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The impact of instant reward programs and bonus premiums on consumer purchase behavior

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ABSTRACT

This study examines the impact of an instant reward program (IRP) with bonus premiums on consumer purchase behavior. An IRP is a rapidly growing form of short-term program that rewards consumers instantly with small premiums per fixed spending, where these premiums are part of a larger set of collectibles. A supplementary element in many IRPs promotes specific brands with an extra premium, labeled bonus premiums. Bonus premiums are the extra premiums consumers can earn by buying a specific promoted brand, which is a non-price promotion tied to the IRP. Therefore, consumers can earn premiums in two ways: based on total spending and on purchases of promoted brands. To test the effects of these marketing instruments, this study uses Dutch household panel data related to purchases of 23 product categories spanning four supermarket chains. We decompose consumer purchase behavior by modeling the number of shopping trips, category-level purchase incidence, brand choice, and purchase quantity. The results show that an IRP results in incremental shopping trips. Promoting a brand with a bonus premium and price discount compared to just a price discount results in higher choice probabilities for the promoted brand. Finally, the IRP and bonus premium are especially effective for households that collect the premiums, but we also find positive albeit smaller effects for non-collecting households.

1. Introduction

Retailers seek instruments to generate consumer excitement and stimulate sales. Many retailers (see Table 1) adopted a new reward program design, namely a short-term program that rewards consumers instantly with small premiums per fixed spending. We label this program design instant reward program (IRP). As Table 1 shows, the IRP instrument has been adopted by many different retailers in many different countries. For example, in Woolworths Dreamworks Heroes promotion, consumers receive cards featuring characters from popular Dreamworks movies for every $20 they spend. The 42 cards fit together in a complementary album (see Table 1 for more examples and Appendix A for an advertisement from an IRP). Thus, an IRP is a rapidly growing form of short-term program that rewards consumers instantly with small premiums per fixed spending, where these premiums are part of a larger set of collectibles.

Marketing instruments that reward consumer purchase behavior can be characterized by three dimensions: reward timing, the collectability of rewards, and the basis on which rewards can be earned (Blattberg, Kim, & Neslin, 2008; Dowling & Uncles, 1997;

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Table 1
Examples of instant reward programs.

Retailer	Year	Country	Promotion name	Premium per
Delhaize	2011	Belgium	Smurfenactie	€20
Nah & Frisch	2012	Austria	Disney Pixar Karten	€10
Rewe	2012	Germany	Unsere Erde	€10
Billa	2012	Italy	Alliga Joe	€20
7-Eleven	2013	Singapore	Team Marvel	$24
Lidl	2014	France	Stikeez	€15
Cactus	2014	Luxembourg	Brazil'oos	€10
Woolworths	2014	Australia	Dreamworks Heroes	$20
Migros	2015	Switzerland	Swiss Mania	CHF20
Plus	2015	Netherlands	Minions	€15
Pick n Pay	2015	South Africa	Stikeez	R150
Lidl	2015	Portugal	Super Gang dos Frescos	€10

Yi & Jeon, 2003; see Table 2). An IRP differs from conventional, frequency reward programs (FRPs) in terms of both timing and collectability: consumers *instantly* receive rewards that are *collectable*, instead of receiving an *uncollectable delayed* reward (e.g., "Buy 10 times, get 1 free"; Kivetz, Urminsky, & Zheng, 2006). The effectiveness of the conventional FRPs is debatable (Dowling & Uncles, 1997; Zhang & Breugelmans, 2012). Some studies reported significant positive effects (e.g., Taylor & Neslin, 2005), while others have not found a significant effect (e.g., Mägi, 2003). In addition, program designs that provide instant rewards are most preferred by consumers (Yi & Jeon, 2003). Therefore, it is important to study how effective program designs with an instant reward scheme are in stimulating sales.

As a supplementary element, many IRPs included promotions of specific brands using a bonus premium; see Appendix A for a feature advertisement with bonus premium. In such programs, consumers can earn premiums in two ways: based on the total purchase amount (e.g., a premium per every $20) and on their purchases of the promoted brand (e.g., buy Coca-Cola and get an additional premium). Hence, bonus premiums are the extra premiums consumers can earn by buying a specific promoted brand, which is a non-price promotion tied to the IRP.

The closest analog to a bonus premium is a free gift promotion: a different item offered for free when purchasing the core product, e.g., a free glass when buying a six-pack of Heineken beer (d'Astous & Jacob, 2002; Laran & Tsiros, 2013). Free gifts are typically offered by a manufacturer for their brand only (Gedenk, Neslin, & Ailawadi, 2006) and not part of a larger set of collectibles (see for example the framework used by d'Astous & Jacob 2002, p. 1286). Previous studies showed that a free gift increases the perceived value of the promoted brand (Palmeira & Srivastava, 2013). In contrast to free gifts, bonus premiums can be used by retailers for multiple brands simultaneously and are part of a larger set of collectables (Table 2). Consumers are more motivated to obtain rewards they collect (Gao, Huang, & Simonson, 2014) and hence they might react more strongly to bonus premiums compared to a free gift when they already own a number of premiums. The use of the bonus premiums constitutes an innovative example of a non-price promotion; by studying them, we add to the growing body of research that considers promotional forms other than regular price discounts (Ailawadi, Gedenk, Langer, Ma, & Neslin, 2014; Kim, Natter, & Spann, 2014).

The goal of this study is to examine the effectiveness of IRPs with bonus premiums. Despite the increased use of these instruments and the fundamental differences with FRPs and free gifts in terms of reward timing and collectability (see Table 2), academics and practitioners have limited knowledge of their effects and we believe we can contribute considerably here. A second contribution is that this study examines the effect of a reward program in combination with promotions. Most existing literature examined program designs which reward consumers only with points/rewards for total spending. Very little research has addressed the effect of promotions within a rewards program (Breugelmans et al., 2015; Grewal et al., 2011). The use of multiple reward-earning bases is particularly interesting because the bonus premium may stimulate brand switching, whereas the IRP may stimulate making trips to the store. A third contribution of this study is the use of actual purchase data. So far, research on premium and free gift promotions is almost exclusively based on experiments (e.g., Gao et al., 2014; Laran & Tsiros, 2013; Simonson, Carmon, & O'Curry, 1994). This is particularly important given that promotions involving premiums and free gifts constitute a general retail trend; overall consumer spending on such promotions reached $45.8 billion in 2009 (Laran & Tsiros, 2013).

More specifically, this study aims to address the following questions: How effective are the IRP and bonus premium on increasing the components of sales? As retailers and manufacturers benefit differently from changes in consumer purchase behavior, it is important to understand the effects of the IRP and bonus premiums on store trips, category incidence, brand choice, and purchase quantity to provide valuable insights to both retailer and manufacturer. What is the effect of these instruments for households

Table 2
Comparison of IRP and bonus premiums with other marketing reward instruments.

Marketing instrument	Reward timing	Collectability	Reward earning basis
IRP	Instantly after purchase	Collectable	Total spending
FRP	After milestone completion	Non-collectable	Total spending
Bonus premium	Instantly after purchase	Collectable	Brand purchase
Free gift	Instantly after purchase	Non-collectable	Brand purchase

who do versus who do not actively collect the premiums? There is only one study that also examines the effects of reward programs that reward both total spending and purchasing specific items (Zhang & Breugelmans, 2012). Our study differentiates in two important aspects. First, the design of the programs we study: We focus on rewards that are collectable and received instantly after purchase. Second, while the Zhang and Breugelmans (2012) study focuses on the two outcome variables relevant to retailers (store visits and spending), we also examine outcome variables relevant to manufacturers (brand choice).

To address these questions, we study three IRPs that ran for four or five weeks at four major supermarket chains. The IRPs provided consumers a premium for every €15 they spent at the supermarket (see Appendix A for example). Consumers could receive bonus premiums for buying specifically promoted brands, in addition to the premium(s) received on the basis of their total spending. The brands for which the retailers gave bonus premiums varied across the weeks of the IRPs. The premiums were small toy figures related to the FIFA 2010 World Cup Soccer, which together formed a collectible set and the consumers could not pick the premiums themselves but randomly received one. With household scanner data, we examine purchases from the studied chains in the Netherlands over 21 weeks, including several weeks before and after the IRP ran. In total, we studied 23 categories that used bonus premiums in the larger ice cream, yellow fat (e.g., margarines and butters), soft drink, and soup product groups. We select these product groups because they feature both low (yellow fat, soup) and high (soft drinks) fit with the World Cup Soccer (Gijsenberg, 2014). To examine the effects of IRPs and bonus premiums, we model the number of shopping trips per week separately for each of the four supermarket chains, and model the category incidence, brand choice, and purchase quantity conditional on the shopping trip separately for each of the 23 categories.

This study demonstrates that the IRPs and bonus premiums significantly affect consumer purchase behavior. First, IRPs have a positive effect on the number of shopping trips to the retailer. Hence, the IRP is of high relevance to retailers because it generates additional visits. Second, bonus premiums predominantly increase the brand choice of the promoted brand but also increase the likelihood of making a purchase in the category (i.e., category incidence). Therefore, bonus premiums are beneficial to manufacturers of the promoted brand (i.e., higher brand sales), and to the retailer due to the higher category sales. Third, the IRPs and bonus premiums are particularly effective for households who collect the premiums, but we also find that bonus premiums increase the brand choice of the promoted brand for non-collecting households.

