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The impact of hard discounter presence on store satisfaction and store loyalty

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ABSTRACT

Hard discounters, such as Aldi and Lidl, have become more important in the last decade. Recent research suggests that the presence of a hard discounter (HD) decreases customers' share of wallet. In this study, we aim to understand why this occurs, by considering how HD presence affects store attributes and store satisfaction. In particular, we investigate whether HD presence affects store satisfaction formation as well as the effect of store satisfaction on share of wallet. We analyze Dutch data on store attribute evaluations, store satisfaction and share of wallet. Our results show that HD presence decreases convenience evaluations of a store, satisfaction and share of wallet. Moreover, we show that the relationship between convenience and store satisfaction becomes more important when a HD is present, while we then also find a stronger positive relationship between satisfaction and share of wallet. Simulations based on our model estimations show that especially price-oriented retailers should fear decreases in share of wallet when a HD is present.

1. Introduction

Hard discounters (HDs) no longer operate at the fringes of the retail landscape in Western Europe, but instead have become an important phenomenon with a significant impact on grocery retailing across the globe. The sales of the two prime exemplars Aldi and Lidl amounted to 90–100 billion dollar each in 2017, with market shares as high as 35 percent in some countries (Steenkamp and Sloot 2019; Vroegrijk et al., 2016). Several factors have contributed to the success of HDs (Steenkamp and Sloot 2019). One is the stagnation of middle incomes in the West, as a result of which many middle-class families have started to shop at HD stores in order to keep their living standards high. Other contributing factors are recessions and the so-called smart shopper phenomenon. Research shows that, in economically difficult times, shoppers may shift (some of) their purchases to HDs, thereby propelling the growth of this store format. When new HD shoppers learn about the quality, assortment, and shopping experiences at HD stores, they may not transfer back their purchases to their original grocery stores and instead remain loyal to the HD (Lamey 2014). This effect is partly driven by the fact that HDs significantly increased the quality of their assortments and now also sell a selection of national brands (Ter Braak et al., 2013). In fact, shopping at a HD is now considered "smart" because of their greater value-for-money compared to similar products at traditional retailers (Chaudhuri 2015).

We know from past research that the market entry of a large discounter (LD, sometimes also referred to as big-box stores) can have substantial performance implications for traditional grocery chains (Ailawadi et al., 2010; Arnold et al., 1998; Gielens et al., 2008; Jia 2008). Research shows average sales losses of 17 percent for incumbent stores after LD entry. Similarly, Vroegrijk et al. (2013) report losses to incumbents' customer shares ranging from 4.4% to 14.3% in response to a HD's market entry (with an overall average of 9.3%), whereas average spending levels at traditional chains decline 9.2% after entry. Since HDs are usually smaller than LDs, the expected performance impact of HD presence on traditional retailers may be very different from that of LDs. For example, Vroegrijk et al. (2013) find that HD entry may lead to multiple store shopping, indicating that consumers transfer parts of their grocery budget to the new entrant but continue buying other products at traditional stores. They find that chains with an upscale image and little assortment overlap are least affected by HD entry. Whereas the aforementioned studies shed some light on which conventional grocery stores lose after a HD's entry, they provide no clear answer as to *why* these stores are affected. It is reasonable to assume that consumers compare the store attributes of HDs with the same attributes of their originally

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preferred stores, which may lead to changes in how satisfied they are with their current grocery stores and, in the case of "perceived losses", transfers of (some of their) grocery expenditures to the new discount store.

Although research has shown that a variety of other complementary stores in the vincinity of a store increases store satisfaction for UK store customers (Clarke et al., 2012), little research has been done to find out how the presence of HDs may lead to changes in attribute satisfaction and ultimately store satisfaction and loyalty. This study attempts to fill this gap in the literature. We have formulated the following research questions: 1) How does HD presence affect store attribute evaluations and store satisfaction of traditional grocery stores? 2) What is the effect of HD presence on the relationships between store attribute evaluations and store satisfaction? and 3) What are the effects of HD presence on the impact of store satisfaction on the share of wallet (SOW) of traditional stores? By examining how store attribute evaluations depend on the local presence of a HD store, we contribute to the store satisfaction and store loyalty literature (e.g., Baker et al., 2002; Gómez et al., 2004; Hunneman et al., 2015). At the same time, we add to the discounter entry literature in several important ways. First, many of the entry studies have sales (shares) as DVs, whereas we focus on store and attribute satisfaction and SOW. Store satisfaction and loyalty ultimately drive sales, but studying their drivers provides richer insights into the reasons why HD presence may lead to changes in performance. Second, whereas the previous studies focus on market entry, we focus on the mere presence of HDs and how this affects store satisfaction and SOWs of traditional chains. We acknowledge that the entry decision is endogenous by first modeling the location decision of HDs and subsequently using the predicted likelihood of the presence of a HD in the equations explaining store and attribute satisfaction and SOW. We empirically test this framework using data on customer evaluations of store attributes, store satisfaction and their relative spending at all grocery chains in the Netherlands over the period 2015–2017.

We find that store satisfaction and SOW of traditional retailers are lower if a HD is present. Our research indicates that this might be caused by a worse evaluation of the traditional chains' prices and an increased importance of convenience attribute in satisfaction formation. Traditional retailers can guard themselves against HDs by making sure that their customer base is very satisfied, so that a HD is less likely to steal their customers away. Even though our empirical study focuses on grocery retailing, we expect many of our findings and recommendations to be valid for other retailers that are challenged by low cost competitors (e.g., Primark in fashion).

The text is organized as follows: We first discuss the relevant literature on store satisfaction formation and HDs. Subsequently, we present our hypotheses and describe the research method. Next, we discuss the empirical results of our study and discuss their implications for management. The final section provides limitations and suggestions for further research.

2. Literature review

This study builds on the store image literature and the literature studying the performance implications of HD entry in a local retail market. In this section, we discuss each of these literatures and how our research contributes.

2.1. Store image literature

Within the retailing and marketing literature, there has been extensive attention for the formation of store satisfaction and loyalty (e.g., Baker et al., 2002; Gómez et al., 2004; Heskett et al., 1994). The satisfaction formation literature is strongly built on attribute models. The classic Fishbein multi-attribute model posits that attitudes towards an object form through a set of salient beliefs about that object's attributes at a given point in time (Mitchell and Olson 1981). In the context of stores, store satisfaction thus depends on a weighted sum of store attribute evaluations, with favorable overall attitudes leading to higher store patronage and store loyalty (Bloemer and de Ruyter 1998; Ter Hofstede et al., 2002). Typical store attributes involve service (i.e., assortment size and depth, personal), price (i.e., promotions, regular prices) and convenience (i.e., travel distance, parking space) (e.g., Hunneman et al., 2015). Store satisfaction can be influenced by changing attribute evaluations and/or altering the perceived importance of these attributes to the consumer. Past research finds that these attributes typically represent benefit and cost-related factors (e.g., Baker et al., 2002; Hunneman et al., 2015). For example, the size of the store's assortment may create value for certain consumers, but this may be outweighed by the travel distance to the store and the store's price level (cost-related factors). Previous studies also find that the importance of store attributes can differ significantly across markets, cultures and purchase occasions (e.g., Hunneman et al., 2017; Steenkamp and Wedel 1991).

2.2. Attribute evaluations

In the store image literature, overall satisfaction is a function of attribute-level evaluations. These attribute evaluations are based on expectation (dis)confirmation at the attribute level, which means that consumers compare the actual performance of an attribute with the expectations they have regarding that attribute (e.g., Oliver 1980). If, for example, the service level is lower than expected, consumers get dissatisfied with that attribute, evaluate it negatively, and this negatively affects the overall evaluation of the store (Mittal et al. 1998, 1999). Consumer expectations about attribute performances may depend on a plethora of factors, including competitor performance and a store's past performance. Prospect theory (Kahneman and Tversky 1979) postulates that satisfaction judgements display (1) reference dependence (people compare attribute performance to a reference point) and (2) loss aversion (the impact of losses is larger than gains of a similar magnitude). If we transfer this idea to the store attribute domain, we can conclude that consumers may compare the attributes of their preferred stores to the same attributes of other stores, which will then influence the attribute evaluations of the focal store (Mittal et al., 1998). If, for example, the prices of the current store are compared to those of another store, which may be a HD, then we can expect that this translates into either a loss (if the other store is less expensive) or a gain (if the other store is more expensive). Mittal et al. (1998) show that negative performance on a service or product attribute has a greater impact on overall satisfaction and repurchase intentions than positive performance has on that same attribute. Moreover, they find that overall satisfaction has diminishing sensitivity to attribute-level performance, meaning that, if consumers experience multiple losses (or gains) over time for a certain attribute, their overall satisfaction judgment will be less sensitive to that. This research thus suggests that losses will have a larger impact on overall attribute evaluations than a gain of the same magnitude.

