Comparing retailer purchase patterns and brand metrics for in-store and online grocery purchasing

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Abstract

Online shopping is growing rapidly in many sectors, particularly in the retail grocery sector. The rise of online shopping poses some questions for retailers and manufacturers. First, to what extent does the online mode attract other retailer's customers, as opposed to one's own current in-store shoppers? Second, is online shopping resulting in more retailer cross-purchasing by consumers? Next, does brand loyalty differ across in-store and online? Lastly, how do private labels perform online compared to in-store? Using data from multiple categories in the UK, this study finds that (1) online sales for a retailer come disproportionately from its own in-store customer base; (2) there is an 'online-buying' market partition across retailers; (3) online-induced retailer cross-purchasing is increasing over time; (4) brand loyalty is somewhat higher for online purchasing; and finally (5) private label brands enjoy *slightly* higher market share online than in-store.

Summary statement of contribution

The study contributes to literature on shopping behaviour, e-commerce and brand metrics by analysing multiple categories with shopper data encompassing in-store and online buying by the same households. The study uses a straightforward method to show the structure of competition among retailers and their online and in-store channels. The study reports a range of managerially relevant findings about online buying, as well as drawing some general insights as to consumer loyalty.

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Introduction

The most rapidly growing form of trade currently is online purchasing. It is revolutionising the retail landscape (Rose and Samouel, 2009; Wood, 2011) and nowadays, consumers can buy virtually anything online. This study focuses on the online grocery sector. Online grocery retailing is a very large business, for example, sales through this medium totalled £6 billion in the UK in 2011 (IGD, 2012). In the last decade, established grocery retailers have capitalised on their infrastructure and purchasing systems to offer developed online shopfronts (Schneider, 2011). These online shopfronts enable consumers to order and pay for groceries online and have them delivered to their door. In the UK around 6% of total retail grocery sales are made online, and this figure is set to double by 2015 (The Telegraph, 2011). In the US around 3% of total grocery sales come from online purchases. While its share of total grocery purchases is still low, online shopping is gaining penetration, and multichannel grocery shopping is becoming the norm (Wood, 2011). Even though the goods that shoppers buy online and offline may be identical, shopper behaviour in terms of brand choice and loyalty may differ due to differences in the channels' characteristics (Cui and Wang, 2010; Danaher et al., 2003; Degeratu et al., 2000). The aim of this paper is to further investigate possible differences in buyer behaviour and brand metrics between online and offline modes.

For the purpose of this study, which focuses on the grocery sector, findings from four empirical studies of online buying are especially relevant. First, Degeratu, Rangaswamy & Jianan (2000) examined the effects of various attributes on choice in online and offline environments. They analysed separate samples of online and offline shoppers in three categories (comparing purchases made from a store retailer, with Peapod purchases). Degeratu et al. found brand names are more important online than offline in some categories, and that price promotions have

stronger effects online than in traditional, brick and mortar supermarkets. Second, Danaher, Wilson & Davis (2003) examined separate, albeit matched, samples of consumers to compare the observed loyalty in each channel (online, in-store) to a baseline formed from the Dirichlet model of repeat-purchase. The study found large brands enjoy higher loyalty online than they theoretically should, whilst the effect was reversed for small brands. Andrews and Currim (2004) utilised the same data as Degeratu et al., and found that in comparison to traditional consumers, online consumers have higher loyalty, reflected in smaller repertoires; are less price sensitive and preferred buying larger pack sizes. All these studies used two separate samples of consumers for online and offline purchases respectively. Therefore, as noted by Chu, Chintagunta & Cebollada (2008 p. 284) "observed differences in shopping behaviour might not be caused by the shopping media but might be inherent in these two groups of consumers". In response, Chu, Arce-Urriza, Cebollada-Calvo & Chintagunta (2010) used data combining offline and online purchases of the same consumers to examine the impact of category and shopper characteristics on buying behaviour in Spain. They also found higher brand loyalty online. Furthermore, online consumers were more size-loyal and had lower price sensitivity.