2. Theoretical background

Retailers have used a variety of marketing instruments that reward consumers for their purchase behavior (Breugelmans et al., 2015; Laran & Tsiros, 2013). The rewarding mechanism of these instruments can be categorized on the basis of multiple dimensions, where the three dimensions most relevant to our research are reward timing, reward collectability, and reward earning base (see Table 2). In the next subsections, we discuss IRPs and bonus premiums along these three dimensions to obtain insights on how these marketing instruments may affect consumer purchase behavior.

2.1. Instant reward programs

The first dimension that drives the effectiveness of an IRP is the timing of the rewards. In the IRP, the rewards are received instantly at the moment of purchase instead of the traditional delayed reward schemes. With an instant reward, there is no risk for the consumer, whether or not s/he will meet the requirements for the reward and hence, consumers perceive delayed rewards as more uncertain compared to immediate rewards (Kim, 2013). Rewarding consumers instantly creates excitement and salience for the reward program, which may result in a momentum effect that reinforces purchases from the focal retailer (Dhar, Huber, & Khan, 2007; Dorotic, Verhoef, Fok, & Bijmolt, 2014; Taylor & Neslin, 2005). Finally, when consumers are rewarded instantly, this strengthens the association between purchasing and collecting rewards which may motivate consumers to keep earning rewards (Zhang & Gao, 2016). Therefore, consumers prefer instant rewards over delayed rewards (Yi & Jeon, 2003), and the effect of instant rewards on sales are stronger compared to the effect of delayed rewards (Zhang, Krishna, & Dhar, 2000).

The second dimension that drives the effectiveness of an IRP is the collectability of the rewards. The rewards used in the IRP are collectable. Prior research showed that many consumers do not have preexisting attachments to premiums (Gao et al., 2014). Yet, after having a few of the premiums, consumers may start to collect the premiums and may aim to complete the set (Carey, 2008), because it is difficult to justify the ownership of having just a few premiums (Gao et al., 2014). Hence, having a number of premiums creates commitment to collect more, which consequently drives the effectiveness of IRPs (Carey, 2008). This need for set completion effect (Carey, 2008) is related to the point pressure effect (Taylor & Neslin, 2005) in traditional FRPs in that it stimulates consumers to continue buying at the retailer. In addition, the possession of collectable premiums highlights a sense of achievement which motivates consumers to keep earning the rewards (Zhang & Gao, 2016).

The third dimension that drives the effectiveness of the IRP is the reward earning basis. An IRP rewards consumers for their total purchases as do conventional FRPs (Breugelmans et al., 2015). Therefore, an IRP should increase the likelihood to make trips to the supermarket, purchase in more categories and in larger quantities.

2.2. Bonus premiums

Bonus premiums enhance the benefits of the promoted brands, which provide consumers an incentive to purchase the promoted brand (Chandon, Wansink, & Laurent, 2000) because consumers tend to react to free offers (Chandran & Morwitz, 2006; Shampanier, Mazar, & Ariely, 2007). Similar to an IRP, bonus premiums reward consumers instantly with collectible rewards.

Because consumers prefer instant rewards over delayed rewards (Yi & Jeon, 2003; Zhang et al., 2000), instantly receiving rewards for purchasing promoted brands may encourage consumers to purchase. Bonus premiums may be particularly effective because consumers aim to collect the set of premiums (Gao et al., 2014; McAlister, Cornwell, & Cornain, 2011), and the promotion is an efficient way to get more premiums. The major difference between the bonus premium and the IRP is the reward earning basis. Bonus premiums reward consumers for purchasing specific brands. Consequently, the bonus premium promotion is expected to stimulate consumers to purchase the promoted brand and therefore increase the brand choice share and the purchase quantity of the promoted brand. In addition, bonus premiums can make it more attractive for households to purchase in the category and at the retailer, and hence may make it more likely for consumers to visit the retailer and to purchase in the category.

2.3. Collecting versus non-collecting households

The IRPs obviously should be more effective for households who collect the premiums; only if they accept the premiums, feelings of excitement and salience lead to the purchase momentum effect. For households who collect the premiums, the attractiveness of a brand supported by a bonus premium is also higher (Gao et al., 2014). However, for households that do not collect the premiums, positive effects for the bonus premiums can be expected as well for two reasons. First, the bonus premium may result in exposure effects, which increase brand interest independent of whether the household collects these premiums (Venkatesan & Farris, 2012). Second, bonus premium promotions may signal an associated discount (Zhang, 2006) which results in lower search costs and higher perceived benefits of the promoted brand for households that do not collect the premiums. Similarly, the IRP may also increase the amount of purchases for non-collecting households. Households that are exposed to marketing activities in-store have more unplanned purchases (Bell, Corsten, & Knox, 2011), and hence the exposure to activities related to the IRP may result in more purchases. Even though the IRP and bonus premiums could have a positive effect for non-collecting households, the effectiveness is expected to be stronger for households that collect the premiums due to the benefits of the premiums themselves as explained in §2.1 and §2.2.

3. Data

3.1. Instant reward programs and bonus premiums

To assess the impact of IRPs and bonus premiums on a household's purchase behavior, we conduct an empirical study of IRPs and bonus premiums in the Dutch supermarket industry. We study IRPs implemented at four large Dutch supermarket chains: AH, Deka, Dirk, and Plus (Table 3). Both Deka and Dirk used the same IRP but these chains are in different parts of the country and do not have overlapping catchment areas. The IRPs were related to the FIFA 2010 World Cup Soccer, which started in week 24. All IRPs started before the FIFA 2010 World Cup Soccer: the IRPs started between weeks 19 and 23 and ran for four or five weeks (Table 3). Consumers received a premium for every €15 they spent at the supermarket; this includes all purchases made at the focal supermarket. The premiums and their set size varied among the IRPs: at AH, the set contained 4 premiums, Plus had 32 premiums, and Dirk and Deka offered 44 premiums. The premiums were small toy figures related to the FIFA 2010 World Cup Soccer (see Appendix A) and did not have any monetary value but formed a set of collectibles. In all cases though, consumers could not pick their preferred premium themselves, but instead randomly received premiums from the set of premiums.

All retailers implemented bonus premiums that consumers could earn for purchases of specific brands, beyond those premiums earned on the basis of their total spending. These bonus premiums were featured in retail mailings (see Appendix A). The retailers used bonus premiums in all weeks of the IRP, the bonus premium promotions ran for one week, and the brands for which the retailers gave bonus premiums varied across the weeks of the IRPs.

3.2. Household panel data

To examine the effects of IRPs and bonus premiums, we study household purchases in four *product groups*: ice cream, yellow fat (e.g., margarines and butters), soft drinks, and soup. We select these product groups because they feature both low (yellow fat, soup) and high (soft drinks) fit with the World Cup Soccer (Gijsenberg, 2014). In these product groups, we use the narrower product categories based on the data provider's classification of product categories. For example, in the ice cream product group, we have two product categories: the ice cream deserts and the ice cream bars on stick. From all the product categories available across the four retailers, we select only the product category–supermarket combinations where at least one brand was supported with a bonus premium. Overall, we study 23 product categories and a detailed description of the studied product categories can be found

Table 3
Overview of instant reward programs in the empirical study.

Supermarket chain	Starting week	Ending week	Premiums in set	Bonus premiums studied
AH	23	26	4	11
Deka	21	25	44	3
Dirk	19	23	44	11
Plus	20	24	32	3
FIFA 2010 World Cup Soccer	24	27		

in Appendix B. In these product categories, all brands, with and without bonus premium promotions were included in the analyses. In total, we consider 28 brands promoted with bonus premiums, which implies that in some product categories the bonus premium instrument was used for multiple brands. The number of brands promoted with bonus premiums varied from 11 at AH, 3 at Deka, 11 at Dirk, and 3 at Plus (Table 3). The number of such brands examined per product group varied: 8 ice creams, 9 yellow fats, 7 carbonated soft drinks, and 4 soups. Most brands received support only once with a bonus premium, though three brands were supported for two non-consecutive weeks during the IRP.

The purchase data from the product categories were provided by GfK Panel Services Benelux, which runs a representative household panel for the Dutch population. Panel members scanned their supermarket receipts at home. The provided data covered weeks 12–32 in 2010—that is, before, during, and after the IRPs and the World Cup Soccer (Table 3). When a consumer purchases at the retailer, he/she can get the premiums at the checkout counter without filling up any form or becoming a program member. However, not every household collected the premiums that they could earn. A unique feature of our dataset is that GfK surveyed a random sample of panel households whether they collected the premiums. The question used in the survey was: Did you collect the premiums at supermarket chain X? (Yes/No). By using this survey question, we could distinguish between households who collected the premiums versus households that did not collect them. The percentage of households that stated they collected the premiums was around 40%: AH (39.50%), Deka (39.13%), Dirk (44.59%), Plus (45.55%).

We select all households that visited at least one of the four chains studied. Most of these households visited only one of the four chains, so the number of households that purchased at any specific supermarket chain was less than the total data set of 2365 households available in the dataset that were surveyed about their collecting behavior of premiums. The number of households that purchased in a supermarket chain varied from 1846 for AH, 116 for Deka, 518 for Dirk, and 292 for Plus. To make the sample from AH more comparable to the other supermarket chains, we used a random sample of 600 households for this chain. We only included households in the data for a product category if they made at least one purchase in this category at the focal supermarket chain.