2.3. Attribute importance

The importance of attributes driving store satisfaction may change over time and is thus not static. We identify three mechanisms that may induce these changes. First, the salience of a stimulus to a perceiver is inherently contextual (Wathieu et al., 2004). In the context of multiple stores competing for a consumer's SOW, this means that both own marketing actions and those of competitors can have a significant impact on store attribute saliences and thus on their perceived importance. This is the focus of our study, in which we look at the effect of the presence of a HD on store satisfaction formation. Previous research provides important evidence for the existence of such effects. Van Heerde et al. (2008), for example, find that the intensive price interactions in a price war make price a more easily accessible attribute, which, as a result, becomes more important in subsequent purchase

decisions. This effect is in line with previous research that shows that consumers with a higher frequency of purchase (i.e., shorter average interpurchase time interval) have a narrower latitude of price acceptance, because they are more aware of the range of price distributions (Kalyanaram and Little 1994). Moreover, Wathieu et al. (2004) show that such an effect can be amplified when the price discount comes from a brand that is usually not associated with price promotions. They show that attention to and the weight of the price attribute are larger in response to a price promotion by a brand that consumers think does not compete on price. The study by Vroegrijk et al. (2016) provides some preliminary evidence for these effects. They find that it is better for traditional supermarkets to not introduce economy private labels (PLs) in their battle against HDs, because these PLs will just enhance consumers' price focus. Therefore, the entry of a price-oriented retailer can have profound implications on consumers' existing preference structures and their patronage behavior. Arnold et al. (1998) find that a market entrant may benefit from consumers' preference ambiguity and change consumers' attribute saliences and their preferences in its own favor. In particular, they find that Wal-Mart, after entry, has been able to change attribute preferences in a direction that is consistent with its own positioning (low prices, assortment size, value-for-money, etc.).

Building on the salience framework, we can identify a second mechanism that enhances attribute accessibility and importance. Kahneman (2003) identifies attribute (dis)similarity as an important driver of that attribute's accessibility in a person's memory. Following this logic, an attribute may become perceptually more salient when there is much variation in attribute performance. At the same time, attributes without any variation may become perceptually non-salient over time. Mittal et al. (2001) show that the weight of different attributes in determining a student's satisfaction with a class depends on the variability in attribute ratings. Hence, when a consumer is confronted with a large variation in service levels across retail chains, we assume that the service attribute becomes more important in the store satisfaction judgement.

A third mechanism is the change in attribute weights in response to changing consumption goals. That is, attribute weights in store satisfaction formation change over time because certain attributes are more important in fulfilling a consumer's consumption goals than others. As a result, consumers to whom service is important are likely to stay with service-oriented grocery chains. Hence, one may expect that the service attribute becomes more important over time because of the "churn" of price (or convenience) oriented consumers. Interestingly, Vroegrijk et al. (2013) find that consumers may decide to shift a part of their grocery budgets to HDs after their entry, while keeping the rest of their budget at their original grocery stores. They also find that consumers that were already shopping at multiple stores are most likely to transfer part of their budgets to HDs. The combination of these findings suggest that price-sensitive consumers shifted part of their grocery budgets to HDs, which could lead to an increased importance of service for the other grocery stores, because they kept the customers who value service most.

2.4. Discount literature

The discount literature concerns studies that investigate the performance implications for incumbent retailers following the entry of LDs (e.g., Wal-Mart) or HDs (e.g., Aldi, Lidl and Trader Joe's). The studies focusing on the effects of LD entry show that the impact of such an event can be rather dramatic. For example, Singh et al. (2006) find that an incumbent store lost 17% in sales volume following Wal-Mart's entry in the local market. Similar figures for traditional supermarkets are reported by Ailawadi et al. (2010), who find that mass stores are even more affected; their sales decline with 40%, whereas drugstores only lose 6% of their sales volume. Jia (2008), focusing on the incumbent's bottom line, shows that 40–50% of the exits of small discount stores can be explained by Wal-Mart's expansion.

Whereas many studies focus on the LD entry's impact on firm performance, Singh et al. (2006) study changes in households' shopping behavior in response to the entry of a LD. They find that the losses in incumbent retailers' sales volumes are mostly due to fewer store visits, while basket sizes remain largely unchanged after LD entry. They also show that the incumbent retailers may lose some of their best customers to Wal-Mart. The incumbent loses most in areas close to the Wal-Mart store and in areas far away from both the Wal-Mart and the incumbent stores. The impact is lowest in areas close to the incumbent stores.

Even though the above-mentioned studies give us important indications of how impactful the entry of a LD can be for traditional retailers, we may not assume that the same effects hold for the entry of a HD. LDs such as Wal-Mart are quite different from HDs. Due to the sheer sizes of their stores and assortments (Steenkamp and Sloot 2019), LDs are able to compete with many different existing retail stores and a large part of their assortments, while at the same time undercutting their prices because of their economies of scale. HDs are usually smaller and have less wide assortments, which limits the number of product groups in which they compete with incumbent retailers. Hence, the expected performance impact of the presence of HDs may be very different from that of LDs. In fact, as we will see, HDs may complement traditional grocery retailers and thus not necessarily substitute them.

Vroegrijk et al. (2013) find that the opening of a HD store may lead to significant decreases in customer shares and spending levels for traditional grocery retailers. More specifically, they find that the declines in the incumbents' customer shares may range from 4.4% to 14.3%, while spending levels for these traditional chains drop on average 9.2% after HD entry. These drops are significant, but smaller than those for LDs.

These smaller effect sizes can be explained by the fact that traditional retailers typically do not lose their best (single-store) customers to the HD, but those who were already shopping at multiple stores. These customers see the HD store as complementary to the traditional stores they already visit (Gijsbrechts et al., 2018). Therefore, they do not transfer their whole grocery budget to the new HD store, but rather visit the HD just for purchases in certain product categories (Gijsbrechts et al., 2018). The above-mentioned findings imply that traditional stores can largely avoid competing with the HD if they position themselves differently and/or are located further away. Local HD entry hurts most for stores located at a moderate distance from the HD; these stores are too close to avoid competition and they do not benefit from one-stop shopping opportunities, as complementary stores in close proximity to the HD store do.

2.5. Conceptual framework

Combining these literatures, we believe that the presence of a HD store significantly affects store satisfaction and SOW. In our conceptual framework (Fig. 1), we hypothesize that changes in consumer attitudes and store preferences may result from changes in store attribute evaluations caused by the presence of a HD and by changes in store attribute importance in overall satisfaction formation. We assume that the mere presence of a HD influences the store attribute satisfaction of incumbent stores. Based on prior literature, we include service, price and convenience as the main store attributes in this study (Hunneman et al., 2015). Second, based on our discussion of changing attribute importance, we also assume that HD presence influences the relationships between store attribute evaluations and store satisfaction for traditional retail stores. Third, we study SOW at the traditional stores. Based on prior research on discounters, it is likely to assume a direct effect of HD presence on SOW (e.g., Vroegrijk et al., 2016). However, we expect that HD presence may also influence the relationships between store satisfaction and SOW. In line with existing literature and empirical evidence, we expect that store satisfaction has a positive effect on loyalty and SOW (e.g., Bolton 1998; Szymanski and Henard 2001; Kumar et al., 2013; Hunneman et al., 2015). We will now continue with a discussion of our main hypotheses, where we discuss each store attribute separately.

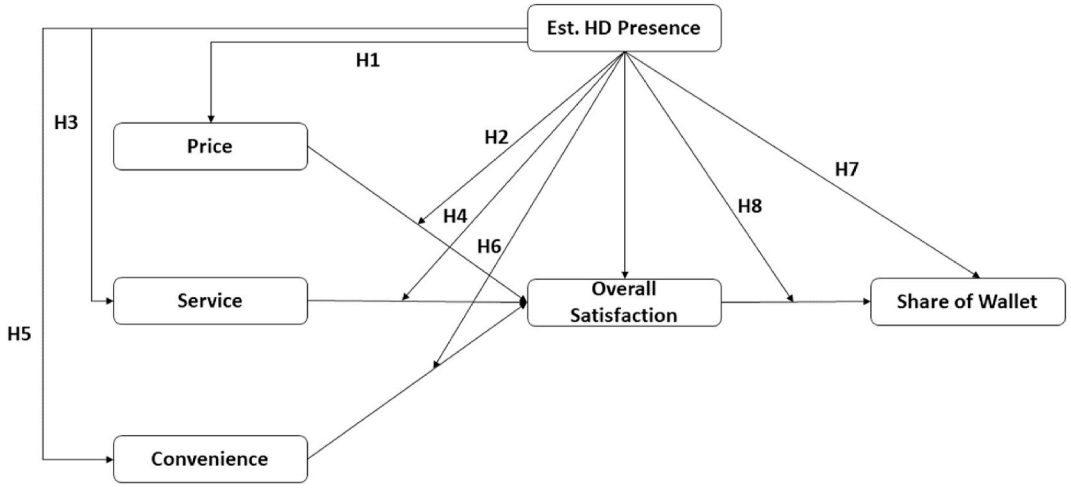

Fig. 1. Conceptual framework. Estimated HD presence influences store attribute evaluations (left side), overall satisfaction and, ultimately, share of wallet (right side).