While the findings from past research in relation to the impact of online / offline mode on buyer behaviour and brand loyalty appear consistent, there are a number of reasons why further investigation is warranted. First, apart from Chu et al. (2010) most studies are based on data from the 1990's. In the last decade, buying groceries online has become more normal for many shoppers. Whilst novel at the start, the online environment is now familiar to consumers so it is possible that shoppers' behaviour online has become more similar to their behaviour in brick and mortar stores. Secondly, again with the exception of Chu et al. (2010) the data for all other studies has come from separate online / in-store samples. Also, while Chu et al. (2010) used single source panel data, they looked at shopping in one chain only. While valuable insights have

been gained from this past work, we argue more insights can be gained from considering a broader scope of purchasing. The current study uses a sample in which the same household may purchase both in-store and online from the same retailer, and considers purchasing across the three major UK retailers, which collectively account for over 50% of total sales in these categories. An examination across multiple retailers potentially allows for greater generalisability of results, and may be particularly important when comparing offline to online loyalty. The reason is that a comparison of loyalty metrics for online and offline modes will be distorted if one examines purchasing for only one retail chain. If we only examine consumer's shopping within one retailer, we gauge their brand loyalty in a limited context – e.g., same retailer, similar presentation of the same brands. If we allow for the fact that consumers buy from multiple retailers (in-store or online), brand loyalty might arguably be lowered – brands may be presented differently across retailers, either in-store or online; the shopper encounters different private label brands; and in the case of online shopping, features such as savable lists do not carry over from one retailer to another. These characteristics suggest that the outcomes of comparing brand loyalty for online and offline modes might be contingent on whether multiple retailers are included. Therefore, some further investigation is warranted.

The study focuses on three topical areas for retailing and brand management in the consumer goods arena. First, given the current growth in online purchasing and the commitment of retailers around the world to investments in their online offerings, how does online purchasing affect the retailer's customer base? Second, what are the implications of online shopping for brand loyalty? Third, given the enormous importance placed on private labels (PLs) currently, are there differences in buyer behaviour towards PLs in the online environment? We now review past work to derive a series of propositions about these issues.

Development of Research Propositions

Before discussing previous work examining online compared to in-store shopping, we note that a considerable number of studies have examined multiple retailer shopping in the physical store format. For example, how shoppers of one retail chain also cross-shop at competing chains in a time period, how they allocate their purchasing of particular brands across competing retailers; how they distribute their purchase requirements for a category across competing retailers. A summary of past research in this area is shown in Table 1.

Table 1 Summary of previous work on multi-retailer shopping

Authors	Country-market	Key aspects of study
Dunn and Wrigley (1984)	Groceries, UK (one city)	Loyalty towards retail stores in one city
Keng and Ehrenberg(1984)	Groceries, UK	Brand buying within a retailer and buying of product category across multiple retail chains
Wrigley and Dunn (1984b)	Groceries, UK (one city)	Store penetration and buying frequency for multiple retailers
Wrigley and Dunn(1984a)	Groceries, UK (one city)	Cross-retailer purchasing of brands
Uncles and Elllis (1989)	Groceries, USA	Buying of private label brands within and across retailers
Uncles and Ehrenberg(1990)	Groceries, USA	Buying of product category across multiple retailers and store types
Ellis and Uncles (1991)	Groceries, UK	Buying of private label brands across retailers
Uncles and Hammond (1995)	Groceries, USA	Buying within-retailer and across multiple retailers
Keng, Uncles, Ehrenberg and Barnard (1998)	Groceries, Japan	Brand buying; and penetration and purchase incidence for store types
Brewis-Levie and Harris (2000)	Clothing, UK	Store penetration, buying frequency and cross-retailer purchasing
Uncles and Kwok (2009)	Groceries, China	Buying product category across store types and retailers
Dawes and Nenycz-Thiel (2013)	Groceries, UK	Buying of private labels across retailers

Several important findings have emerged from this body of work: that among the retailer's shopper base, there are generally more light or infrequent buyers than heavy ones; that those customers tend to cross-purchase the same product at competing retailers over the course of a

year; that the pattern of cross-retailer purchasing follows a predictable pattern, such that buyers of a product at any chain on average cross-purchase that category more at other big chains than other small ones. In this study we draw on many of the ideas, findings and analytical approaches used by the studies listed in Table 1. We extend those past analyses of consumers engaging in multiple-retailer purchasing of categories and brands in physical stores, to investigate purchasing across multiple retailers and across the in-store and online modes.