3.3. Promotional variables

All retailers studied used weekly mailings to support brand sales. For the majority of the brands featured in the mailing, there is an associated price discount highlighted in the mailing. During the IRP, some brands were supported with a feature in the mailing, a discount, *and* a bonus premium. Thus, all brands that were supported with a bonus premium were featured and on discount also. These promotions ran for one week, similar to the regular promotions without a bonus premium. In addition, the retailers also supported brands with a discount and a feature but without a bonus premium during the IRP. In this way, we can distinguish the effectiveness of the different marketing mix instruments.

For many brands, there was only one package size available, so we used the price per volume unit of this size as the price variable to compute the discount. The percentage discount was computed compared to the median product price in non-promotional weeks. For brands with multiple package sizes,[1] we weight the prices per unit for the different package sizes per week by their market share over the 21 weeks and compute the discount that way. Some weeks did not generate any purchases for a specific brand at a certain supermarket chain, which always occurred during weeks the brand was not featured in the retailers mailing (i.e., non-promotional weeks), so we impute 0% discount for the brand at that week. The average discount depth compared to the median price was 26.53% for a regular price promotion and 26.42% for a bonus premium promotion indicating that brands promoted with a bonus premium do not receive a deeper discount.

3.4. Exploratory analysis

In Table 4a, we present the household purchase behavior across trips with and without an IRP. During the IRP, households made more trips per week to the supermarket chain compared to weeks without an IRP (1.03 vs. 0.98). The average category purchase incidence was higher during trips when the IRP ran compared to trips without an IRP (11.69% vs. 10.57%). As Table 4a also illustrates, the average purchase quantities of the purchased brand in a trip were higher when the IRP ran compared to trips without an IRP running at the retailer, with a mean value of 2.91 vs. 2.38 units. Hence, model-free evidence indicates that during an IRP, households make more trips to the store, have higher category purchase incidence, and those that purchased did so in larger quantities.

Table 4b shows that households were more likely to purchase in the category if a brand was promoted with a feature and discount (16.88% vs. 8.71%). The likelihood to purchase in the category increased even further if a brand in the category was supported with a bonus premium (19.47%). The descriptive statistics for brand choice and purchase quantity are only computed for brands that were promoted with a bonus premium to provide some observations of the effects of the bonus premium. Households strongly reacted to promotions with discount and feature, such that brand share increased substantially (66.69% vs. 25.52%).[2] Table 4b

[1] We regard different SKUs of a brand with the same packaging form as one brand because they are promoted jointly by the retailers. SKUs with different packaging forms represent different categories as they are not promoted jointly. For example, Becel margarine in 250 and 500 g packages represent the same brand. However, a 330 ml can of Coca-Cola is treated as a different category than a 1500 ml Coca-Cola bottle, which matches how GfK groups packing forms and SKUs.

[2] Across the categories, the percentage of trips where multiple brands are purchased within the same category is 3.2%. The model used in the analyses for brand choice does not account for purchasing multiple brands during the same trip within a product category. For these purchases, we randomly picked one of the brands and the associated purchase quantity. As a robustness check, we have also deleted the purchases where multiple brands are purchased, these results are highly similar and available upon request.

Table 4a
Dependent variables: Descriptive statistics with and without an instant reward program.

	No. of trips per household per week (average)	Category purchase incidence per trip (%)	Brand share per category incidence (%)	Purchase quantity per category incidence (units)
No IRP	0.98	10.57	n.a.	2.38
IRP	1.03	11.69	n.a.	2.91

Table 4b: Dependent variables: Descriptive statistics with and without promotions

No promotion	n.a.	8.71	25.52[a]	2.50[a]
Discount + feature	n.a.	16.88	66.69[a]	3.37[a]
Discount + feature + Bonus premium	n.a.	19.47	75.21[a]	3.82[a]

Note: [a]The descriptives are only computed for brands that are promoted with a bonus premium. All averages in the table differ significantly from each other ($p < 0.05$), except the purchase quantity for Discount + feature vs. Discount + feature + bonus premium ($t = 1.41$, $p = .17$).

also indicates that providing a bonus premium in addition to a price discount and feature increased the brand share even further (75.21% vs. 66.69%). The average quantity purchased increased when the brand was promoted with a feature and discount (3.37 vs. 2.50 units) but did not increase significantly further when the brand was also promoted with a bonus premium in addition to the discount and feature (3.82 units vs. 3.37 units). Thus, the descriptive statistics provide initial evidence for the effectiveness of the IRP and the bonus premium, but we need a model to formally test whether IRPs and bonus premiums affect household purchase behavior.

4. Model

4.1. Model overview

To examine the impact of IRPs and bonus premiums on consumer purchase behavior, we need to account for the different impacts of these two instruments due to the difference in reward earning base. The IRP rewards consumers with premiums based on total spending per trip. Therefore, the IRP can stimulate consumers to visit the store more frequently (i.e., increases the number of shopping trips), makes consumers more likely to purchase within a category (i.e., category incidence), and makes consumers more likely to purchase brands in larger quantities. The bonus premium rewards consumers for buying a specific brand. Therefore, the effect of a bonus premium might affect brand choice and purchase quantity of the promoted brand, but may also make it more attractive to make a category purchase or to visit the retailer. As such, we decompose the number of units household h buys of brand j in week w Q_{hjw}, into the number of trips household h makes in week w T_{hw}, and number of units Q_{hjt} household h buys of brand j at shopping trip t (e.g., Van Nierop, Leeflang, Teerling, & Huizingh, 2011).

$$E\left(Q_{hjw}\right) = E(T_{hw}) * E\left(Q_{hjt}\right) \tag{1}$$

4.2. Shopping trips

The first component of Eq. (1) is the number of shopping trips of household h to the retailer in week w, $E(T_{hw})$, which is a count variable. Therefore, the Poisson regression model is widely used and is an appropriate way to model the number of shopping trips (Van Nierop et al., 2011). In the shopping trip model, we include the IRP as an explanatory variable to examine whether the IRP affects the number of shopping trips. We further examine if the effect of the IRP is stronger for households who collect the premiums and if the effect varies with the number of weeks the program is running. Here, we also include aggregate promotional variables to control for possible increases in (bonus premium) promotions offered, which may stimulate consumers to visit the store. Therefore, we have three aggregate promotional variables in the trip model: the fraction of categories with bonus premium promotions ($\text{BonusPremiumIntensity}_w$), the fraction of categories with feature promotions ($\text{FeatureIntensity}_w$), and the average discount depth across categories (AvDiscountDepth_w).

We include control variables for the World Cup Soccer and temperature. Households may make more shopping trips to retailer during the World Cup Soccer given that they may consume more when they watch games together with family and friends. In addition, they may visit the retailer less frequently with higher temperatures. Households with children may make fewer shopping trips as they do more one-stop shopping and therefore we include an indicator variable for children. We further control for household heterogeneity by including the household's share of wallet during the 11 weeks prior to the data period used and by including a normally distributed household-specific random intercept. We estimate the shopping trip model for all four supermarket chains but do not estimate it jointly with the models for the category incidence, brand choice, and purchase quantity. The latter

models are estimated at the trip-level whereas the shopping trip model is at the week-level. The number of times that household h visits the retailer v shopping trips at week w is modeled by[3]

$$\Pr[T_{hw} = v \mid \lambda_{hw}] = \frac{\exp(-\lambda_{hw})\lambda_{hw}^{v}}{v!}, v = 0, 1, 2, 3, \ldots \tag{2}$$

$$\begin{aligned} \mathrm{Ln}(\lambda_{hw}) = {} & \theta_{0h} + \theta_1 \mathrm{IRP}_w + \theta_2 \mathrm{IRP}_w \times \mathrm{WeekIRP}_w + \theta_3 \mathrm{IRP}_w \times \mathrm{Collecting}_{hw} + \theta_4\, \mathrm{BonusPremiumIntensity}_w \\ & + \theta_5\, \mathrm{FeatureIntensity}_w + \theta_6\, \mathrm{AvDiscountDepth}_w + \theta_7 \mathrm{WCS}_w + \theta_8 \mathrm{Temperature}_w + \theta_8 \mathrm{SOW}_h + \theta_9 \mathrm{Children}_h \end{aligned} \tag{3}$$

where

IRP_w	=	Dummy variable, indicating whether the retailer ran an IRP during week w
$\mathrm{WeekIRP}_w$	=	The number of weeks since the IRP started, 0 if $\mathrm{IRP}_w = 0$
$\mathrm{Collecting}_{hw}$	=	Dummy variable, indicating whether the household h collected the premiums during the weeks w the IRP ran, 0 if $\mathrm{IRP}_w = 0$
$\mathrm{BonusPremiumIntensity}_w$	=	The fraction of categories where at least one product is supported with a bonus premium during week w, 0 if $\mathrm{IRP}_w = 0$
$\mathrm{FeatureIntensity}_w$	=	The fraction of categories where at least one product is supported with a feature during week w
$\mathrm{AvDiscountDepth}_w$	=	The average maximum discount across categories in week w
WCS_w	=	Dummy variable, indicating whether or not the World Cup Soccer ran in week w
$\mathrm{Temperature}_w$	=	The average daily temperature during week w
SOW_h	=	The share of wallet of household h at the supermarket chain in the first 11 weeks of 2010 (initialization period)
$\mathrm{Children}_h$	=	Dummy variable, indicating the presence of children in household h