3. Hypothesis development

3.1. Price

HDs usually create their own market space by breaking the price boundaries of the existing retail market space. In other words, they lower prices to levels previously thought to be economically unviable (Steenkamp and Sloot 2019). In doing so, they change the reference prices against which the price levels of the traditional retailers are compared and consumers may start wondering why these traditional retailers are so expensive compared to the HD. If the distance between stores on the price attribute is significantly large, the so-called contrast effect (Cunha and Schulman 2011; De Bruyn and Prokopec 2017) states that consumers may enhance the price distance between these two stores even further in their minds. Consequently, the price image of a traditional retailer declines once a HD becomes available to the shopper. Lab experiments by Wathieu et al. (2004) show strong evidence for this effect in a brand setting. They show that offering and retracting discounts decreases the subsequent choice share for high-priced brands but increases the choice share of low-priced brands.

The positioning of the HDs is one of "value for money", emphasizing their low prices without compromising too much on quality. As a result, the positioning and communication of HDs centers on price-related messages as their main point of differentiation from traditional grocery stores. HDs invest a lot of money in advertising. Lidl, for example, was the largest advertiser in the German grocery industry in 2017 (€279.7 million) and in the UK in 2015 (£ 78 million) (Steenkamp and Sloot 2019). These price-related messages make price a more salient attribute, which increases the availability of that attribute in consumers' memories and thus its importance in subsequent decision-making. Hence, in areas where HDs become accessible to consumers, we expect that price-related attributes become important in store satisfaction and loyalty formation. This effect can be amplified if the incumbent retailers also start emphasizing the price in their marketing communications with consumers, which is an all too common competitive response of conventional retailers. This seems a particular bad idea for stores that typically do not compete on price: Such communications are perceived as unusual and thus increase the salience of price even more. For example, in response to Aldi's success in Australia, mainstream retailer Coles started a campaign 'Down, down. Prices are down' using frequently purchased items to demonstrate price leadership (Steenkamp and Sloot 2019). Similarly, price interactions occurred more frequently in the Dutch grocery industry after market leader Albert Heijn initiated a price war in 2003 (Van Heerde et al., 2008), as a result of which consumers became more price sensitive.

In sum, we formulate the following hypotheses:

H1: Consumers will be less (more) satisfied with the price attribute of traditional grocery chains in areas where a HD is (not) present.
H2: The relationship between the price attribute and store satisfaction is stronger (weaker) for traditional grocery chains in areas where a HD is (not) present.

3.2. Service

HD stores are usually very small (about 8000 to 15,000 square feet) and carry ultra-limited assortments. They are further characterized by low staffing levels and minimal store decoration. To reduce costs, items are frequently displayed on shipping pallets and in the boxes in which they arrive. It is thus fair to say that, compared to traditional retailers, they score low on service-related attributes. If consumers evaluate the service levels of their traditional retailers using HDs as a benchmark, the service evaluation of traditional stores will improve. Again, the contrast effect may even lead to an increase in the perceived distance between stores, as a result of which the service image of traditional stores will increase even more.

Due to the larger variations in the service levels across chains, consumers may become more aware of the differences in service performance across chains, which may in turn increase the importance of this attribute in decision-making. As noted, Mittal et al. (2001) provide evidence for this effect. They find that the importance of attributes in determining student satisfaction with a class depends on the variability in these attributes' performances. Similarly, we expect that, if service levels vary more, the importance of the service attribute in store satisfaction formation may increase.

We therefore formulate the following two hypotheses:

H3: Consumers will be more (less) satisfied with the service attribute of traditional grocery chains in areas where a HD is (not) present.
H4: The relationship between the service attribute and store satisfaction is stronger (weaker) for traditional grocery chains in areas where a HD is (not) present.

3.3. Convenience

HDs are usually located at less central locations, which forces consumers to travel more (and potentially by car) to these locations. Thus, HD stores usually score lower on the convenience dimension that

measures whether a store is in close proximity. Hence, if consumers evaluate the convenience of their traditional retailers against that of HD stores, the traditional store will be evaluated better.

The lack of convenience is often considered as the most common reason why shoppers discontinue shopping at HD stores (Faigen et al., 2018). At the same time, previous research by Vroegrijk et al. (2013) shows that traditional chains generally do not lose their consumers' shopping budgets completely to HDs if such stores become more accessible. This implies that traditional stores in close proximity to the HDs do not have to lose customers following a HD's entry, as long as they complement each other. Interestingly, Clarke et al. (2012) show consumers prefer a large store nearby with complementary stores present. Results of Gijsbrechts et al. (2018) reveal that customers who shift part of their grocery budgets to the HD would like to shop at the traditional retailers and the HDs on combined shopping trips in order to reduce the time and effort spent on (grocery) shopping. These findings indicate that 1) there will be more variation in perceived shopping convenience across grocery chains and 2) consumers engage in combining visits to the HD and traditional grocery stores. Both developments lead to an increase in the importance of convenience in store satisfaction formation.

Based on our discussion we hypothesize the following:

H5: Consumers will be more (less) satisfied with the convenience level of traditional grocery chains in areas where a HD is (not) present.

H6: The relationship between convenience and store satisfaction is stronger (weaker) for traditional grocery chains in areas where a HD is (not) present.

3.4. HD and SOW

The presence of a HD increases the amount of competition in a local market. Following this logic, the mere presence of HD may lead to lower SOWs for traditional chains because of the larger consumer choice sets resulting from a HD's entry and consumers' opportunity of allocating grocery budgets over a larger number of stores thereby reducing the average amount spent per store. Vroegrijk et al. (2013) find evidence for such an effect after local HD entry. In particular, they find that, on average, consumers reduce their spending at traditional chains by 9.2% after HD entry. Traditional stores lose most of their revenues to consumers who visit multiple stores, including the HD. This may indicate that these consumers do not necessarily leave the traditional retailers completely because they are dissatisfied but because they now have more possibilities for spending their grocery budgets. Consequently, we assume that HD presence is negatively related to SOW of the conventional retailer. We thus hypothesize:

H7: The presence of a HD is negatively related to the SOW of the traditional grocery chains.

3.5. Store satisfaction and SOW

Based on our previously defined hypotheses, we expect that store satisfaction will mainly change due to changes in attribute evaluations as well as due to the changing relationships between store attribute evaluations and store satisfaction. However, the relationship between store satisfaction and SOW may also change. In line with the existing literature, we assume a positive relationship between satisfaction and SOW (Kumar et al., 2013). Multiple factors moderate the relationship between satisfaction and loyalty (Kumar et al., 2013; Seiders et al., 2005). According to Seiders et al. (2005), possible moderators of this relationship are customer, relational, and marketplace variables. Customer-related factors may include variety seeking, age, and income. Relational factors are variables that affect the relationship between the customer and the company such as transaction costs. Marketplace moderators refer to the type of product (product vs. service) and the degree of competition.

The presence of a HD may lead to increased competition and thus weaken the relationship between store satisfaction and SOW (Kumar et al., 2013). The extent to which this happens depends on a consumer's elaboration of the differences between the HD store and its alternatives. Bloemer and de Ruyter (1998) distinguish between latent satisfaction and manifest satisfaction. They argue that the former has a weaker relationship with SOW because of the non-elaborative nature of this satisfaction type. Consumers may find shopping at a particular store just "acceptable" without being truly satisfied and still not decide to leave that store (Arnold et al., 2005; Chitturi et al., 2008). For manifest satisfaction, on the other hand, consumers make a deliberate comparison between alternative stores and they thus become fully aware of the differences between stores. In that situation, it is likely that consumers with an economic shopping orientation perceive the HD store as a better alternative and shift their purchases accordingly (Mägi 2003). On the other hand, if a consumer really cares about the services provided by his traditional store, he may also become more loyal to the traditional retailer. In that case, given that the HD presence makes some of the differences between a HD and a traditional store more salient, the relationship between store satisfaction and SOW becomes stronger.

We thus hypothesize:

H8: The relationship between store satisfaction and SOW is stronger (weaker) for traditional grocery chains in areas where a HD is (not) present.

4. Research methodology

4.1. Description of data

We test the hypotheses using monthly survey data (from January 2015 until September 2017) from a representative sample of Dutch grocery shoppers. In the observation period, the two hard discounters Aldi and Lidl had market shares of 7 and 10.3% in the Dutch market (Distrifood n.d.). Aldi has been active in the Dutch market from 1973 onwards, whereas Lidl has entered more recently in 1996. The dataset contains 18,172 observations collected from 6898 unique respondents and 24 grocery chains. The survey items measure consumers' attitudes to and preferences for all Dutch grocery chains, which are collected as part of the so-called EFMI Shopper Monitor. More specifically, as a part of this survey, individuals responsible for their household's grocery shopping are asked to answer several questions related to how they evaluate each grocery store and their attributes. It is important to note that the sample of surveyed consumers changes each month, so that we are unable to track changes within a household over time. The survey data are similar to the data used in Hunneman et al. (2015; 2017), though, in this study, we use more recent data and we add additional data on HD presence. Table 1 provides the definitions and measurements of some key variables. Store satisfaction is measured by asking respondents how they would evaluate the stores they visited in the last month on a 10-point scale ranging from 1 (poor) to 10 (excellent). Respondents also evaluate these stores on 17 store attributes ranging from perceptions about the store's price level, its assortment size to the friendliness of their personnel. SOW is measured as the respondents' self-reported share of grocery purchases at each chain that they have visited the month before. The survey also contains data on household size, age and income, which we include as control variables in our models. Moreover, we measure the typical type of shopping trip associated with each chain, where we distinguish between major shopping trips, fill-in trips and special trips (Hunneman et al., 2017). We also control for these shopping trips in our model, as consumers behave differently per shopping trip and evaluations could be influenced by the specific purchase situation (e.g., Bell and Lattin 1998; Kahn and Schmittlein 1992; Hunneman et al., 2017).