Category level multichannel buying

As noted by Wood, (2011, p. 2) 'Multi-channel shopping is increasingly becoming the norm'. Many consumers who buy in one channel are also buying in other channels (Chu et al., 2008). Therefore, we would expect that many shoppers will buy the same category from both online and offline stores over a time period such as a year. Next, previous research shows that while consumers have a repertoire of stores they shop at over time , they tend to have one store / retailer to which they are most loyal (e.g. Uncles and Kwok, 2009). Therefore, the assumption is that consumers who buy online will also have a retailer to which they are most loyal. Drawing from the brand extension literature, online storefronts can be seen as a brand extension of an offline store, where the same brand is taken to a different channel (e.g. Laforet, 2008). For example, in the UK, Tesco brands its online store as Tesco Direct and Tesco.com. Since consumers are already familiar with the offline store, often participate in its online-based loyalty scheme, and are exposed to promotions in-store, it is likely that the online store they will shop at will be the same as the offline store they already shop in. The brand equity of the offline store should mean shoppers are more likely to notice advertisements for the same retailer's online store (e.g. Nicholls et al., 2003). Finally, lack of trust has been suggested as a major barrier to shop online (e.g. Gefen, 2000). However, the fact that the shopper is likely to have already shopped in a

physical store of the same retailer should decrease the perceived risk of trying an unfamiliar platform. Also, payment systems such as PayPal offer online shoppers more security.

Given all those points, we propose that:

> *P1: Within a category, the majority of online shoppers of a particular retailer are also offline (e.g. in-store) shoppers of the same retailer.*

Cross purchasing from different online stores

While many shoppers engage in multichannel shopping, not all do. Past research has suggested those who shop online are behaviourally and demographically different to those who do not (Soopramanien and Robertson, 2007). A number of studies indicate that online shoppers are higher educated, younger and have higher levels of income (e.g. Allred et al., 2006). Allred, Smith & Swinyard (2006) and Corner, Thompson, Dillon & Doolin (2005) found that online shoppers were less risk averse, while Swaminathan, Lepkowska-White & Rao (2003) found online shoppers were less price sensitive. Finally, a study by Brashear, Kashyap, Musante & Donthu (2009) looked at the differences between online shoppers and in-store shoppers, and found online shoppers were more likely to value convenience, were more impulsive in their purchasing, had higher incomes and were heavier users of email and the internet in general. In summary, past research has highlighted some possible behavioural differences between those who buy online, and those who do not. However, there is little guidance about whether online buyers should cross-purchase at multiple retailers more so than in-store buyers. Therefore we rely on simple logic. While we expect online shoppers will also purchase groceries in-store, we also posit that many online shoppers may purchase from multiple online grocery retailers in a given period. Setting up accounts is relatively easy and online removes location-based barriers to shopping at multiple retailers in a period. Furthermore, the existence of websites that facilitate

comparisons of basket prices for multiple online retailers should increase the likelihood of cross shopping. However, a contra argument can also be proposed. That is, the ease of ordering/re-ordering from a retailer-specific savable list, and the need to set up a new account to order from another retailer, makes online shoppers less likely to use other online retailers to buy the same category. Also, while stock outs are often the reason for cross-retailer shopping offline, they are less likely to happen online. Even if stock outs happen, in the online environment another item is usually suggested, which should reduce the need to cross-shop. These factors point to the following competing propositions:

P2: Within a category, there are higher (lower) levels of consumer cross-purchasing between the online stores of different retailers than the extent of cross-purchasing in off-line modes between those retailers.