4.3. Category incidence, brand choice, and purchase quantity

The second component of Eq. (1) is the number of units household h purchases of brand j at shopping trip t, $E(Q_{hjt})$. The probability that household h buys q units of brand j at trip t is the product of the category incidence probability $\Pr(I_{ht})$, the probability that the household chooses brand j conditional on the category incidence $\Pr(C_{hjt}|I_{ht})$ and the probability of the purchase quantity for a household h conditional on the brand choice and purchase incidence $\Pr(Q_{hjt} = q|C_{hjt,}\, I_{ht})$ (e.g., Ailawadi, Gedenk, Lutzky, & Neslin, 2007):

$$\Pr\left(Q_{hjt} = q\right) = \Pr(I_{ht}) * \Pr\left(C_{hjt}|I_{ht}\right) * \Pr\left(Q_{hjt} = q|\, C_{hjt,}\, I_{ht}\right) \tag{4}$$

where

$\Pr(Q_{hjt} = q)$	=	Probability that household h buys q units of brand j during trip t
$\Pr(I_{ht})$	=	Probability that household h buys in the category during trip t
$\Pr(C_{hjt}\|I_{ht})$	=	Probability that household h purchases brand j during trip t given that household h makes a category purchase
$\Pr(Q_{hjt} = q\|C_{hjt}, I_{ht})$	=	Probability that household h purchases q units brand j during trip t given that household h makes a category purchase and purchases brand j

Similar to previous studies (e.g., Ailawadi et al., 2007), the category incidence and brand choice model are handled in a nested logit framework, and the quantity model in a zero-truncated Poisson model. To account for unobserved household heterogeneity, we model the intercepts as normally distributed parameters that may vary across households, and for each category, jointly estimate the models with quasi-random Halton draws (Train, 2009). However, we do not impose a covariance structure on the random effects across the category incidence, brand choice, and purchase quantity equations to keep the computational burden manageable which is a similar approach to for example Ailawadi et al. (2007). The likelihood function is presented in Appendix C.

In the next subsections, we present the three components, where the IRP is an explanatory variable for the category incidence and purchase quantity, whereas the bonus premium is an explanatory variable for the brand choice and purchase quantity.

4.4. Category incidence model

In the nested logit framework, the category incidence model is a binary logit model. In this model, we include the IRP as an explanatory variable and test if the effect varies over the weeks of the IRP and between collecting and non-collecting households. The bonus

[3] Our shopping trips data fits a Poisson distribution, because the mean and variance are similar (AH: $M = 1.11$, variance $= 1.39$; Deka: $M = 1.03$, variance $= 1.36$; Dirk: $M = .79$, variance $= .92$; Plus: $M = 1.09$, variance $= 1.45$).

premium promotion is tied to a specific brand and is not directly related to category incidence and hence is not included here. However, due to a promotion, households may be more likely to purchase in the category; therefore, we have included the inclusive value ($Incval_{ht}$), which equals the denominator of brand choice model (Eqs. (7) and (10)), which is the standard in the nested logit model (Train, 2009). In this way, we incorporate the effect that households may be more likely to make a category purchase if one of the brands is promoted with a feature, discount, and/or bonus premium. Finally, we include variables for the effects of the World Cup Soccer and temperature. Given that households may be more (less) likely to visit the retailer during the World Cup Soccer (higher temperatures), they are less (more) likely to purchase in the category. We control for household heterogeneity by including an indicator variable for children in the household, household's share of wallet in the initialization period, the household's inventory, and by including a random intercept that varies across households. Hence, the model takes the following form:

$$\Pr(I_{ht}) = \frac{e^{W_{ht}}}{1 + e^{W_{ht}}} \tag{5}$$

$$\begin{aligned} W_{ht} = {} & \alpha_{0h} + \alpha_1 \mathrm{IRP}_t + \alpha_2 \mathrm{IRP}_t \times \mathrm{WeekIRP}_t + \alpha_3 \mathrm{IRP}_t \times \mathrm{Collecting}_{ht} + \alpha_4 \mathrm{WCS}_t + \alpha_5 \mathrm{Temperature}_t + \alpha_6 \mathrm{Inventory}_{ht} \\ & + \alpha_7 \mathrm{SOW}_h + \alpha_8 \mathrm{Children}_h + \alpha_9\, \mathrm{Incval}_{ht} \end{aligned} \tag{6}$$

$$\mathrm{Incval}_{\mathrm{ht}} = \ln\left(\sum\nolimits_j e^{V_{hjt}}\right) \tag{7}$$

where

IRP_t	=	Dummy variable, indicating whether the retailer ran an instant reward program during shopping trip t
$\mathrm{WeekIRP}_t$	=	The number of weeks since the IRP started during shopping trip t, 0 if $\mathrm{IRP}_t = 0$
$\mathrm{Collecting}_{ht}$	=	Dummy variable, indicating if the household h collected the premiums during the IRP, 0 if $\mathrm{IRP}_t = 0$
WCS_t	=	Dummy variable, indicating whether the World Cup Soccer ran during shopping trip t
$\mathrm{Temperature}_t$	=	The average daily temperature on shopping trip t
$\mathrm{Inventory}_{ht}$	=	The inventory (in units) of household h on shopping trip t
SOW_h	=	The share of wallet of household h at the supermarket chain in the first 11 weeks of 2010 (initialization period)
$\mathrm{Children}_h$	=	Dummy variable, indicating the presence of children in the household
Incval_{ht}	=	The "inclusive value" for household h on shopping trip t

In the category incidence model, one of the explanatory variables is the current household inventory. The inventory in our model is updated on a daily level d for a household h.

$$\mathrm{Inventory}_{hd} = \max(\mathrm{Inventory}_{hd-1} + \mathrm{Q}_{hd-1} - \mathrm{Consumption}_h, 0) \tag{8}$$

where

Q_{hd}	=	The quantity purchased (in units) by household h on day d
$\mathrm{Consumption}_h$	=	The consumption (in units) by household h

Eq. (8) shows that previous purchases, inventory levels, and consumption all determine the household's current inventory. The initial inventory equals seven times the daily consumption ($\mathrm{Consumption}_h$) in line with Ailawadi and Neslin (1998). $\mathrm{Consumption}_h$ equals the average daily purchases over the time span of our data period, in line with Chintagunta (1993). The variables Q_{hd-1} and $\mathrm{Consumption}_h$ are calculated based on the four supermarket chains under study and two other major service supermarket chains in the Netherlands (Jumbo and C1000). We also use these six supermarket chains to compute the state dependence variable Last_{hjt} in the brand choice model. In total, these six supermarket chains cover 69.83% of the grocery spending of the households in our data during the first 11 weeks of 2010. Given the time span of our data, we cannot let the consumption vary by the number of items in the inventory (Ailawadi et al., 2007).

4.5. Brand choice model

In the nested logit framework, the brand choice model is a multinomial logit regression. In this model, we include the bonus premium as an explanatory variable and test if the effect varies for households that collect premiums versus non-collecting households. The IRP variable is constant over the brands, and hence we do not include it as an explanatory variable here. In the brand choice model, we include other promotional variables such as feature, pre- and post-feature dummies, and percentage discount. We do not include pre- and post- effects for the discount and/or a bonus premium because they are always supported with a feature. In addition, we control for consumer preference heterogeneity by including a state dependence variable (Last_{hjt}), brand- and

household-level random effects, and we include brand dummies. Therefore, we have

$$\Pr\left(C_{hjt} \mid I_{ht}\right) = \frac{e^{V_{hjt}}}{\sum_j e^{V_{hjt}}} \tag{9}$$

$$V_{hjt} = \beta_{0hj} + \beta_1 \text{BonusPremium}_{jt} + \beta_2\ \text{BonusPremium}_{jt} \times \text{Collecting}_{ht} + \beta_3 \text{Feature}_{jt} + \beta_4\ \text{PreFeature}_{jt} + \beta_5\ \text{PostFeature}_{jt} + \beta_6\ \text{Discount}_{jt} + \beta_7\ \text{Last}_{hjt} \tag{10}$$

where

BonusPremium_{jt}	=	Dummy variable, indicating whether brand j available on shopping trip t is supported by a bonus premium
Collecting_{ht}	=	Dummy variable, indicating whether the household h collected the premiums during the IRP, 0 if $\text{BonusPremium}_{jt} = 0$
Feature_{jt}	=	Dummy variable, indicating whether brand j available on shopping trip t is supported by a feature
PreFeature_{jt}	=	Dummy variable, indicating whether brand j is supported by a feature in the supermarket mailing in the week after shopping trip t
PostFeature_{jt}	=	Dummy variable, indicating whether brand j is supported by a feature in the supermarket mailing in the week before shopping trip t
Discount_{jt}	=	The percentage discount compared to median price per volume unit of brand j on shopping trip t
Last_{hjt}	=	Dummy variable, indicating whether brand j was purchased on the previous category purchase before shopping trip t by household h