Table 1
Key variables used in this study.

Variable	Questions	Scale
Store satisfaction	If I would have to assign a grade from 1 (very bad) to 10 (excellent) to the overall performance of the following supermarkets, I would give them:	10-point scale
Store attributes	How would you evaluate the following supermarkets on the dimensions below on a scale from 1 (very bad) to 10 (excellent)? •Low prices •Attractive offers •Product quality •Customer friendly personnel •Good supply of fresh products •Large assortment •Long opening hours •Store attractiveness •Fast checkout •Good supply of additional services (copy machine, postcards and tickets, photo service, etc.) •Child friendliness of the store •Tidy store •Spacious store •Knowledgeable personnel •Much attention for new products •The store is nearby •Sufficient supply of other stores close to the focal store	10-point scale
Share of wallet	Can you give an indication which percentage of your total expenditures on groceries you spent at the following supermarkets last month? (total sum should be 100%)	Percentage

Similar to Hunneman et al. (2015; 2017) we factor-analyzed the store attribute data using principal components analysis with Varimax rotation and derive, similar to the prior studies, three principal components (see Table 2, where we omitted factor loadings smaller than 0.50 for readability). We use an orthogonal rotation method to ensure across-construct discriminant validity. Furthermore, since we include several interaction terms in our model equations, multicollinearity and thus possibly unreliable parameter estimates are issues that we want to avoid. The three principal components (PC) explain 62% of the variance. In line with prior studies on the same data (Hunneman et al. (2015; 2017) and other studies (e.g., Gómez et al., 2004; Theodoridis and Chatzipanagiotou, 2009), the PCs reflect price, (PC1), service (PC2), and convenience (PC3). The low alpha for convenience arises due to the use of only two items.[1] However, the PC is in line with earlier studies (Hunneman et al. 2015, 2017).

Table 2
Factor loadings matrix for all store attributes.

Survey elements – specific attributes	Factor loadings		
	Price	Service	Convenience
Low prices	.886		
Attractive offers	.610		
Product quality		.673	
Customer friendly personnel		.749	
Good supply of fresh products		.710	
Large assortment		.786	
Long opening hours		.552	
Store attractiveness		.857	
Fast checkout		.717	
Good supply of additional services (copy machine, postcards and tickets, photo service, etc.)		.622	
Child friendliness of the store		.645	
Tidy store		.844	
Spacious store		.756	
Knowledgeable personnel		.769	
Much attention for new products		.767	
The store is nearby			.749
Sufficient supply of other stores close to the focal store			.653
Cronbach alpha	.654	.936	.370

We supplement the above-mentioned data with data on observed actual HD presence in a specific (four-digit) zip-code and with geo-demographic data for the (four-digit) zip code in which each household is located. These data have been obtained from the Streetlife database owned by Cendris Dataconsulting, which contains consumer socio-demographic and lifestyle data for all zip codes in the Netherlands. We use these zip-code level consumer characteristics to predict the likelihood that a HD will be present in each zip code to account for endogeneity (see section on model specification). A description of the data and a full correlation matrix of all our data are included in Appendix A.

4.2. Model free evidence

To obtain an initial understanding of the key phenomenon that we want to study, namely the impact of HD presence on store satisfaction and loyalty, we first conduct a preliminary, model-free analysis. First, we split our full sample in two: one set of observations for which a HD is present and another for which a HD is not present. To investigate how HD presence influences overall satisfaction, store attribute evaluations and SOW, we compare the average values for each of these variables in both subsamples (please see Table 3). Table 3 shows that all variables except for convenience differ significantly depending on whether a HD is present or not. Both the service and price attribute and overall satisfaction are higher if a HD is present, whereas the SOW of traditional chains is higher if no HD is present. These results indicate, in line with hypotheses 1, 3 and 5, that store attribute *evaluations* may differ conditional on the presence of a HD store.

In addition to the effect of HD presence on store attribute *evaluations*, we are also interested in whether the *importance* of store attributes may vary depending on the presence of a HD store. For this purpose, we ran two separate regressions estimating Equation (3), one for the set of observations for which a HD was present and another for observations without HD stores. After that, we also estimated the same regression model for the full sample. We then conducted a Chow test to check whether we can pool both subsamples and get one set of parameter estimates for the whole sample. The Chow test compares the residual sum of squares of the separate regressions with the same statistic for the whole sample. If the residual sum of squares for the pooled model is much larger than the residual sum of squares of the separate models, we have evidence that parameter heterogeneity is so large that pooling is

Table 3
Model free evidence for differences in key variables depending on HD presence.

	HD present	HD not present	t-value	Sign
Service	0.447	0.353	2.75	***
Price	−0.091	−0.186	2.32	**
Convenience	0.186	0.177	0.21	
Satisfaction	7.649	7.571	3.09	***
Share of wallet	28.621	30.148	−2.43	**

***: significant at $\alpha = 0.01$, **: significant at $\alpha = 0.05$, *: significant at $\alpha = 0.10$.

[1] We checked how sensitive the outcomes are to changes in the two-item convenience construct. These results show that, if we only include one of the two items, the probability of a HD being present does not positively moderate the effect of convenience on satisfaction. This seems to indicate that the combination of the two items, hence both the distance to the store and the presence of other stores, as represented by the factor score is important. This finding is supported by the work of Vroegrijk et al. (2013) who find that HD entry leads to multiple store shopping. Hence, HD presence leads to higher satisfaction if (and only if) consumers can spend their grocery budget at multiple stores including the HD.

not allowed. The F-statistic that we find for the satisfaction model is not significant ($F = 0.98; p > 0.05$), suggesting that we can safely pool the data. However, as indicated before, this analysis may be problematic because the presence of HD stores at a particular location may be endogenous, a topic we address in the next section. For the SOW model, we also find a small F-statistic ($F = 1.00; p > 0.05$), which indicates that pooling is allowed please check appendices B1–B4 for the tables with parameter estimates). However, as recommended by Leeflang et al. (2015), we still use panel data models with random chain effects in the next sections discussing the empirical study to account for possible parameter heterogeneity. More specifically, we explain differences in the effects of store attributes across chains to check whether HD presence influences satisfaction and SOW.

5. Model specification

5.1. The possible endogeneity of HD store locations

HDs are likely to locate their stores in areas with price-sensitive consumers and with few other similarly positioned stores. In other words, site selection is an endogenous decision that likely depends on the degree of competition and consumer attributes like the average income level and average household size in an area. Failing to account for this possible relationship when it exists, is likely to lead to an overestimation of the effects of store attributes on store satisfaction and SOW. In order to account for the possibly endogenous store locations, we develop a model that, based on exogenous consumer characteristics at the zip code level, predicts the likelihood of a HD store being present in the area (Papies et al., 2017). We then use that probability estimate as an explanatory variable in the models explaining store satisfaction and SOW. In this way we ensure that the explanatory variable measuring HD presence is not correlated with the error terms of the satisfaction and SOW equations a thus does not lead to biased and inconsistent parameter estimates.

We thus specify a binary logit model that estimates the probability that a HD store is present in a certain zip code, using exogenous zip-code level consumer attributes as predictors as well as competitive intensity measures. More specifically, we estimate the following model:in which

$$\begin{aligned} z = {} & \alpha_0 + \alpha_1 \#HH_{it} + \alpha_2 \#CHAIN_{it} + \alpha_3 MOD.INC_{it} \\ & + \alpha_4 > MOD.INC_{it} + \alpha_5 HH2_{it} + \alpha_6 HH3_{it} + \alpha_7 HH4_{it} + \alpha_8 HH5_{it} + \alpha_9 RES.VAL200_{it} \\ & + \alpha_{10} RES.VAL400_{it} + \alpha_{11} RES.VAL600_{it} + \alpha_{12} VFM.CHAIN_{it} \\ & + \alpha_{13} PRICE.CHAIN_{it} + \alpha_{14} LOW.BUDG_{it} + \alpha_{15} AVG.BUDG_{it} \end{aligned} \tag{1}$$

The subscripts i and t are indices for zip code and year respectively. The dependent variable $p(HD_{it}=1)$ is the probability that a HD store is present in zip code i at time t. We include the following explanatory variables: the number of households ($\#HH_{it}$), the number of grocery chains in zip code i and its neighboring zip codes at time t ($\#CHAIN_{it}$), the percentage of households with modal income ($MOD.INC_{it}$) and above model income ($>MOD.INC_{it}$), the percentage of households with respectively two ($HH2_{it}$), three ($HH3_{it}$), four ($HH4_{it}$), and five members ($HH5_{it}$), the percentage of households with estimated values of their main residences between 200,000 and 399,000 euros ($RES.VAL200_{it}$), between 400,000 and 599,000 euros ($RES.VAL400_{it}$), and above 600,000 euros ($RES.VAL600_{it}$), the percentage of households that buy at value-for-money grocery stores ($VFM.CHAIN_{it}$), and those that buy at first-price grocery stores ($PRICE.CHAIN_{it}$), and the percentage of households with a low ($LOW.BUDG_{it}$) and average budget ($AVG.BUDG_{it}$) for grocery shopping.