Next we consider how the extent of retailer cross-purchasing via online stores could be changing over time. As with the previous discussion, there are different viewpoints. First, one could argue that over time, consumers become more sophisticated in their use of online shopping. Therefore, shoppers who use the internet regularly for purchasing groceries may become more confident and prepared to undertake comparison-shopping in the online mode, thereby reducing their loyalty to a particular online retailer. This confidence should lead to heightened cross-retailer online shopping over time. On the other hand, decades of research show that shoppers, when placed in a new situation, quickly form habits (Martin, 2008). Therefore, over time shoppers should become more loyal to one online retailer and there will be less cross shopping in the online mode over time. Therefore, another proposition with competing alternatives is proposed:

P3: The extent of online cross-retailer shopping is increasing (decreasing) over time.

We now turn to brand-level buying and loyalty across online and in-store channels.

Behavioural Loyalty

Brand loyalty is one of the most widely researched topics in contemporary marketing. The focus of this paper is on behavioural loyalty (e.g. Ehrenberg, 2000). In the following section, we discuss the literature on behavioural loyalty differences between online and offline channels, and develop propositions.

Choice among brands in repetitively bought categories is largely habitual - consumers routinely buy from a largely stable repertoire of brands over time (e.g., Ehrenberg, 2000; Martin, 2008). However, there are theoretical expectations that brand loyalty should be higher online than offline. The reason for expecting higher loyalty online is the possibility to have savable 'shopping lists', which restrict consideration sets, and hence should increase loyalty (Chu et al., 2008). For example, Tesco offers "Quick shop using the last order" and Asda "See all your favourite items from previous shops" options. Deregatu et al. (2000) found less brand switching online than offline, supporting the assumption of higher loyalty due of savable lists. Danaher et al. (2003) compared brand loyalty online and offline to Dirichlet benchmarks, and found that large brands have higher than expected loyalty in the online mode; but smaller brands had somewhat less than expected. The study therefore implies overall, brand loyalty could be quite similar online to in-store. In the most recent study of online shopping behaviour, Chu et al. (2010) showed higher brand loyalty online across multiple product categories. Therefore, there are reasonably consistent results indicating brand loyalty is somewhat higher online than offline. Accordingly, the fourth proposition is as follows.

P4: Behavioural brand loyalty levels online are higher on average, than offline.

Small versus large brands

Is the rise of online shopping good news for bigger brands, because they can capitalise on their established reputation; or is it good news for small brands, allowing them a growth opportunity? As mentioned, Danaher et al. (2003) found that large brands have higher than expected loyalty online than offline, while smaller brands had the opposite. While their data did not allow for an explanation of the result, they concluded it was because of (1) stronger reliance of brand names online, as other sensory information is not accessible online as compared to offline and/or (2) higher perceived risk in buying online than offline leads to repeated purchasing of a well known, hence trusted brand. Supporting the first explanation, Deregatu et al. (2000) found that brand name (net of other marketing mix effects) is a more important purchase cue online than offline. While the empirical evidence supports heightened big-brand loyalty online, it is not necessarily intuitive that brand-name familiarity should heighten loyalty to big brands online. Arguably, brand-name familiarity could not only boost loyalty, but boost the penetration of the larger brand as well. If that were the case, the big brand might well be bigger online, but its loyalty level could still be 'as expected' for a brand of its now larger size, since penetration and loyalty are systematically related (e.g. Ehrenberg et al., 1990). However, given past results we propose that:

> *P5: Large brands have higher behavioural loyalty online than in-store, small brands have lower behavioural loyalty online than in-store.*

Private labels

Private labels (also called home brands or store brands) are becoming increasingly more important for retailers. Retailers see private labels as a vehicle for higher profit margins and a point of differentiation from competitors (Kumar and Steenkamp, 2007). Private label penetration is growing fast worldwide (Trojanowska, 2012). One of the barriers to growth for individual private labels is their restricted distribution, although this is also a principal

characteristic that differentiates them from national brands. The online environment partially removes the selective distribution barrier, as shoppers can shop at different retailers from the convenience of their computer.