4.6. Purchase quantity

The decision to purchase q units of brand j during trip t is modeled by a zero-truncated Poisson regression and we write down the natural logarithm of the purchase rate. In this model, we use the same variables as before to assess the effectiveness of the IRP and bonus premiums on the purchase quantity. We again include the promotional variables feature and discount. We include variables for the effects of the World Cup Soccer and temperature. Given that households may be more (less) likely to visit the retailer during the World Cup Soccer (higher temperatures) they are less (more) likely to purchase in larger quantities. Furthermore, we again control for household heterogeneity by including household inventory levels, share of wallet, a dummy variable indicating whether the household has children, and by including a normally distributed random intercept. We have included tables with all correlations between the explanatory variables in the web appendix.

$$\Pr\left(Q_{hjt} \mid C_{hjt}, I_{ht}\right) = \frac{\lambda_{hjt}{}^{q}}{\left(e^{\lambda_{hjt}} - 1\right) q!}, q = 1, 2, 3, \ldots. \tag{11}$$

$$\text{Ln}\left(\lambda_{hjt}\right) = \Upsilon_{0hj} + \Upsilon_1 \text{IRP}_t + \Upsilon_2 \text{IRP}_t \times \text{WeekIRP}_t + \Upsilon_3 \text{IRP}_t \times \text{Collecting}_{ht} + \Upsilon_4 \text{BonusPremium}_{jt} + \Upsilon_5 \text{BonusPremium}_{jt} \times \text{Collecting}_{ht} + \Upsilon_6\ \text{Feature}_{jt} + \Upsilon_7 \text{PreFeature}_{jt} + \Upsilon_8\ \text{PostFeature}_{jt} + \Upsilon_9 \text{Discount}_{jt} + \Upsilon_{10} \text{WCS}_t + \Upsilon_{11} \text{Temperature}_t + \Upsilon_{12} \text{Inventory}_{ht} + \Upsilon_{13}\ \text{SOW}_h + \Upsilon_{14} \text{Children}_h \tag{12}$$

4.7. Household collection of premiums

Because households can decide for themselves whether or not to collect premiums, this is part of the response to the IRP and hence may be endogenous. Wooldridge (2010) recommends to use the control function approach (Petrin & Train, 2010) for nonlinear

Table 5
Instrumental variables for collecting IRP premiums.

Grocery price shopping survey questions[a]	
Shopping_1	During shopping: I first look at the price
Shopping_2	During shopping: I first look at attractive discounts
Shopping_3	During shopping: I first look if it is cheaper somewhere else
Attitudes towards instant reward programs[a]	
IRP_Attitude	When my favorite supermarket/drugstore runs an IRP, I feel stronger connected to the store
	I enjoy IRPs
	IRPs offer attractive benefits
World Cup Soccer	
WCS_Interest	I watched matches at the FIFA 2010 World Cup Soccer (No/Yes)

[a] All items are measured on a 5-point scale (1 = totally disagree, 5 = totally agree).

models such as nested logit (Wooldridge, 2010, p. 652) and Poisson models (Wooldridge, 2010, p. 747) instead of substituting the endogenous variable with predicted values. Hence, we follow the procedure advocated by Wooldridge (2010).

For the endogenous variable (Collecting$_{ht}$), we perform a first-stage regression with the endogenous variable as the dependent variable and instrumental variables that affect the decision to collect but that are not related to the dependent variables of the main model (i.e., shopping trips, category incidence, brand choice, and purchase quantity; Table 5). Collecting is a dichotomous variable and therefore we cannot use linear regression, but use probit regression models to predict whether or not a household collects premiums (see Che, Chen, & Chen, 2012 for a similar approach). In our study, we have to perform a first-stage regression for every retailer to predict whether a household collects the premiums at that retailer. By using this method to address the endogeneity problem, the probit residuals are added into the shopping trip (Eq. (3)), the category incidence (Eq. (6)), and purchase quantity (Eq. (12)) to control for the possible endogeneity of Collecting$_{ht}$. We do not include the residuals in the brand choice model (Eq. (10)), because this is an integrated nested logit model with the category incidence (Eq. (7)) and the residuals should be included only once (Wooldridge, 2015). Furthermore, we do not interact the residuals with any of the exogenous variables, which is standard in the control function approach (Wooldridge, 2015). Given that the model is estimated in two steps, the standard errors in the second stage need to be corrected (Wooldridge, 2010, p. 652). Therefore, we correct the standard errors in both the shopping trip model and the category incidence, brand choice, and purchase quantity models using the method of Terza (2014).

We seek instrumental variables that directly affect the decision to collect but that are not related to the other dependent variables. We operationalize the instrumental variables based on the annual survey held among the household panel by GfK. From this survey, we use three questions related to grocery price shopping, a summed scale of three questions related to attitudes towards IRPs and whether the household has watched the FIFA 2010 World Cup Soccer. These instruments are appropriate because (1) the instruments capture a consumer's general interest in promotions, IRPs, and the World Cup Soccer; (2) our instrumental variables are formulated with respect to retailing in general and are therefore not related to shopping behavior at particular chains (Leenheer, van Heerde, Bijmolt, & Smidts, 2007). In the first-stage regression, we include SOW$_h$ and Children$_h$, because these variables vary across households. The other independent variables in Eqs. (3), (6), and (12) do not vary across households and hence cannot be used in the first-stage regressions.

4.8. Comparing coefficients across categories and chains

To examine the effects of IRPs and bonus premiums, we estimate a shopping trip model for every chain and a category incidence, brand choice, and purchase quantity model for every product category. In nonlinear models such as the nested logit, coefficients cannot be directly compared across chains and product categories (Mood, 2010). Therefore, we use average partial effects (APE) because these can be compared across models and capture the nonlinearity (Mood, 2010). The APE are intuitive to interpret: for an indicator variable (e.g., FRP and bonus premium) this is the difference in predicted probability/quantity between setting the variable to one minus setting the variable to zero (see Wooldridge, 2010, Eq. 15.33). The reported APEs are the weighted mean APEs across the categories and retailers by the inverse of the associated standard error. To test if the APEs of the IRP and the bonus premium are significantly different from zero, the added Zs method is used (Rosenthal, 1991) which is frequently applied in marketing (e.g., Gijsenberg, 2014; Kremer, Bijmolt, Leeflang, & Wieringa, 2008).

5. Results

We first discuss the results of the first-stage probit regressions predicting household collection of IRP premiums (Table 6) to obtain the endogeneity correction terms. Next, we discuss the effects of the IRP and bonus premium on the number of shopping trips, category incidence, brand choice, and purchase quantity. Three versions have been estimated for each model. In model 1, we estimate a model that does not distinguish between collecting and non-collecting households, whereas in model 2, we include this distinction as an interaction variable for both the IRP and the bonus premium. In model 3, we estimate the full model that includes

Table 6
First-stage regressions for household collection of IRP premiums.

	AH		Deka		Dirk		Plus	
	Parameter	S.E.	Parameter	S.E.	Parameter	S.E.	Parameter	S.E.
SOW$_h$	.851***	(.204)	2.152***	(.535)	1.834***	(.255)	1.318***	(.304)
Children$_h$	.487***	(.118)	.455	(.294)	.547***	(.129)	.941***	(.181)
Shopping_1$_h$	.117**	(.065)	−.148	(.150)	.100	(.076)	−.048	(.103)
Shopping_2$_h$	−.100	(.075)	.159	(.199)	−.292***	(.096)	−.137	(.124)
Shopping_3$_h$	−.037	(.055)	−.039	(.148)	.003	(.062)	.087	(.083)
WCS_Interest$_h$	.220***	(.058)	.170	(.143)	.220***	(.066)	.177*	(.091)
IRP_Attitude$_h$	.058***	(.026)	.162***	(.065)	.072**	(.030)	.135***	(.044)
Constant	−1.958***	(.322)	−.940***	(.829)	−1.278***	(.367)	−2.115***	(.536)
N	600		116		518		292	
F	25.84		8.15		28.60		17.37	

Notes: *$p < .1$. **$p < .05$. ***$p < .01$.

Table 7
Effects of instant reward programs and bonus premiums on consumer purchase behavior.