5.2. Store attribute model

In our study, we are interested in the effects of HD presence on the three store attributes, store satisfaction and SOW. We start with discussing the store attribute models. We estimate separate equations for each store attribute p:

$$\begin{aligned} STATTR_{pjkt} = {} & \lambda_{0jp} \\ & + \lambda_{1p} P(HD=1)_{jt} + \lambda_{2p} FILTRIP_{kjt} + \lambda_{3p} MAJTRIP_{kjt} \\ & + \lambda_{4p} SPECTRIP_{kjt} + \lambda_{5p} AGE_{kt} + \lambda_{6p} INC_{kt} + \lambda_{7p} HHS_{kt} \\ & + \sum_{m=1}^{M-1} \phi_{mp} I_{mkjt} + \sum_{l=1}^{L-1} \phi_{pl} I_{lkjt} + \zeta_{pkjt} \end{aligned} \tag{2}$$

in which,

$$\lambda_{0jp} = \psi_{00p} + \omega_{0jp} \tag{2a}$$

The subscripts k, j and t are indices for respondent, chain, and year respectively. We estimate separate models for each store attribute p (1, …, 3), or consumers' valuations of a store's price ($PRICE_{kjt}$), service ($SERV_{kjt}$), and convenience ($CONV_{kjt}$). $P(HD=1)_{jt}$ is a variable that measures the likelihood that a HD store is present in the zip code of chain store j at time t. In addition, we include the following explanatory variables: $FILTRIP_{kjt}$, $MAJTRIP_{kjt}$, $SPECTRIP_{kjt}$ indicate with 1 (yes) or 0 (no) whether respondent k' s visit to chain j at time t was a regular fill-in trip, a major shopping trip, or a trip made for a special occasion, respectively; AGE_{kt}, INC_{kt}, HHS_{kt} are respondent k's background characteristics measuring his/her age, income and household size at time t; the I_{mkjt}'s are indicator variables representing the month: 1 if the observation is in month m ($m = 1, \ldots 12$), 0 otherwise; I_{lkjt} indicates the year to which an observation belongs: 1 if the observation is in year l, 0 otherwise.

5.3. Store satisfaction model

Store satisfaction is modeled using a panel data model that allows us to test hypotheses 2, 4, and 6.

$$\begin{aligned} SAT_{kjt} = {} & \beta_{0j} + \beta_{1j} SERV_{kjt} + \beta_{2j} PRICE_{kjt} + \beta_{3j} CONV_{kjt} \\ & + \beta_4 P(HD=1)_{jt} + \beta_5 AGE_{kt} + \beta_6 INC_{kt} \\ & + \beta_7 HHS_{kt} + \beta_8 FILTRIP_{kjt} + \beta_9 MAJTRIP_{kjt} + \beta_{10} SPECTRIP_{kjt} \\ & + \sum_{m=1}^{M-1} \phi_m I_{mkjt} + \sum_{l=1}^{L-1} \phi_l I_{lkjt} + \varepsilon_{kjt} \end{aligned} \tag{3}$$

in which,

$$\beta_{0j} = \gamma_{00} + \upsilon_{0j} \tag{3a}$$

$$\beta_{pj} = \gamma_{p0} + \gamma_{p1} FILTRIP_{kjt} + \gamma_{p2} MAJTRIP_{kjt} + \gamma_{p3} SPECTRIP_{kjt} + \gamma_{p4} P(HD=1)_{jt} + \gamma_{p5} AGE_{kt} + \gamma_{p6} INC_{kt} + \gamma_{p7} HHS_{kt} + \upsilon_{pj} \tag{3b}$$

The dependent variable in Equation (3) is respondent k's evaluation of chain j at time t. Three explanatory variables are the principal components measuring consumers' evaluations of each store's price ($PRICE_{kjt}$), service ($SERV_{kjt}$), and convenience ($CONV_{kjt}$). Each slope parameter β_{pj} ($p = 1, \ldots, 3$) is the sum of a general mean, the deterministic effects of a set of explanatory variables and a normally distributed error term with mean zero and constant variance ($\upsilon_{pj} \sim N\left(0, \sigma_j^2\right)$). We are specifically interested in the γ_{p4} parameters, as they consider the moderating effects of the HD presence on the store attribute – store satisfaction relationship. Note that we also account for moderating effects of the shopping trips in line with Hunneman et al. (2017).

5.4. Share of wallet model

Next, we specify a model that explains share of wallet (SOW_{kjt}). This model has a similar specification as the store satisfaction model:

$$\begin{aligned} ln\left(\frac{SOW_{kjt}}{1-SOW_{kjt}}\right) &= \theta_{0j} + \theta_{1j}SAT_{kjt} \\ &+\theta_2 P(HD=1)_{jt} + \theta_3 FILTRIP_{kjt} + \theta_4 MAJTRIP_{kjt} \\ &+\theta_5 SPECTRIP_{kjt} + \theta_6 AGE_{kt} + \theta_7 INC_{kt} + \theta_8 HHS_{kt} \\ &+\sum_{m=1}^{M-1} \varrho_m I_{mkjt} + \sum_{l=1}^{L-1} \varrho_l I_{lkjt} + \varepsilon^*_{kjt} \end{aligned} \quad (4)$$

in which,

$$\theta_{0j} = \delta_{00} + \nu_{0j} \quad (4a)$$

$$\begin{aligned} \theta_{1j} &= \delta_{10} + \delta_{11} FILTRIP_{kjt} + \delta_{12} MAJTRIP_{kjt} + \delta_{13} SPECTRIP_{kjt} \\ &+ \delta_{14} P(HD=1)_{jt} + \delta_{15} AGE_{it} + \delta_{16} INC_{it} + \delta_{17} HHS_{it} + \nu_{1j} \end{aligned} \quad (4b)$$

We apply a logit transformation to this variable to ensure that it has a normal distribution by approximation.

6. Empirical results

6.1. Explaining HD presence

Table 4 shows the estimates of our HD presence model (Eq. (1)). The McFadden (pseudo) R^2 for this model is 28%. Note, that this value should not be interpreted as a normal R^2, and that McFadden suggest that values between 20% and 40% represent a very good fit of the model (McFadden 1977). As can be observed, we have multiple significant predictors of discounter presence. Discounters are more likely to be present if there are more households ($p < .01$). When there are more grocery chains in the focal and neighboring zip-codes, discounters are likely to be less present since there is already strong competition ($p < .01$). In terms of income, we find that discounters are less likely to be present when there are more consumers having a medium income ($p < .05$). We also find some household size effects, although the effects are not fully consistent with the notion that HDs should be present in areas with larger households. Specifically, a HD is more likely to be present when there are more two-person households ($p < .01$), as well as when there are households with five or more persons ($p < .05$). There are some housing value effects too. In general, it seems that HDs are more likely to enter a local region, when the housing value is below 200K euros. In these areas, consumers have fewer financial assets. Finally, we observe that when there are more price chains (not being a discounter) in an area, discounters are also more likely to be present ($p < .01$). In these areas, the presence of price chains might signal to discounters that there are great market opportunities given that consumers seek lower prices in these chains. Discounters may however be able to outperform these chains on price.

Table 4
Logit model estimation results for HD presence (Eq. (1)).

Variable	Parameter	Parameter estimate	t-value	Sign
Intercept	α_0	−5.935	−9.58	***
$\#HH_{it}$	α_1	.708	29.52	***
$\#CHAIN_{it}$	α_2	-.045	−7.02	***
MOD_INC_{it}	α_3	-.008	−2.48	**
$> MOD\_INC_{it}$	α_4	-.0002	-.07	
$HH2_{it}$	α_5	.022	4.53	***
$HH3_{it}$	α_6	-.012	−1.82	*
$HH4_{it}$	α_7	.007	1.21	
$HH5_{it}$	α_8	.017	2.11	**
RES_VAL200_{it}	α_9	-.016	−7.32	***
RES_VAL400_{it}	α_{10}	-.010	−1.69	*
RES_VAL600_{it}	α_{11}	-.016	−2.00	**
VFM_CHAIN_{it}	α_{12}	.001	.78	
$PRICE\_CHAIN_{it}$	α_{13}	.041	12.47	***
LOW_BUDG_{it}	α_{14}	.011	1.85	*
AVG_BUDG_{it}	α_{15}	-.010	−1.27	

***: significant at α = 0.01, **: significant at α = 0.05, *: significant at α = 0.10.

6.2. Store attribute model

We now turn to results for the store attribute models (Table 5). We assumed that HD presence would affect the store-attribute evaluations and indeed, as expected, we find a negative coefficient for price. However, this coefficient (λ_{2k}) is only marginally significant ($p < .10$). We find no significant coefficient for HD presence in the service attribute model ($p > .10$). Hence, HD presence does not seem to affect the service evaluation of conventional retail chains. However, we do find a significant negative coefficient for HD presence in the convenience model. ($p < .01$). This result suggests that the convenience attribute of traditional retailers is evaluated worse when a HD is present. This contrasts H5, where we assumed a positive effect. These results marginally support H1, while we find no support for H3 and H5. The parameter estimates indicate strong effects for our control variables. For example, we find that older consumers have higher store attribute evaluations. This also holds true for larger households. Furthermore, consumers with lower income levels are likely to have lower attribute evaluations. These consumers are typically HD customers.