Past research has found that non-users of private labels know almost nothing about them (Nenycz-Thiel, 2010). In comparison, non-users of national brands have good levels of knowledge about those brands. This difference in knowledge about brands is mainly due to out-of-store advertising for national brands. Advertising reaches brand non-users and helps to build brand associations. Those associations act as cues in a buying occasion. Therefore, non-users of private labels, being un-advertised, often fail to notice them on shelf. This situation may be different in the online environment, where brands are usually sorted and presented alphabetically, hence giving private labels a better chance to be noticed by non-users. Further, retailers' online websites often have links to private label lines and ranges (e.g. Sainsbury's and its *Taste the Difference* range), hence giving consumers the opportunity to skip over national brands. Retailers often give the shopper a Cheaper Alternative function for many products (see e.g. http://www.tesco.com/cheaperalternatives) that offers a private label product as a substitute to a top selling brand. Therefore, the final proposition is that:

P6: Private labels enjoy higher share of purchases online than offline.

Data and analysis

To investigate these propositions we used consumer panel data provided by Kantar. The data are for the UK market and comprise brand unit sales and loyalty metrics for brands in ten diverse grocery categories. The Kantar data are obtained from a panel of over 15,000 households, weighted geographically and demographically to match the composition of the UK population. The data provided are at the aggregate brand / retailer level, not at the individual purchase record level. The available data includes the mode of purchasing (in-store or online). We analysed data for three leading UK retailers: Tesco, Asda and Sainsbury's, all of which have significant online and in-store presence in the UK market. Examining multiple retailers enables us to examine purchasing and loyalty metrics across stores and PL brands. We conducted the analysis at the level of the individual brand within each category, not at the level of the entire 'shopping basket' purchased on each trip. The unit of analysis is purchase incidence, rather than dollar amount or volume bought.

Purchase duplication – illustrative analysis using one product category

To address proposition 1 and 2, cross purchasing (or 'purchase duplication', as per Ehrenberg, 2000) was calculated for in-store and online modes. An example of this analysis is shown for breakfast cereal in Table 2. Reading across the Tesco row 64% of households bought breakfast cereal at a Tesco store in 2008. Of those households, 43% also bought cereal at an Asda store, 37% at a Sainsbury's store, then 14% also bought from Tesco online, 4% from Asda online and lastly, 2% via Sainsbury's online. Therefore, to use Ehrenberg's term, many Tesco store-buying households are 'duplicated', i.e., also appear, as buyers of Asda, Sainsbury and so on. Table 2 also shows four purchase duplication coefficients or 'D-coefficients' (e.g. Keng and Ehrenberg, 1984). The D-coefficient expresses the amount of purchase duplication among certain entities *A*,

B, *C* etc., controlling for their overall size, or market penetration. For example, a D-coefficient of 2.0 suggests that the proportion of *A*'s customers who also buy *B* is 2.0 times the market penetration of *B*. A higher D-coefficient implies stronger substitution between the entities (e.g. brands, retailers, shopping modes) of interest. In Table 2 the D-coefficients refer to combinations of the two shopping modes – in-store shoppers who bought that category at other retailers in-store, and at other retailers online; and online shoppers who bought that category at other retailers in-store, and other retailers online. The respective magnitude of these D-coefficients and their interpretation is discussed shortly.

Table 2. Duplication across retailers and purchase modes – breakfast cereal. UK, 52 weeks 2008

		% who also bought …					
		In-store			*Online*		
Retailer	**% HH's buying at all …**	Tesco	Asda	Sainsbury's	Tesco	Asda	Sainsbury's
In-store							
Tesco	64	-	43	37	**14**	4	2
Asda	45	62	-	35	10	**7**	2
Sainsbury's	37	63	41	-	9	3	**4**
Online							
Tesco	10	**84**	42	34	-	13	7
Asda	4	61	**82**	33	36	-	8
Sainsbury	2	49	33	**75**	34	14	
Average	***27***	***64***	***48***	***42***	***21***	***8***	***5***
Duplication co-efficients		**Store-store = 0.96 online-store = 1.1**			**Store-online =1.1 online-online =3.4**		