	Model 1		Model 2		Model 3	
	APE	Z-score	APE	Z-score	APE	Z-score
Shopping trips						
IRP_w	.062***	3.120	.017	.504	.026	.771
$\times WeekIRP_w$			−.008	−.736	−.008	−.735
$\times Collecting_{hw}$			.117***	4.649	.099***	3.806
$BonusPremiumIntensity_w$	.050	.953	.026	.385	.026	.385
$FeatureIntensity_w$	−.067	−1.521	−.070	−1.486	−.070	−1.484
$AvDiscountDepth_w$	.093**	2.009	.089*	1.869	.089*	1.868
WCS_w	.105***	5.595	.110***	5.217	.111***	5.190
$Temperature_w$	−.010***	−7.271	−.010***	−7.132	−.010***	−7.091
SOW_h	1.726***	20.075	1.713***	20.032	1.725***	16.841
$Children_h$	−.075*	−1.947	−.082***	−2.128	−.091*	−1.891
$Residual_h$					.112***	5.045
Category incidence						
IRP_t	.009***	2.903	.017****	3.263	.008	1.295
$\times WeekIRP_t$			−.003	−1.478	−.002	−1.067
$\times Collecting_{ht}$			−.004	−.788	−.001	−0.140
WCS_t	−.004	−1.151	−.005	−1.280	−.005	−1.124
$Temperature_t$	.001***	6.694	.001***	6.602	.002***	6.314
$Inventory_{ht}$	−.036***	−37.344	−.038***	−35.825	−.032***	−19.599
SOW_h	−.031***	−6.360	−.031***	−5.959	−.036***	−3.138
$Children_h$	−.004***	−1.473	−.003	−.964	−.004	−.578
$Residual_h$					−.006**	−2.083
Brand choice						
$BonusPremium_{jt}$	.121***	11.971	.088***	6.421	.083***	5.838
$\times Collecting_{ht}$			.090***	6.682	.086***	6.150
$Feature_{jt}$	.424***	71.520	.414***	63.034	.382***	52.611
$PreFeature_{jt}$	−.003	−.476	−.008	−1.162	−.006	−.736
$PostFeature_{jt}$	−.004	−.531	−.005	−.651	−.003	−.366
$Discount_{jt}$	.043	1.463	.069**	2.002	.187***	4.692
$Last_{hjt}$	.401***	145.851	.418***	155.549	.382***	103.917
Purchase quantity						
IRP_t	.031	1.128	.015	.309	−.010	−.193
$\times WeekIRP_t$			.003	.198	.004	.183
$\times Collecting_{ht}$			−.038	−.946	−.012	−.228
$BonusPremium_{jt}$	−.049	−.891	−.100	−1.317	−.103	−1.243
$\times Collecting_{ht}$			−.029	−.427	−.056	−.783
$Feature_{jt}$	.618***	7.263	.608***	6.953	.623***	6.682
$PreFeature_{jt}$	−.102**	−2.578	−.105***	−2.493	−.085*	−1.753
$PostFeature_{jt}$	−.052	−1.081	−.049	−.980	−.064	−1.234
$Discount_{jt}$	−.274	−1.263	−.287	−1.298	−.254	−1.041
WCS_t	.007	.208	−.019	−.542	−.020	−.504
$Temperature_t$	.012***	5.540	.015***	6.256	.015***	5.520
$Inventory_{ht}$	−.131***	−21.504	−.139***	−22.031	−.135***	−16.819
SOW_h	−.296***	−8.111	−.297***	−8.085	−.262***	4.149
$Children_h$	.131***	6.494	.132***	6.507	.099***	2.797
$Residual_h$					.005	.340

Notes: APE is the average partial effect weighted over the categories by the associated standard error; *$p < .1$. **$p < .05$. ***$p < .01$.

the residuals from the first-stage probit regressions to account for the endogenous relation of the decision to collect the premiums with the outcome variables. The estimation results of all models are presented in Table 7. Finally, we present the substantive sizes of the effects in Table 9 to provide further insights.

5.1. Collection of premiums by households

The results from the first stage probit regressions show that the likelihood that a household collects premiums increases with share of wallet and having children. In addition, the instrumental variables also predict the decision to collect the premiums. Households interested in the World Cup Soccer and with a positive attitude towards IRPs are more likely to collect the premiums. To test whether the instruments are strong, we have used the joint F-test. The statistics are greater than 10, except for Deka. This indicates that the instruments are sufficiently strong (Leeflang, Wieringa, Bijmolt, & Pauwels, 2015, p. 211). To test robustness, we have removed Deka from the analyses and we find highly similar results. Hence, we include the residuals from these probit regressions in the second-stage models as discussed in §4.7, to correct for the potential endogeneity of $Collecting_{ht}$.

5.2. Instant reward program effects

We examine the effects of the IRP on the number of shopping trips to the retailer, category incidence, and purchase quantity level (Table 7). In our discussion, we focus on the effects of model 3 unless stated otherwise. The results show that the overall effect of the IRP on number of shopping trips is positive (model 1: IRP_w: .062; $p < .01$). However, the results in model 3 show that the impact of the IRP is moderated by whether the household collects the premiums ($IRP_w \times Collecting_{hw}$: .099; $p < .01$). The APE of IRP_w for the benchmark group of non-collecting households indicates that the IRP increases the number of shopping trips only for households that collect the premiums (IRP_w: .026; $p = .44$). The APE of the IRP for collecting households is smaller when correcting for the endogeneity of collecting, but remains positive and significant ($IRP_w \times Collecting_{hw}$: model 3: .099 vs. model 2: =.117). The results further indicate that the effect of collecting is indeed endogenous given the significant positive effect of $Residual_h$ ($p < .01$, Wooldridge, 2015). Finally, we find a negative but small and non-significant effect of the week of the IRP on IRP effectiveness. Hence, the IRP effect on the number of shopping trips does not change significantly during the IRP period.[4]

The effect of the IRP on the category incidence is positive and significant (model 1: IRP_t: .009; $p < .01$). The results show that when the IRP runs, households are more likely to purchase in the category. The effect of the IRP on the category incidence does not vary significantly between households that collect and households that do not collect ($IRP_t \times Collecting_{ht}$: −.001; $p = .89$). However, the significant effect of the residual ($Residual_h$: −.053; $p = .02$) indicates that the decision of collecting is endogenous for the category incidence. After including the residual, the effect of the IRP becomes insignificant (.008: $p = .20$). The effect of the IRP on category incidence does not vary significantly over the weeks of the IRP ($IRP_t \times WeekIRP_t$: −.002; $p = .29$).

The overall effect of the IRP on the purchase quantity for the purchased brand is positive but insignificant (model 1: IRP_t: .031; $p = .26$), this indicates that households do not purchase in larger quantities when the IRP runs. In model 3, the effect of the IRP, referring to the benchmark level of non-collecting households in the first week of the IRP remains insignificant. The coefficient for $IRP_t \times Collecting_{ht}$ is insignificant (−.012; $p = .83$), indicating that collecting households do not purchase in significantly larger quantities during the IRP compared to non-collecting households. We find that the decision to collect is not endogenous to the purchase quantity, given the insignificant coefficient for the $residual_h$ ($p = .41$). Finally, the effect of the IRP does not vary significantly over the weeks of the IRP (.004; $p = .73$).[5]

5.3. Bonus premium effect

The effect of bonus premiums is examined on brand choice and purchase quantity (Table 7). We do not directly estimate the effect of bonus premiums on category incidence. However, households may be more likely to purchase in the category due to a bonus premium. Therefore, we have included the inclusive value in the nested logit models ($Incval_{ht}$). The coefficients for the inclusive value are positive with an average coefficient of .503 and the coefficient is never significantly larger than one or smaller than zero (Train, 2009). This indicates that a positive shift in the utility of the brand choice model (for example, due to a bonus premium), does not only affect the brand choice but also increases the purchase incidence probability (Train, 2009). Consequently, we have estimated two APEs: (1) the direct effect of bonus premiums on the brand choice probability and (2) the indirect effect of bonus premiums on the category incidence probability as reported in Table 8.

Promoting a brand with a bonus premium has a strong positive effect on brand choice (model 1: $BonusPremium_{jt}$: .121; $p < .01$). The effect of the bonus premium is stronger for households that collect the premiums, but is also positive and significant for non-collecting households (model 2: $BonusPremium_{jt}$: .088; $p < .01$; $BonusPremium_{jt} \times Collecting_{ht}$: .090; $p < .01$). Furthermore, both effects are still significant and become only slightly smaller after controlling for endogeneity (model 3: $BonusPremium_{jt}$: .083; $p < .01$; $BonusPremium_{jt} \times Collecting_{ht}$: .086; $p < .01$).

Promoting a brand with a bonus premium not only increases the probability of purchasing the promoted brand but also makes it more likely that households' purchase in the category (Table 8). Promoting a brand with a bonus premium has a positive and significant effect for non-collecting households (model 2: $BonusPremium_{jt}$: .007; $p < .01$) and there is an incremental effect for households that collect the premiums (model 2: $BonusPremium_{jt} \times Collecting_{ht}$: .012; $p < .01$). Again, we find that the incremental APE of the bonus premium for collecting and non-collecting households are slightly smaller after controlling for endogeneity (model 3: $BonusPremium_{jt}$: .006; $p < .01$; $BonusPremium_{jt} \times Collecting_{ht}$: .008; $p < .01$).

Bonus premiums do not have a significant effect on the purchase quantity (Table 7: model 1: $BonusPremium_{jt}$: −.049; $p = .37$). The effect of the bonus premium on the purchase quantity is insignificant for non-collecting households ($BonusPremium_{jt}$: −.103;

[4] The IRP and bonus premiums effectiveness may depend on the fit with the World Cup Soccer (i.e., carbonated soft drinks; Gijsenberg, 2014) or depending on the fit with summer (i.e., ice cream). We tested whether the APE of the IRP and bonus premiums differed across the product groups with meta-analyses regressions and found non-significant effects. These results suggest that the effects of the IRP and bonus premiums were not significantly affected by category fit with the time of year or World Cup Soccer. We also tested whether the effect varied between the four studied supermarket chains by means of meta-analyses regressions and found no significant difference (see web appendix). Finally, meta-analyses regressions indicate that the effect of bonus premiums is not significantly different during the World Cup Soccer compared to prior to the World Cup Soccer for both collecting and non-collecting households (BonusPremium: $\beta_{wcs} = .026$, $p = .68$; BonusPremium × Collecting: $\beta_{wcs} = -.053$, $p = .56$).

