0	−0.00001	−0.00004	−0.59677	−0.17431	0.19072	–	–	–	–	–	–	–
	1	0.9991	0.9963	<0.0001	<0.0001	<0.0001	–	–	–	–	–	–	–
Income	0	0.00003	0.00014	−0.1995	−0.08073	0.17542	0.25624	–	–	–	–	–	–
	1	0.9973	0.9873	<0.0001	<0.0001	<0.0001	<0.0001	–	–	–	–	–	–
Delight	0	0.00001	0.00006	−0.03167	−0.05729	−0.05239	0.09123	0.05879	–	–	–	–	–
	1	0.9989	0.9951	0.0005	<0.0001	<0.0001	<0.0001	<0.0001	–	–	–	–	–
Regret	0	0.00001	0.00005	−0.34255	−0.18093	0.14975	0.38973	0.14663	−0.38005	–	–	–	–
	1	0.999	0.9956	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	–	–	–	–
Repurchase	0	0	0.00002	−0.0945	−0.00369	0.07453	0.14811	0.06883	0.6116	−0.30148	–	–	–
	1	1	0.9987	<0.0001	0.685	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	–	–	–
Responsible	0	0.00002	0.00007	0.04117	0.10294	−0.08202	−0.06402	−0.01706	0.1689	−0.21252	0.20723	–	–
	1	0.9986	0.9943	<0.0001	<0.0001	<0.0001	<0.0001	0.0601	<0.0001	<0.0001	<0.0001	–	–
Expertise	0	−0.00004	−0.00016	0.07726	0.11411	−0.04514	−0.01821	−0.01514	−0.00273	−0.06093	−0.00709	0.0338	–
	1	0.9965	0.9855	<0.0001	<0.0001	<0.0001	0.0454	0.0955	0.7636	<0.0001	0.4351	0.0002	–
Involvement	0	0.00002	0.00008	−0.02706	0.01071	−0.02518	0.04344	−0.02891	−0.01416	−0.01572	−0.00015	−0.054	−0.00078
	1	0.9982	0.993	0.0029	0.2398	0.0056	<0.0001	0.0015	0.1195	0.0838	0.9868	<0.0001	0.9317

[a]Plant type 0 = annual, 1 = perennial.
[b]Price $5, $10, $20, and $40 for annuals, $10, $20, $30, and $40 for perennials.
[c]Guarantee length 0, 30, or 60 d for annuals; 0, 90, or 365 d for perennials.
[d]Gender 0 = female, 1 = male.
[e]Adults or number of adults in the household.
[f]Children or number of children in the household.

Table 4. Overall multiple regression model showing variables, estimate (standard error), *t* value and probability.

Variable	Estimate	(SE)	*t* value	*p*
Intercept	19.69373	1.68503	11.69	<.0001*
Plant type	2.66526	0.51306	5.20	<.0001*
Price	0.41278	0.01816	22.72	<.0001*
Guarantee length	−0.03370	0.00199	−16.94	<.0001*
Delight	1.32198	0.30400	4.35	<.0001*
Regret	10.48312	0.28811	36.39	<.0001*
Repurchase	2.21051	0.291051	7.49	<.0001*
Responsible	0.11058	0.23392	0.47	.6364
Expertise	−0.74787	0.22808	−3.28	.0010*
Involvement	0.89780	0.22486	3.99	<.0001*
Age	−0.00422	0.02014	−0.21	.8341
Female	−1.61097	0.47088	−3.42	.0006*
Adults	0.91063	0.26835	3.39	.0007*
Children	3.06914	0.34314	8.94	<.0001*
Income	−0.27550	0.08585	−3.21	.0013*

*indicates significant difference at $p < 0.05$.

Table 5. Chow test results showing parameter estimates for both annual and perennial plant models showing the effect of guarantee length, plant type, and price on perceived risk level.

	Parameter estimates		
Plant type	Price	Guarantee	R^2
Annual	0.4209*	−0.0867*	0.0551
Perennial	0.4067*	−0.0307*	0.0573

*indicates significant difference at $p < 0.05$.