Table 2 shows that in this sample category, the majority of any particular retailer's online shoppers also shop in-store at that retailer in the time period. For example, 10% of households bought cereal online from Tesco; of those, 83% also bought cereal in a Tesco store over the year. Results were similar for Asda and Sainsbury online shoppers – 82% and 75% of them also bought in-store from the same retailer respectively. What this pattern amounts to is retailer-based 'partitions'. A partition is defined here as a group of entities – in this case, retailers and their physical store and online modes –that are more directly substitutable with each other, manifest as heightened levels of cross-purchasing. This definition is consistent with past studies that have identified market partitions on the basis of heightened levels of brand switching (e.g. Fraser and Bradford, 1983; Kalwani and Morrison, 1977). The partitions here reflect that online shoppers tend to unduly favour retailers at which they also shop in-store (for the same category); and vice-versa: shoppers who buy in-store at a specific retailer also tend to use that same retailer when buying the category online. For example, 83% of Tesco's online shoppers also purchased the same category at a Tesco store, but fewer Asda and Sainsbury online shoppers (61% and 49% respectively) also bought from Tesco online in the time period.

Now we examine proposition 2 relating to heightened levels of cross-purchasing or purchase duplication between the various online stores. In other words, whether shoppers who engage in online shopping at retailer *A*, for example, are more likely to engage in online shopping at retailer *B* or *C*, compared to the extent observed for in-store shoppers at *A*. The analysis of D-coefficients in this example category shows that households who buy cereal from one retailer online are much more likely to buy it online from one of the other two retailers, compared to their likelihood of buying it in-store from one of the other two retailers. In Table 2 we see the D-coefficient for purchase duplications across stores for in-store purchases in this category is 0.96 – in other words, the extent of purchase duplication across retailers in the in-store mode is on average 0.96 times their penetration. From in-store to online (and vice versa) it is 1.1 times store penetration. Lastly, the extent of online purchase duplication across retailers is much higher, on average 3.4 times their online penetration. For example, 36% of Asda online shoppers and 34% of Sainsbury's online shoppers also buy the category via Tesco's online store. These figures are approximated well by the D-coefficient of online-online shopping of 3.4 (3.4 x Tesco's penetration of 10 = 34% purchase duplication).

Findings across the ten product categories

The purchase duplication approach described above was used for all ten categories. In terms of proposition 1, we found in all cases the majority of a retailer's online buyers are also its in-store buyers. The results are summarised in Table 3. On average, 66% of a retailer's online buyers are also in-store buyers of the same retailer; compared to only 31% of them being in-store buyers of another retailer. This result provides strong support for proposition 1.

Table 3. Comparing retailer's online shoppers who are also in-store shoppers of the same retailer, vs. shoppers of another retailer

	Average % of retailer's online shoppers (10 categories, 52 weeks)	
Category	who are also in-store shoppers of that **same** retailer	who are also in-store shoppers of **other** retailer.
Tesco	70	27
Asda	67	35
Sainsbury's	62	30
Average	***66***	***31***

For proposition 2, the D-coefficients for online shopping across retailers were much higher than the coefficients for store to store, or store to online, in all categories. In other words, online shoppers of one retailer have a much higher tendency to cross-shop other retailers online, compared to their tendency to cross-shop those other retailers in-store. The D coefficients for online shopping across retailers were all approximately 3.0 or more (as per Table 4) whereas the D coefficients for online to in-store shopping across retailers were all approximately 1.0, similar to those shown in Table 2. Overall, these findings support proposition 2. They suggest there is a strong online shopping partition in the UK grocery market, with more purchase duplication of customers within the online mode across retailers.

To determine if the extent of retailer purchase duplication of online grocery shopping is growing, the ten categories were compared across the years 2008 and 2010. Results show an increase in retailer purchase duplication – measured as the D coefficient - in all categories over the period as per Table 4. A paired sample t-test was significant (t=-3.0, d.f. 9, p two-tailed =0.014). This supports the idea that online cross-retailer shopping is growing, as stated in proposition 3.

Table 4 Purchase Duplication co-efficients across retailer's online stores

	Duplication co-efficients (10 categories, 52 weeks)	
Category	**2008**	**2010**
Cereal	3.4	3.9
Laundry detergent	3.1	3.2
Biscuits	4.6	5.0
Margarine	3.8	4.0
Cough Liquid	3.1	5.2
Dog Food	4.5	4.8
Toothpaste	3.7	4.5
Coffee	4.5	4.6
Shampoo	4.0	4.6
Soft Drinks	3.2	3.7
Average	***3.8***	***4.3***

Next we examine proposition 4 relating to brand loyalty for in-store and online buying.