6.3. Store satisfaction model

Table 6 shows the results of the store satisfaction model. The conditional R^2 for this model is 71% (Johnson 2014), which means that it explains store satisfaction fairly well. In our discussion of the results, we will focus on the HD presence effects. As could be assumed, the store attributes service, price and convenience are positively related to store satisfaction ($p < .01$). Interestingly, although not specifically hypothesized, HD presence is negatively related to store satisfaction ($p < .01$). Thus, conventional stores that are located in an area where a HD is present have less satisfied customers. Our results do not show significant interactions between price and service with HD presence ($p > .10$). Thus, we cannot support our hypotheses 2a and 4a, that HD presence would increase the relationship between price and service attributes and store satisfaction. We do find a positive interaction effect between convenience and HD presence ($p < .05$), supporting H6a. Thus, convenience is a more important attribute when a HD is present.

Beyond the effects of HD presence, we also included multiple control variables and interaction effects. Interestingly, we replicate the findings of Hunneman et al. (2017) on the shopping trip effects with this larger sample. We also observe multiple moderating effects of household size, income and age. For example, store satisfaction of higher incomes tend to be less affected by price ($p < .01$).

6.4. SOW model

Table 7 shows the results of the model explaining SOW. The conditional R^2 for this model is 69%, which means that it explains SOW fairly well. As expected, satisfaction is positively related to SOW ($p < .01$). The presence of a HD is negatively related to SOW ($p < .01$). This is in line with prior findings in the discounting literature (e.g., Vroegrijk et al., 2016) and supports H7. We find a positive significant interaction effect between satisfaction and HD presence ($p < .05$). Thus, when a HD is present, satisfaction has a stronger relationship with SOW thereby supporting H8. This is a relevant finding, as it suggests that conventional retailers should focus more on satisfying customers to keep loyal customers when a HD is present.

We also included multiple other variables in the SOW model. Low-income customers tend to be less loyal ($p < .01$), while we also find that, for these customers, satisfaction is less important given the positive interaction effect between income and satisfaction ($p < .01$). We also included interactions with the type of shopping trip. In general, we find

Table 5
Estimation results for the store attribute models (Eq. (2)).

Variable	Parameter	Price		Service		Convenience	
		Par	t-value	Par	t-value	Par	t-value
$P(HD=1)$	λ_{2p}	**-.105**	**−1.94***	**-.036**	**-.78**	**-.333**	**−5.91*****
$FILTRIP_{kjt}$	λ_{3p}	.182	5.16***	.073	2.39**	.316	8.55***
$MAJTRIP_{kjt}$	λ_{4p}	.353	8.58***	.087	2.45**	.130	3.02***
$SPECTRIP_{kjt}$	λ_{5p}	.210	5.17***	.280	8.00***	.098	2.31**
AGE_{kt}	λ_{6p}	.013	11.27***	.014	13.98***	.007	5.97***
INC_{kt}	λ_{7p}	-.050	−4.91***	-.063	−7.11***	-.036	−3.35***
HHS_{kt}	λ_{8p}	.106	7.82***	.110	9.29***	.081	5.78***
Conditional R2		.31		.17		.09	

***: significant at α = 0.01, **: significant at α = 0.05, *: significant at α = 0.10.

Table 6
Estimation results for the store satisfaction model (Eq. (3)).

Variable	Parameter	Parameter estimate	t-value	Sign
$SERV_{kjt}$	β_1	.851	12.85	***
$PRICE_{kjt}$	β_2	.581	9.62	***
$CONV_{kjt}$	β_3	.244	4.77	***
$P(HD=1)_{jt}$	$\boldsymbol{\beta_4}$	**-.127**	**−3.35**	***
AGE_{kt}	β_5	.001	.98	
INC_{kt}	β_6	-.018	−2.45	**
HHS_{kt}	β_7	.021	2.12	**
$SERV_{kjt} \times FILTRIP_{kjt}$	γ_{11}	-.048	−1.61	
$SERV_{kjt} \times MAJTRIP_{kjt}$	γ_{12}	-.061	−1.65	*
$SERV_{kjt} \times SPECTRIP_{kjt}$	γ_{13}	.070	1.93	*
$SERV_{kjt} \times P(HD=1)$	$\boldsymbol{\gamma_{14}}$	**.068**	**1.59**	
$SERV_{kjt} \times AGE_{kt}$	γ_{15}	-2×10^{-4}	-.25	
$SERV_{kjt} \times INC_{kt}$	γ_{16}	.045	5.55	***
$SERV_{kjt} \times HHS_{kt}$	γ_{17}	-.064	−5.77	***
$PRICE_{kjt} \times FILTRIP_{kjt}$	γ_{21}	-.037	−1.45	
$PRICE_{kjt} \times MAJTRIP_{kjt}$	γ_{22}	-.045	−1.42	
$PRICE_{kjt} \times SPECTRIP_{kjt}$	γ_{23}	-.031	−1.04	
$PRICE_{kjt} \times P(HD=1)$	$\boldsymbol{\gamma_{24}}$	**.056**	**1.54**	
$PRICE_{kjt} \times AGE_{kt}$	γ_{25}	-.002	−2.04	**
$PRICE_{kjt} \times INC_{kt}$	γ_{26}	-.040	−5.60	***
$PRICE_{kjt} \times HHS_{kt}$	γ_{27}	.031	3.33	***
$CONV_{kjt} \times FILTRIP_{kjt}$	γ_{31}	.016	.67	
$CONV_{kjt} \times MAJTRIP_{kjt}$	γ_{32}	.025	.90	
$CONV_{kjt} \times SPECTRIP_{kjt}$	γ_{33}	-.009	-.31	
$CONV_{kjt} \times P(HD=1)$	$\boldsymbol{\gamma_{34}}$	**.066**	**2.01**	**
$CONV_{kjt} \times AGE_{kt}$	γ_{35}	-.001	−1.78	*
$CONV_{kjt} \times INC_{kt}$	γ_{36}	-5×10^{-4}	-.07	
$CONV_{kjt} \times HHS_{kt}$	γ_{37}	.009	.95	
$FILTRIP_{kjt}$	β_8	.099	3.84	***
$MAJTRIP_{kjt}$	β_9	.244	7.88	***
$SPECTRIP_{kjt}$	β_{10}	.064	2.03	**

Conditional $R^2 = 0.71$.
***: significant at α = 0.01, **: significant at α = 0.05, *: significant at α = 0.10.

Table 7
Estimation results for the SOW Model (Eq. (4)).

Variable	Parameter	Parameter estimate	t-value	Sign
SAT_{kjt}	θ_1	.131	2.60	***
$P(HD=1)$	θ_2	-.600	−2.18	**
$FILTRIP_{kjt}$	θ_3	2.425	11.55	***
$MAJTRIP_{kjt}$	θ_4	4.044	14.80	***
$SPECTRIP_{kjt}$	θ_5	1.772	6.72	***
AGE_{kt}	θ_6	1×10^{-4}	.03	
INC_{kt}	θ_7	-.157	−3.07	***
HHS_{kt}	θ_8	.019	.28	
$SAT_{kjt} \times FILTRIP_{kjt}$	δ_{11}	-.088	−3.31	***
$SAT_{kjt} \times MAJTRIP_{kjt}$	δ_{12}	-.0152	−4.47	***
$SAT_{kjt} \times SPECTRIP_{kjt}$	δ_{13}	-.079	−2.41	**
$SAT_{kjt} \times P(HD=1)$	δ_{14}	.078	2.17	**
$SAT_{kjt} \times AGE_{kt}$	δ_{15}	-.0003	-.43	
$SAT_{kjt} \times INC_{kt}$	δ_{16}	.019	2.89	***
$SAT_{kjt} \times HHS_{kt}$	δ_{17}	-.002	.28	

Conditional $R^2 = 0.69$.
***: significant at α = 0.01, **: significant at α = 0.05, *: significant at α = 0.10.

that when consumers have a specific trip, the impact of satisfaction is decreased.

6.5. Robustness checks

We have done several additional analyses to check how robust our findings are and to gain further insights.