[5] We tested for non-linear decay effects by including dummies for the first and last week of the IRP instead of a linear time trend. The results show that the APE's in the shopping trip model are significant: Shopping trip model (FirstWeekIRP: APE = −.073, $Z = -1.888$, LastWeekIRP: APE = −.075, $Z = -2.003$), but this does not affect the results for the other variables. The other APE's are not significant: Category incidence model (FirstWeekIRP: APE = .009, $Z = 1.309$, LastWeekIRP: APE = .007, $Z = 1.159$); Purchase quantity (FirstWeekIRP: APE = .007, $Z = 0.104$ LastWeekIRP: APE = .124, $Z = 1.797$). Hence, we conclude that using dummies instead of a linear time trend does not provide a very different interpretation.

Table 8
Indirect average partial effects of brand choice variables on category incidence.

	Model 1		Model 2		Model 3	
	APE	Z-score	APE	Z-score	APE	Z-score
$BonusPremium_{jt}$	.012***	5.659	.007***	3.192	.006***	2.866
$\times Collecting_{ht}$			.012***	4.889	.008***	3.676
$Feature_{jt}$	.037***	15.385	.036***	15.392	.031***	10.954
$PreFeature_{jt}$	.002	−.936	−.001	−.638	−.001	−.227
$PostFeature_{jt}$	.002	−.857	−.001	−.425	−.002	−.882
$Discount_{jt}$	.007	1.197	.019***	11.679	.011***	7.107
$Last_{hjt}$	.028***	16.425	.027***	14.063	.024***	10.742

Notes: APE is the average partial effect weighted over the categories by the associated standard error; *$p < .1$. **$p < .05$. ***$p < .01$.

$p = .21$) and the incremental effect for collecting households is also insignificant ($BonusPremium_{jt} \times Collecting_{ht}$: −.056; $p = .43$). Hence, promoting a brand with a bonus premium does not result in purchasing the brand in larger quantities during a shopping trip.

Finally, the effect of the fraction of categories where at least one product is supported with a bonus premium does not significantly increase the number of shopping trips to the retailer ($BonusPremiumsIntensity_w$ .026; $p = .70$). This suggests that households do not base their decision to visit a particular store on the availability of bonus premium promotions. An alternative reason for this insignificant effect could be that we only have the data available for the categories studied and hence, not all promotions are included.

5.4. Control variables

The coefficients of the promotional variables $Feature_{jt}$ and $Discount_{jt}$ are in line with what would be expected. A feature and a discount both result in a significantly higher brand choice, and a feature results in purchasing in larger quantities. The aggregate promotional variable $AvDiscountDepth_w$ is positive, which indicates that if the discounts are deeper, households are more likely to visit the retailer. The effects of control variables (World Cup Soccer, temperature, share of wallet, children, household inventory, and state dependence) are also in line with what would be expected. For example, in all three models, household share of wallet in the initialization period increases the number of shopping trips to the retailer. As another example, households with children make fewer shopping trips but tend to purchase in larger amounts.

5.5. Managerial insights: IRP and bonus premiums effects on brand and category sales

The empirical results demonstrate significant effects of both the IRP and bonus premiums on household purchase behavior. Here, we further examine the substantive size of these effects. To take the perspective of both manufacturer and retailer, we determine the impact on both *brand unit sales* and *category unit sales,* because the IRP rewards consumers for their overall spending behavior, and a bonus premium promotion for purchasing a specific brand. We examine category unit sales, because we have data on a limited number of categories, and prior research did not find much evidence for cross-category effects of promotions (Srinivasan, Pauwels, Hanssens, & Dekimpe, 2004). Pertinent questions thus arise: How strong are the effects on households' purchase behavior and what are the relative effect sizes of the IRP and the bonus premium instruments? To address these questions, we use the model coefficients per category and chain to compute the response to several scenarios in the second week of the IRP. For the price promotion scenario, we took a 25% discount as this is very close to the average discount depth we observe in our data: 26.53% for a regular price promotion and 26.42% for a bonus premium promotion. The effects of the different scenarios are thus calculated per category and store and only then aggregated and reported, and take the decision to collect into account. In Table 9, we report the effect for collecting households, non-collecting households and the effect on total brand and category unit sales.

Table 9
Sales impact of instant reward programs, price promotion, and bonus premium.

Percentage increase in[a]	No IRP		IRP		
	No promotion (benchmark)	25% Discount + feature	No promotion	25% Discount + Feature	25% Discount + feature + bonus premium
Promoted brand unit sales					
Collecting households	–	464%	25%	562%	736%
Non-collecting households	–	464%	7%	484%	570%
Total effect	–	464%	15%	517%	640%
Category unit sales					
Collecting households	–	60%	25%	90%	105%
Non-collecting households	–	60%	7%	68%	70%
Total effect	–	60%	15%	78%	85%

[a] The percentage changes of all scenarios are relative to the no IRP and no promotion scenario (benchmark).

Table 9 reports the relative percentage change in unit sales compared to a scenario without a promotion and IRP for both the promoted brand and category unit sales. The results show that supporting a brand with a 25% discount and feature results in a substantial increase in the unit sales for the promoted brand (464%), and also increases the category unit sales (60%) and these effect sizes are in line with previous reports (Gedenk et al., 2006). The IRP generates an increase in sales of 25% for households that collect the premiums and a 7% increase for non-collecting households which leads to a total sales increase of 15%. Bonus premiums are often combined in combination with a price discount. We contrast the effectiveness of the bonus premium plus 25% discount and feature versus a 25% price discount and feature. These results show that supporting a brand with a bonus premium generates additional sales on top of the effect of the 25% discount and feature (736% vs. 562%) for collecting households and a smaller but positive effect for non-collecting households (570% vs. 484%). Combining the effects for collecting and non-collecting households results in a total increase in brand sales of 640% vs. 517% due to adding a bonus premium. Supporting a brand with a bonus premium also generates more additional category sales than just supporting a brand with a 25% discount and feature for collecting households (105% vs. 90%), non-collecting households (70% vs. 68%), and also in total the category sales (85% vs. 78%). This implies that the incremental effect adding the bonus premium on brand sales is 24% and on category sales is 9%. Thus, these scenarios show that (a) an IRP is an effective instrument to generate higher category sales; (b) promoting a brand with bonus premium promotion on top of a 25% discount has an additional effect on both the sales of the promoted brand as well as on the category sales; and (c) the IRP and bonus premium promotion result in much stronger impact for households who actively collect the premiums but especially the bonus premium is also effective for non-collecting households.

6. Discussion and conclusions

6.1. Conclusions

To our knowledge, this is the first study to quantify the substantial effects of instant rewarding of consumer purchases by means of an IRP and bonus premiums. An IRP is a rapidly growing form of short-term program that rewards consumers instantly with small premiums per fixed spending, where these premiums are part of a larger set of collectibles. Bonus premiums are the extra premiums consumers can earn by buying a specific promoted brand, which is a non-price promotion tied to the IRP. Hence, a consumer can earn premiums based on total spending and by buying a promoted brand. We conduct an empirical investigation of the impact of the IRP and bonus premiums on the number of shopping trips to the retailer, category incidence, brand choice, and purchase quantity across four retailers and 23 product categories. To assess the impact of these instruments, we examine the effect on both *brand unit sales* and *category unit sales* to take the perspective of both retailer and manufacturer.

The key findings from our study are that both IRPs and bonus premiums are effective instruments to stimulate consumer purchase behavior. More specifically, (1) the IRP instrument increases the number of trips to the retailer but does not affect the category incidence or purchase quantity. (2) The bonus premium instrument is particularly effective at increasing the brand choice probability. Consumers are more likely to choose the promoted brand if it is promoted with both the bonus premium and price discount compared to when it is promoted with just a price discount. In addition, bonus premiums also increase the likelihood of making a purchase in the category (i.e., category incidence), because the attractiveness of purchasing in the category increases when a brand is supported with a bonus premium. However, bonus premiums do not affect the purchase quantity decision when purchasing the promoted brand. The findings on the bonus premium effectiveness imply that a bonus premium is a relevant addition to regular price promotions because it prompts stronger consumer reactions if a brand is promoted with both a bonus premium and a price discount.

(3) The IRP and bonus premium effects are strongest for households who actively collect the premiums. IRPs and bonus premiums have smaller but still positive impacts for non-collecting households. More specifically, the IRP increments the number of shopping trips for collecting households but not for non-collecting households. For the in-store outcome variables, we find that both collecting and non-collecting households have a higher likelihood to purchase in the category and to purchase the promoted brand when a brand is promoted with a bonus premium although the effects are stronger for collecting households. The contrast between collecting and non-collecting households is consistent with the idea that an IRP creates a stronger lock-in effect to collect the premiums and hence increases the number of shopping trips to the retailer only if the premiums are collected. The positive effects found in the store also indicate that non-collecting households respond to the in-store activities related to the IRP and bonus premium. A possible explanation for this positive effect for non-collecting households is that bonus premiums expose consumers to the brand, which affects the brand choice (Venkatesan & Farris, 2012; Zhang, 2006). In addition, IRPs and bonus premiums may foster unplanned buying, because of the exposure to in-store marketing materials related to the IRP and bonus premium (Bell et al., 2011).