Brand loyalty

There are a number of metrics for the measurement and analysis of behavioural brand loyalty. We use SCR, or share of category requirements. This metric is calculated simply as purchases of the brand, divided by total purchases of all brands in the time period. SCR has been used in numerous brand loyalty investigations (e.g., Bhattacharya, 1997; Bhattacharya et al., 1996; Fader and Schmittlein, 1993; Jung et al., 2010; Stern and Hammond, 2004).

The data available for the brand loyalty analysis are for the same ten categories reported earlier. The data comprise SCR for 210 brands for both in-store and online purchases made in the three largest UK retailers. To facilitate testing the propositions relating to brand loyalty and size, brands with a market share of more than 1.5 times the average for the category were coded as 'big'; and small brands were coded as such if they were less than 0.5 times the average size for the category. We tested if the results were sensitive to these size multipliers, and they were not.

Preliminary analysis indicated that average SCR over 52 weeks is higher for the online shopping mode compared to in-store (in-store SCR 25%, online SCR 31.5%, $t=-14$, d.f. 209, $p<0.001$). However, average category purchase frequency is consistently *lower* in the online mode compared to in-store for the same time period. For example, the average category purchase rate for cereal online over 52 weeks is 11 purchases, compared to 17 for in-store buying over the same period. This lower purchase frequency for online purchasing could bias SCR downwards, because fewer purchase occasions affords less opportunity to buy multiple brands in the time period. Therefore, to ensure the comparisons of SCR are not biased by the different purchase rates for in-store and online, a series of steps were followed which are detailed in Appendix 1.

The loyalty comparisons for in-store and online are presented in Table 5. Over all ten categories, the average analysis period for in-store purchases is 42 weeks, and 78 weeks for online purchases.

Table 5 Analysis of SCR across buying modes (10 categories, 210 brands)

	Average Brand SCR (average 42 weeks for in-store, 78 weeks for online)						
	In-store brand SCR	Online brand SCR	Difference (Online-in-store)	Std. error of difference	t	d.f.	p-value (two-tailed)
All Brands[1]	27.4	29.8	2.4	.38	-6.05	209	0.00
Market-Leading brands*	30.8	32.5	1.7	.72	-2.3	36	0.026
Small brands*	20.5	25.4	4.9	1.28	-3.8	25	0.001
Food brands	27.6	30.6	-3.0	.67	-4.39	57	0.001
Non-Food brands	27.4	29.5	-2.1	.47	-4.49	151	0.001

The analysis shows that brand loyalty, measured as SCR in this large sample of brands, does differ to some extent by buying mode. The average brand SCR is 27.4% for in-store purchases and 29.8% for online purchases. The difference is statistically significant, but fairly small in absolute terms. This result is consistent with several past studies, such as Degeratu, Rangaswamy and Jianan (2000). Next, there was no evidence that small brands have lower loyalty in the online mode compared to what they achieve in-store. Small brands had higher SCR online compared to in-store. Indeed, they showed a somewhat larger loyalty difference in the online

[1] The pattern of results is the same if we simply compare SCR's for 52 weeks of in-store to 52 weeks of online – overall, SCR is slightly higher for online purchasing, and is higher for small brands as well as big brands. Therefore while there is a rationale for combining SCR's for differing time periods to properly compare in-store and online purchasing, the results still hold without doing so.

mode compared to that shown by big brands. We also checked if loyalty differed by purchasing mode specifically for food versus non-food categories, since Chu et al. (2010) found the effect of online purchasing on brand loyalty to be stronger for food items. To do so, each category was classified as food or non-food (omitting dog food and cough liquid), and a series of t-tests were run. Results in Table 5 show that both category types exhibit somewhat higher brand loyalty in the online mode compared to in-store.