We have included main effects for the store attributes to check whether the attribute evaluations affect SOW directly beyond the indirect effect through satisfaction. What we find is that, in this model, satisfaction still has a positive effect on SOW, while HD presence remains to have a negative impact on SOW. However, the store attributes also have an effect on SOW apart from their effects through satisfaction. We find that price has a significant positive effect on share of wallet, whereas service has a significant negative effect on SOW. We also then find that the interaction between satisfaction and HD presence is no longer significant. Hence, these findings indicate that the negative effect that HDs have on traditional retailers' price attribute evaluations may carry over into a lower SOW beyond its indirect effect on SOW through store satisfaction.

7. Discussion

HDs are imposing a strong threat to conventional retailers (Steenkamp and Sloot 2019). We studied the impact of HD presence on store attribute evaluations, store satisfaction formation and SOW. So far, research has studied the impact of HD on customer purchase behavior and store performance (e.g., Gijsbrechts et al., 2018; Vroegrijk et al., 2016). However, there is no study that aims to understand how store evaluations and store satisfaction are affected, as well as how HD presence changes the interrelationships between these evaluations, store satisfaction and SOW. By disentangling these effects, we gain a better understanding of how HDs change customer behavior and how they affect store performance metrics. We consider this a major contribution to the retailing literature and the emerging studies on the impact of HDs on traditional retail stores and customer purchase behavior.

Table 8 summarizes our main findings. Importantly, our results show

Table 8
Summary of results.

Hypothesis	HD presence will	Outcome
1	decrease price satisfaction	Marginally supported
2	increase relationship between price satisfaction and store satisfaction	Not supported
3	increase service satisfaction	Not supported
4	increase relationship between service satisfaction and store satisfaction	Not supported
5	increase convenience satisfaction	Not supported, decrease in convenience satisfaction
6	increase relationship between convenience satisfaction and store satisfaction	Supported
7	decreases SOW	Supported
8	increases relationship between store satisfaction and SOW	Supported

that HD presence has a significant negative effect on conventional retailers. First, we find evidence that HD presence marginally decreases the evaluation of the price attribute for conventional retailers, while also convenience perceptions are reduced. The first finding is expected since HDs focus strongly on price. A stronger effect could have been expected though. However, retailers might have adjusted prices already and may have introduced low-price private labels (Steenkamp and Sloot 2019) resulting in only a marginal decrease in price perceptions. Our results indicate that prices do not become more important in satisfaction formation if a HD is present. This is a surprising finding since one would expect that the price attribute becomes more salient if a HD is present. One explanation for the insignificance of this effect may be that traditional retailers did already learn that the best response to HD entry is to communicate attributes other than price. The decrease in the importance of convenience is unexpected and contrasts with our hypothesis and also seems to contrasts findings of Clarke et al. (2012). One potential explanation for this finding is that a HD usually is not located close to the conventional retailer. As customers now divide their purchases between conventional retailers and the HD (e.g., Gijsbrechts et al., 2018), they are less satisfied with the convenience attribute because they have to spend more time on shopping and they will have to travel between the conventional retail stores and the HD store. Second, our findings suggest that HD presence increases the importance of convenience in creating store satisfaction. Importantly, convenience evaluations worsen for traditional retailers, which results in lower store satisfaction. Third, we also show that HD presence is negatively related to store satisfaction. Thus, HD presence reduces store satisfaction beyond the effects of the changes in store attribute evaluations. This seems to diverge from findings of Clarke et al. (2012) that consumers tend to prefer a variety of store formats in the vicinity of a store. This can potentially be explained by the disruption caused by the presence of a HD, which creates new standards and expectations which currently are not fully met by traditional retailers. Note that this negative change in store satisfaction leads to a lower SOW given the positive relationship between store satisfaction and SOW. Fourth, in line with earlier results, SOW decreases when a HD is present (e.g., Gijsbrechts et al., 2018). This direct effect is expected, as customers will start purchasing at a HD, which reduces the SOW of traditional retailers. Fifth, we find that the positive relationship between store satisfaction and SOW strengthens when a HD is present. This supports the notion that competition increases the importance of creating satisfied customers (e.g., Kumar et al., 2013). For traditional retailers this effect is negative, as decreases in store attributes and store satisfaction carry over into a lower SOW. However, it also suggests that retailers can harness themselves against HDs by creating satisfied customers, for example through delivering a strong customer experience within the store (e.g., Verhoef et al., 2009).

7.1. Management implications

To understand the impact of HD presence, we simulated what would happen to an average traditional retailer when a HD is present using our model results. Table 9 shows that satisfaction with an average chain will decrease with approximately 2% if a HD is present, while the chain's SOW will go down by almost 3.7%. For the average retail chain, the presence of a HD is thus negative. It decreases both store satisfaction and SOW. In order to overcome this, these retailers should invest strongly in increasing attribute perceptions and satisfaction. This can be done through emphasizing their strengths vis-à-vis HDs, for example the relatively high customer service, the quality of their products, and their larger assortments. Previous research suggests it is dangerous to become too similar to HDs. Consumers should see HDs and traditional chains as complements rather than substitutes (Clarke et al., 2012; Vroegrijk et al., 2013; Gijsbrechts et al., 2018).

We also investigated whether these outcomes are different for chains scoring high on service and more price-oriented chains. We used the same classification of chains as being reported in Hunneman et al. (2015). For both retailer types, the effects of a HD are negative. It decreases satisfaction with approximately 2.10%. We also find a negative effect on SOW. However, the decrease in SOW is larger for price-oriented chains than for service-oriented chains. This is however not a big difference. This finding is in line with previous literature that indicates that HDs and traditional chains are complementary and consumers may thus visit both chains to benefit from the attractive offers of a HD in certain categories and from the higher service levels of traditional retailers in other categories (Vroegrijk et al., 2013; Gijsbrechts et al., 2018).

7.2. Research limitations

This study used cross-sectional data to investigate how HD presence a affects store attribute evaluations, store satisfaction and SOW. We however did not study the consequences of HD entry over time. In our data, the HD is already present (or not) and we studied cross-sectional differences for existing retailers confronted with a HD. Future research could study entry consequences and look at how a HD entrance changes customer store evaluations or, more generally, customer behavior, over time. Such studies can potentially also consider defensive reactions of incumbent retailers, for example by adding private labels to their assortments. We do not observe these reactions. Next, the convenience attribute we adopted captures two dimensions that are not necessarily highly correlated: we found a significant 0.23 correlation between the dimension measuring location and that measuring the presence of other stores. Even though the Principal Components Analysis clearly indicated that these two items form one factor, additional research could investigate the (content) validity of these two dimensions in more detail. Our study also only investigates the Dutch market. It would be very interesting to study the effects of HD presence in the US market, where HDs now aim to gain strong positions. A comparison across markets would also be highly relevant. Where for example Germany has a long-standing tradition in HD, we observe strong growth in HD only recently in some other countries such as the UK (Steenkamp and Sloot 2019). It would be interesting to replicated our study in the UK, where prior research has also considered the effects of the presence of different store formats on

Table 9
Simulation results of HD presence on satisfaction and SOW.

	HD present		no HD present		% change	
	SAT	*SOW*	*SAT*	*SOW*	*SAT*	*SOW*
average chain	7.29	16.70%	7.45	17.33%	−2.09%	−3.72%
service chain	7.29	17.48%	7.45	17.63%	−2.09%	−0.86%
price chain	7.29	16.12%	7.44	16.29%	−2.10%	−1.07%

store satisfaction (e.g. Clarke et al., 2012). We also did not collect objective SOW or purchase data, but instead used self-reported SOW as our measure for loyalty (e.g., De Wulf et al., 2001). However, some of our results are directionally in line with earlier studies using objective measures (e.g., Vroegrijk et al., 2016). Future research could aim to combine the individual level survey data on customer evaluations with actual individual-level purchase data at the SKU level. Overall, we believe more research on the effects of HD on existing retailers and their customers is welcome. Given the disruptive nature of HDs in the global retail market, this is a very important topic.

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Appendix A. Correlation Matrix

	SAT_{kjt}	SOW_{kjt}	AGE_{kt}	HHS_{kt}	INC_{kt}	$MAJTRIP_{kjt}$	$FILTRIP_{kjt}$	$SPECTRIP_{kjt}$	$SERV_{kjt}$	$PRICE_{kjt}$	$CONV_{kjt}$	$P(HD=1)_{jt}$
SAT_{kjt}	1.00	.00	.00	.79	.00	.00	.00	.00	.00	.00	.00	.34
SOW_{kjt}	.30	1.00	.00	.03	.09	.00	.00	.00	.00	.00	.00	.57
AGE_{kt}	.12	-.02	1.00	.00	.15	.05	.00	.90	.00	.00	.01	.42
HHS_{kt}	.00	-.02	-.24	1.00	0	.12	.54	.01	.71	.77	.44	0
INC_{kt}	-.04	-.01	-.01	.37	1.00	.32	.26	.11	.00	.00	.13	0
$MAJTRIP_{kjt}$	.26	.83	-.01	-.01	-.01	1.00	.00	.00	.00	.00	.00	.38
$FILTRIP_{kjt}$	.17	.56	-.03	.00	-.01	.39	1.00	.00	.00	.00	.00	.19
$SPECTRIP_{kjt}$	.28	.64	.00	-.02	-.01	.58	.33	1.00	.00	.00	.00	.63
$SERV_{kjt}$	.73	.12	.14	.00	-.06	.11	.05	.18	1.00	.00	.00	.01
$PRICE_{kjt}$	.60	.24	.14	.00	-.05	.22	.11	.17	.39	1.00	.00	.32
$CONV_{kjt}$	.23	.12	.03	-.01	-.02	.10	.14	.10	.03	.07	1.00	.00
$P(HD=1)_{jt}$	-.01	.00	-.01	.07	.08	.01	.01	.00	.03	-.01	-.06	1.00

Note: Correlation coefficients are below the diagonal, corresponding p-values above the diagonal.