3.7.1. Price break points

Finding a significant effect of MBG length on PR, we delved deeper into the relationships between PR and plant type, price point, and guarantee length with separate Chow tests (Table 6). There was no change in the PR for annuals at all guarantee lengths when the price increased from $5 to $10. However, PR decreased more when the MBG increased from 0 d to 30 d yet there was no benefit (no further reduction in PR) when the MBG was increased to 90 d. So, for annual plants priced at $10 there was a significant reduction in PR with a 30-d MBG but no change by adding an additional 60 d.

For annual plants, there was an overall increase in PR as the price increased from $10 to $20. This change occurred independently of guarantee length. Results showed no break points when the price of annuals increased from $20 to $40 meaning that consumers expressed no significant increase in PR for annuals $\geq$ $10 (up to $40).

For perennial plants, several of the breakpoints indicated a significant change in PR (Table 6). As the price of the perennial increased from $10 to $20, we found a significant increase in PR at all guarantee lengths. When the perennial plant increased from $20 to $30, we found significant decreases in PR as the MBG got longer.

3.7.2. Guarantee length breakpoints

For annual plants, overall PR decreased as MBG length increased, independently of price point (Table 7). In other words, for annual plants, moving from no MBG to a 30-d MBG decreased the PR of annuals at all price points. A similar finding was observed in moving the MBG from 30 d to 90 d. At all price points, the PR was lower with a longer MBG. For perennial plants, results showed that increasing the MBG length from 0 to 90 d reduced PR and that risk reduction was enhanced when the price of the perennial increased from $30 to $40. We also observed the reduction of PR on perennials when the length of the MBG increased from 90 to 365 d. As the price of the perennial increased in increments of $10 up to $40, the magnitude of the risk

Table 6. Chow test results showing the effect of guarantee length at three price breakpoints on perceived risk level.

Plant type	Price breakpoint	Guarantee length	*p* Value
Annual	$5–$10	All	.3488
		0 d	.9996
		30 d	.0520*
		90 d	.9784
	$10–$20	All	.0756*
		0 d	.1310
		30 d	.1723
		90 d	.4752
	$20–$40	All	.2067
		0 d	.2142
		30 d	.2246
		90 d	.1295
Perennial	$10–$20	All	.0843*
		0 d	.9929
		90 d	.8600
		365 d	.9867
	$20–$30	All	.0005**
		0 d	<.0001**
		90 d	.1133
		365 d	.0121**
	$30–$40	All	.0226
		0 d	<.0001**
		90 d	<.0001**
		365 d	<.0001**

*indicates a significant difference at $p < 0.10$.
**indicates a significant difference at $p < 0.05$.

Table 7. Chow test results showing the effect of price point at three guarantee lengths on perceived risk level.

Plant type	Guarantee breakpoint	Price point	*p* Value
Annual	0–30 d	All	<.0001*
		$5	.9996
		$10	.9970
		$20	.8557
		$40	.9905
	30–90 d	All	<.0001*
		$5	.7563
		$10	.9795
		$20	.6204
		$40	.9999
Perennial	0–90 d	All	<.0001*
		$10	.9929
		$20	.9985
		$30	.9964
		$40	.0064*
	90–365 d	All	<.0001*
		$10	<.0001*
		$20	.0006*
		$30	.0103*
		$40	.0083*

*indicates significant difference at $p < 0.10$.

reduction changed significantly each time. In other words, for each increase of $10 on the perennial plant, the MBG had an increasingly bigger effect on mitigating risk.