6.2. Implications

Studying the impact of IRPs with bonus premiums contributes to the existing literature in several ways. In this study, we focus on a reward scheme that rewards consumers instantly with collectable rewards (Keh & Lee, 2006). Such designs are important to study, because retailers actively seek to differentiate their reward programs (Zhang & Breugelmans, 2012) and to improve their effectiveness (Breugelmans et al., 2015). The IRPs reward consumers instantly instead of offering delayed rewards after many purchases which is common in conventional FRPs (see Bijmolt, Dorotic, & Verhoef, 2010). We show that programs with an instant reward design have a substantial impact on consumer purchase behavior. This contributes to a growing body of studies that recognize that a piecemeal procedure where consumers are rewarded through repeated small rewards highlights a sense of achievement which motivates consumers to keep earning the rewards (Zhang & Gao, in press). The collectability of the rewards is a new design characteristic

implemented in the IRPs and bonus premiums. Due to the collectability of the rewards, consumers may strive to complete the set of premiums (Carey, 2008), which consequently drives the effectiveness of the IRPs and bonus premium promotion. Therefore, both the instant reward schemes and the collectability of the rewards are important drivers of program effectiveness.

Another interesting design element is the reward earning basis, in the IRP with bonus premiums consumers are rewarded for both total spending and for purchasing specific brands. In this way, our study answers the call for studies of possible synergy effects between reward program designs and other promotional forms (Breugelmans et al., 2015; Grewal et al., 2011). Our study thus reflects the junction of research into reward program designs and (non)-price promotions. This study shows that it is effective to link promotions to an IRP. By implementing bonus premiums, retailers create stronger lock-in with collecting households and enjoy many opportunities to remind them of the IRP. Bonus premiums also might be effective for encouraging consumers to start collecting, because they can receive multiple premiums during a single shopping session. Multiple premiums may trigger collection behavior, because consumers justify their ownership of multiple premiums with a collection motive (Gao et al., 2014). In this way, our study advances research that examines promotional forms other than sales promotions (e.g., Ailawadi et al., 2014; Kim et al., 2014; Laran & Tsiros, 2013). Furthermore, research on premiums so far is almost exclusively based on experiments (e.g., Gao et al., 2014; Laran & Tsiros, 2013; Simonson et al., 1994), and this study is one of the first studies that examines the effects of premiums using actual purchase data.

The findings from our study provide valuable insights for retailers and manufacturers. Because instantly rewarding consumers with collectable rewards that have little to no monetary value enhances consumer purchase behavior, IRPs with bonus premiums represent an efficient and effective instrument that managers can use to increase short-term sales. Although, managers should evaluate these benefits relative to their costs to set-up and run the program. Our findings show that households with children and a high share of wallet are more likely to collect the premiums. Retailers thus should consider the aimed target group of their promotional instrument, if the target group is households that spend a relative small amount implementing these instruments using collectable premiums may not result in the aimed sales increase.

Bonus premiums constitute an effective instrument for increasing both the sales of the promoted brand as well as increasing category unit sales and thus can be beneficial to the retailer and manufacturer. The sales impact of a bonus premium plus discount is stronger than just a discount, so retailers and manufacturers should prefer adding bonus premiums to promote brands during the IRP. An advantage of bonus premiums is that they do not eat into cash flow, but there are of course costs related to running these bonus premium promotions. Consequently, bonus premiums offer an effective opportunity for retailers to collaborate with manufacturers and share the costs of the IRP. Manufacturers can provide additional support to retailers by sponsoring bonus premiums (Ailawadi & Harlam, 2009), because they generate brand sales next to price promotions. In sum, both the IRP and the bonus premium instrument are relevant alternatives to the marketing mix to enhance short-term sales.

6.3. Limitations and further research

Several extensions of this work stem from its limitations. This article is the first to demonstrate the impact of an IRP with bonus premiums on households purchase behavior. The results demonstrate a positive effect of bonus premiums on brand choice for households that do not collect the premiums. Further research should test what drives these positive effects because there are several possible explanations. For example, bonus premium may also serve as cues to make consumer decisions easier (Venkatesan & Farris, 2012), which may partially explain the significant effect of bonus premiums for non-collecting households on brand choice. IRP effectiveness on purchase incidence does not differ significantly across IRPs offered by retailers. However, further research should consider how IRP design characteristics, such as the reward type or reward structure, might enhance their effectiveness. For example, Lee-Wingate and Corfman (2010) argue that premiums intended for consumers' children are more effective, especially in hedonic categories. The need for set completion also disappears if the rewards are not part of a larger set of collectibles (Carey, 2008). Although the rewards usually are collectible in practice, further research should test how the effects differ if the rewards are not collectible. The different premium set sizes vary considerably in our empirical study (see Table 3); research could examine the optimal set size in various conditions. Furthermore, future research could test programs that are not related to major sport events. In our study, we focus on four IRPs that ran in partly overlapping weeks and hence it is not possible to examine the effect of competition because we also include the week of the IRP as a moderator. Further research should also test the effect of competition between IRPs, as loyalty program research indicates that such competition negatively affect program effectiveness (see Bijmolt et al., 2010, p. 212). In our study, we find that promoting a product with a bonus premium and a price promotion results in additional sales compared to promoting the product with just a price promotion. However, to provide richer insights for retailers and manufacturers, research could examine the long-term effects and profitability of these instruments. Future research can, for example, account for consumer consumption and stockpiling behavior and control for the costs related to the program. Finally, the brands in our empirical analysis are all national brands; other studies should test if the effects of the bonus premium hold for private labels and niche brands. We hope this article thus stimulates more interest in the possible synergy effects across new reward program designs and other promotional forms.

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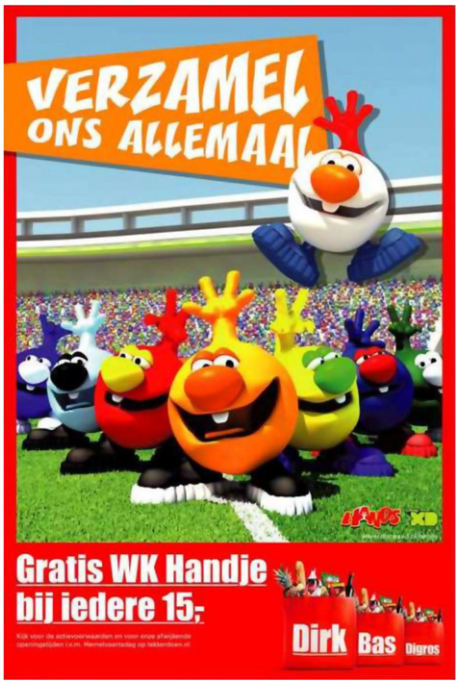
Appendix A. Examples of the IRPs and bonus premiums

(a) Advertisement IRP Dirk



Translations Dutch to English:
Verzamel ons allemaal:
Collect all of us

Gratis WK Handje bij iedere 15:
Free premium per every €15 spend

(b) Sample feature advertisement with bonus premium (AH)

Translations Dutch to English:

Gratis Beesie bij deze actie:
Free premium with this promotion

Appendix B. Product category description

Chain	Product category	Transactions	Brands	Brands with bonus premiums	Households	Market coverage
AH	Frying and baking fats	650	5	1	179	1.00
AH	Margarine	932	6	1	280	1.00
AH	Halvarine	1075	7	2	301	0.98
AH	Instant soups	492	5	1	198	1.00
AH	Wet soups	445	5	1	188	1.00

(continued on next page)

Appendix B *(continued)*

Chain	Product category	Transactions	Brands	Brands with bonus premiums	Households	Market coverage
AH	Ice cream bars on stick	815	6	3	286	0.97
AH	Ice cream deserts	394	5	2	192	0.99
Deka	Margarine	267	6	1	80	0.94
Deka	Instant soups	143	4	1	58	0.96
Deka	Fruit flavored soft drinks (bottles)	65	4	1	37	1.00
Dirk	Frying and baking fats	582	5	1	171	1.00
Dirk	Margarine	1034	8	1	313	1.00
Dirk	Full cream butters	310	4	1	143	0.95
Dirk	Halvarine	828	6	1	237	0.99
Dirk	Ice cream bars on stick	623	6	2	247	0.94
Dirk	Cola (bottles)	296	3	1	130	1.00
Dirk	Cola (cans)	446	3	1	144	1.00
Dirk	Orangeade (bottles)	182	3	1	81	1.00
Dirk	Orangeade (cans)	408	3	1	134	1.00
Dirk	Fruit-flavored soft drinks (bottles)	393	5	1	157	1.00
Plus	Instant soups	415	5	1	180	1.00
Plus	Ice cream deserts	217	4	1	133	0.95
Plus	Cola (bottles)	153	4	1	68	1.00

Appendix C. Likelihood

$$L = \prod_h \prod_t \prod_j \left[\left(\frac{e^{W_{ht}}}{1+e^{W_{ht}}} \right)^{I_{ht}} \left(\frac{1}{1+e^{W_{ht}}} \right)^{1-I_{ht}} \left(\frac{e^{V_{hjt}}}{1+e^{V_{hjt}}} \right)^{C_{hjt}} \left(\frac{\lambda_{hjt}{}^{q}}{(e^{\lambda_{hjt}}-1)q!} \right)^{C_{hjt}} \right]$$

Appendix D. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.ijresmar.2016.08.001.

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