Appendix B. Additional analyses

Table B1
Estimation results for store satisfaction model with HD present (Eq. (3)).

Variable	Parameter	Parameter estimate	t-value	Sign
$SERV_{kjt}$	β_1	1.03	6.41	***
$PRICE_{kjt}$	β_2	.40	2.83	***
$CONV_{kjt}$	β_3	.51	4.29	***
AGE_{kt}	β_5	3×10^{-3}	1.67	*
INC_{kt}	β_6	-.027	−1.19	
HHS_{kt}	β_7	.08	2.38	**
$SERV_{kjt} \times FILTRIP_{kjt}$	γ_{11}	.02	.26	
$SERV_{kjt} \times MAJTRIP_{kjt}$	γ_{12}	-.16	−1.48	
$SERV_{kjt} \times SPECTRIP_{kjt}$	γ_{13}	.04	.34	
$SERV_{kjt} \times AGE_{kt}$	γ_{14}	$-2x10^{-3}$	-.74	
$SERV_{kjt} \times INC_{kt}$	γ_{15}	.06	2.12	**
$SERV_{kjt} \times HHS_{kt}$	γ_{16}	-.13	−3.74	***
$PRICE_{kjt} \times FILTRIP_{kjt}$	γ_{21}	.08	1.14	
$PRICE_{kjt} \times MAJTRIP_{kjt}$	γ_{22}	.03	.39	
$PRICE_{kjt} \times SPECTRIP_{kjt}$	γ_{23}	-.08	−1.00	
$PRICE_{kjt} \times AGE_{kt}$	γ_{24}	7×10^{-4}	.32	
$PRICE_{kjt} \times INC_{kt}$	γ_{25}	-.03	−1.19	
$PRICE_{kjt} \times HHS_{kt}$	γ_{26}	.02	.51	
$CONV_{kjt} \times FILTRIP_{kjt}$	γ_{31}	.02	.26	
$CONV_{kjt} \times MAJTRIP_{kjt}$	γ_{32}	-.03	-.42	
$CONV_{kjt} \times SPECTRIP_{kjt}$	γ_{33}	-.01	-.15	
$CONV_{kjt} \times AGE_{kt}$	γ_{34}	4×10^{-3}	−2.16	**
$CONV_{kjt} \times INC_{kt}$	γ_{35}	-.03	−1.38	
$CONV_{kjt} \times HHS_{kt}$	γ_{36}	.01	.29	
$FILTRIP_{kjt}$	β_8	.02	.26	
$MAJTRIP_{kjt}$	β_9	.39	4.37	***
$SPECTRIP_{kjt}$	β_{10}	.12	1.22	

Conditional $R^2 = 0.72$.
***: significant at $\alpha = 0.01$, **: significant at $\alpha = 0.05$, *: significant at $\alpha = 0.10$.

Table B2
Estimation results for store satisfaction model without HD present (Eq. (3)).

Variable	Parameter	Parameter estimate	t-value	Sign
$SERV_{kjt}$	β_1	.84	5.74	***
$PRICE_{kjt}$	β_2	.68	4.84	***
$CONV_{kjt}$	β_3	.25	2.15	**
AGE_{kt}	β_5	2×10^{-3}	1.26	
INC_{kt}	β_6	-.04	−2.27	**
HHS_{kt}	β_7	4×10^{-4}	-.02	
$SERV_{kjt} \times FILTRIP_{kjt}$	γ_{11}	-.02	-.24	
$SERV_{kjt} \times MAJTRIP_{kjt}$	γ_{12}	-.03	-.32	
$SERV_{kjt} \times SPECTRIP_{kjt}$	γ_{13}	.07	.82	
$SERV_{kjt} \times AGE_{kt}$	γ_{14}	$-1x10^{-3}$	-1x10-3	
$SERV_{kjt} \times INC_{kt}$	γ_{15}	.04	1.72	*
$SERV_{kjt} \times HHS_{kt}$	γ_{16}	-.02	-.86	
$PRICE_{kjt} \times FILTRIP_{kjt}$	γ_{21}	-.06	-.90	
$PRICE_{kjt} \times MAJTRIP_{kjt}$	γ_{22}	.02	.27	
$PRICE_{kjt} \times SPECTRIP_{kjt}$	γ_{23}	-.01	−1.40	
$PRICE_{kjt} \times AGE_{kt}$	γ_{24}	$-3x10^{-3}$	−1.66	*
$PRICE_{kjt} \times INC_{kt}$	γ_{25}	-.04	−2.58	***
$PRICE_{kjt} \times HHS_{kt}$	γ_{26}	.04	2.08	**
$CONV_{kjt} \times FILTRIP_{kjt}$	γ_{31}	6×10^{-3}	.11	
$CONV_{kjt} \times MAJTRIP_{kjt}$	γ_{32}	-.06	-.77	
$CONV_{kjt} \times SPECTRIP_{kjt}$	γ_{33}	.06	.82	
$CONV_{kjt} \times AGE_{kt}$	γ_{34}	4×10^{-4}	-.23	
$CONV_{kjt} \times INC_{kt}$	γ_{35}	1×10^{-3}	.09	
$CONV_{kjt} \times HHS_{kt}$	γ_{36}	3×10^{-3}	.14	
$FILTRIP_{kjt}$	β_8	.10	1.45	
$MAJTRIP_{kjt}$	β_9	.21	2.46	**
$SPECTRIP_{kjt}$	β_{10}	.13	1.59	

Conditional $R^2 = 0.72$.
***: significant at $\alpha = 0.01$, **: significant at $\alpha = 0.05$, *: significant at $\alpha = 0.10$.

Table B3
Estimation results for SOW Model with HD present (Eq. (4)).

Variable	Parameter	Parameter estimate	t-value	Sign
SAT_{kjt}	θ_1	.10	1.33	
$FILTRIP_{kjt}$	θ_2	1.53	4.82	***
$MAJTRIP_{kjt}$	θ_3	3.42	8.13	***
$SPECTRIP_{kjt}$	θ_4	1.13	2.80	***
AGE_{kt}	θ_5	-.01	-.72	
INC_{kt}	θ_6	-.17	−2.12	**
HHS_{kt}	θ_7	.19	1.71	*
$SAT_{kjt} \times FILTRIP_{kjt}$	δ_{11}	-.03	-.77	
$SAT_{kjt} \times MAJTRIP_{kjt}$	δ_{12}	-.13	−2.51	**
$SAT_{kjt} \times SPECTRIP_{kjt}$	δ_{13}	-.03	-.70	
$SAT_{kjt} \times AGE_{kt}$	δ_{14}	8×10^{-4}	.69	
$SAT_{kjt} \times INC_{kt}$	δ_{15}	.02	1.76	*
$SAT_{kjt} \times HHS_{kt}$	δ_{16}	-.02	−1.71	*

Conditional $R^2 = 0.69$.
***: significant at $\alpha = 0.01$, **: significant at $\alpha = 0.05$, *: significant at $\alpha = 0.10$.

Table B4
Estimation results for SOW Model without HD present (Eq. (4)).

Variable	Parameter	Parameter estimate	t-value	Sign
SAT_{kjt}	θ_1	.14	2.54	**
$FILTRIP_{kjt}$	θ_2	1.58	6.18	***
$MAJTRIP_{kjt}$	θ_3	3.57	10.82	***
$SPECTRIP_{kjt}$	θ_4	2.03	6.33	***
AGE_{kt}	θ_5	2×10^{-3}	.40	
INC_{kt}	θ_6	-.03	-.56	
HHS_{kt}	θ_7	-.13	−1.57	
$SAT_{kjt} \times FILTRIP_{kjt}$	δ_{11}	-.02	-.55	
$SAT_{kjt} \times MAJTRIP_{kjt}$	δ_{12}	-.12	−3.10	***
$SAT_{kjt} \times SPECTRIP_{kjt}$	δ_{13}	-.13	−3.38	***
$SAT_{kjt} \times AGE_{kt}$	δ_{14}	7×10^{-4}	-.77	

(*continued on next page*)

Table B4 (*continued*)

Variable	Parameter	Parameter estimate	t-value	Sign
$SAT_{kjt} \times INC_{kt}$	δ_{15}	4×10^{-3}	.52	
$SAT_{kjt} \times HHS_{kt}$	δ_{16}	.02	1.52	

Conditional $R^2 = 0.74$.
***: significant at $\alpha = 0.01$, **: significant at $\alpha = 0.05$, *: significant at $\alpha = 0.10$.

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