4. Discussion and conclusions

MBGs quantitatively reduced PR, answering our first research question. The MBG facilitated the consumer's goal of minimizing loss probability, consistent with prior studies (Bauer 1960; Jacoby and Kaplan 1972; Taylor 1974; Derbaix 1983; Mitchell 1999). The overall model which included the five demographic characteristics and six attitudinal factors explained 23% of the variance,

typical of social science research where often ~25% of the variance is accounted for by parameters and is considered acceptable (Abelson 1985; Moksony 1990). The variance accounted for in this study is aligned with other investigations of PR which have explained <20% of the variance (Dowling 1986). We found that for each 1 d increase in MBG (moving from 0 d to 365 d) we observed a decrease in PR of 0.0337 (coefficient from overall regression model), thus a 90-d MBG would reduce PR by 3% overall. Nadeem (2006) indicated that a 5% in improvement of customer retention can result in a 75% increase in profitability. Because PR affects product choices (Bauer 1960; Jacoby and Kaplan 1972; Derbaix 1983; Mitchell 1999), MBGs may contribute to customer retention, so the small but measurable reduction in PR by communicating a MBG has quantifiable potential to benefit both retailer, perhaps in additional purchases and consumers in their increased willingness to make a purchase because the perceive with lower risk.

We answered our second research question in finding several structural break points. Thus, the nature of reducing PR through increasing MBGs was not linear, in this case, for plants. We found the first break point for annuals at 30 d as price increased from $5 to $10. This 'tipping point' could be a crucial point for retailers as price at which the MBG begins to matter *more* to consumers. Identifying additional tipping points merits further investigation.

Both plant price and guarantee length influenced PR of annuals and perennials, answering the third research question. Again, this sample of consumers used the guarantee length and price to reduce the likelihood of loss, consistent with prior studies. We saw slightly different effects for annuals and perennials. Moving from 0 to 30 d and from 30 d to 90 d, as the price of annuals increased, the PR continued to decrease at all price points. The effect was more pronounced for perennials. For perennials at any price point, MBGs markedly reduced PR. Increasing the length of the MBGs (up to 1 year) produced a great reduction in PR. These results would indicate that promoting a 30-d MBG on annuals over $5 and on any perennial would reduce consumers' PR, which could lead to greater purchases and/or customer retention.

We found that *Involvement* was not related to PR which may mean that simply having a keen interest in a product category may not be a sufficient condition to persuade a consumer to make a purchase. While prior work showed that involvement level was related to PR (Dowling 1986; Patterson 1993; Pires, Stanton, and Eckford 2004), perhaps the products (annuals and perennials) generally were perceived as low-risk choices much like fast-moving consumer goods. In this study, heightening product interest or involvement would not appear to have the PR mitigation effect that education may have. Greater expertise did reduce PR, so retailers who make an effort to increase the knowledge base of the consumers may help to indirectly reduce PR.

Delight did not reduce PR. Having a prior positive experience (*Delight*) was related to a higher likelihood to repurchase the plant, but did not mitigate PR. Greater regret increased PR. The implication for retailers may be to monitor the product returns to help create a less emotional outcome, striving to reduce PR. Perhaps even promoting an easy or simple return process to help guarantee a positive outcome may help to encourage consumers to bring unexpected negative occurrences back to the retailer for another opportunity for success. While only 6.5% of the products included in this study were returned, the customers who requested a return may experience higher regret. This could be an important segment to pursue to give them a more positive outcome or, at least, prevent some negative word-of-mouth complaining to influence other customers.

MBGs do have a measurable impact on PR. For plants that are expected to survive multiple season and/or with higher prices, results provide evidence that PR is lowered faster as MBG duration increases for perennial plants. We suspect that this may be related to the expectation of these plants growing for multiple seasons. Future research should investigate the role of MBGs on shrubs and trees to determine if the effect is similar or enhanced, since those types of plants represent an even greater financial investment and are expected to persist in the landscape for many years.

Limitations of this study include the small range of plants, prices, and guarantee lengths. However, the results do show merit in future investigations of more MBG modifications on more

plants and other products. The key finding is clear: guarantees do reduce PR in a measurable way which is related to product longevity, price, and length of guarantee. Practically, all plant retailers would be contributing to the mitigation of PR if they marketed a MBG policy. The guarantee specifications, as well as costs, merit further investigated.

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