Private label market share

Finally, the analysis examines if PLs enjoy more market share in online purchasing compared to in-store. To facilitate this analysis we re-calculated brand shares within each retailer, such that we can determine the market share of, for example, an Asda PL in terms of Asda's total category sales, and a Tesco PL in terms of Tesco's total category sales, rather than the market shares of those PL's in the total market across all retailers. We compared the market share for PLs in each buying mode; as well as splitting the PL items into three price / quality tiers. The tiers were based on the PL's average price per unit of volume. PLs that sell in the range of +10% to -30% compared to manufacturer brands were classified as mainstream; PLs selling below that level were classed as budget, and those selling at more than 30% above the average manufacturer brand price were classed as premium. We checked these classifications against the brand name, which in most cases provided confirming evidence as to the correct tier for the brand (e.g. Tesco value, Sainsbury's basics). We then calculated the absolute difference in market share across buying modes for each retailer's PL brand(s). The calculation was simply (PL share online – PL share in-store). While there are inevitably scaling effects using absolute differences (a 1-point absolute share difference for a 1% share brand is contextually different to a 1-point share difference for a 20% share brand), there are also potentially misleading scaling effects using

proportional differences (a 1% difference for a 1% share brand is 100% difference). Therefore, the comparison used absolute differences, because the results are easily interpretable.

The PL market share results are summarised in Table 6. They indicate some directional support for PLs having slightly higher market share in the online mode ($p=0.15$). Further analysis indicated that if mainstream and premium PLs are grouped together, they enjoy higher market share online than in-store, with a magnitude of approximately 1 market share point, (marginally statistically significant, at $p=0.12$).

Table 6 Analysis of brand market shares across buying modes

	Market share within each retailer (10 categories, 52 weeks, 3 retailers)						
	In-store	Online	Difference	Std. error of difference	t	d.f.	p-value
All brands	0.057	0.059	0.0018	0.0013	1.3	455	0.18
Market-Leading brands *	0.153	0.152	-0.001	0.004	0.2	93	0.83
Small brands *	0.007	0.009	0.001	0.0006	2.2	135	0.03
All Private labels	0.08	0.09	0.008	0.005	1.46	63	0.15
Budget private labels	0.076	0.075	-0.0007	0.006	.15	18	0.91
Mainstream / Premium private labels	0.085	0.097	0.012	0.007	1.59	44	0.12

** asterisked are manufacturer brands only*

Summary, conclusions and managerial implications

Our study of online versus in-store purchasing across ten grocery categories in the UK found that the majority of online shoppers for a retailer are also its in-store shoppers. Next, we found a heightened tendency for online shoppers at *one* retailer to also shop online at *other* retailers. This extent of online cross-retailer purchasing was found to be consistently increasing over time, between 2008 and 2010. The study examined brand loyalty, and found brands exhibit somewhat higher SCR in the online mode compared to in-store. Both small and big brands obtained higher SCR online, indeed the effect appears stronger for small brands. Finally, the study found some indication that private label brands – specifically, medium and higher-quality level private labels, enjoy approximately 1 point extra market share online than in-store.

A summary of the research propositions tested is shown below:

Table 7 Summary of results

	Proposition	Result/Finding
1	Within a category, the majority of online shoppers of a particular retailer are also offline (in-store) shoppers of the same retailer	Confirmed
2	Within a category, there are higher (lower) levels of consumer cross-purchasing between the online stores of different retailers than the extent of cross-purchasing in off-line modes between those retailers.	The levels of cross-purchasing between online retailers are higher
3	The extent of online cross-retailer purchasing is increasing (decreasing) over time	There has been an increase in online cross-purchasing over time
4	Behavioural brand loyalty levels online are higher on average, than offline.	Brand loyalty is slightly higher online.
5	Large (small) brands have higher (lower) behavioural loyalty online than offline.	Both large and small brands have higher behavioural loyalty online. The effect appears stronger for small brands.
6	Private labels enjoy higher share of purchases online than offline.	Mainstream / premium PLs do enjoy slightly higher market share online.

Several general learnings and managerial implications arise from the study. First, while consumers have always cross-purchased from multiple retailers in a time period such as a year (Dawes and Nenycz-Thiel, 2013; Keng and Ehrenberg, 1984; Keng et al., 1998; Uncles and Hammond, 1995; Uncles and Kwok, 2009; Wrigley and Dunn, 1984b), these findings are consistent with the idea that the internet has removed location-based barriers to shopping across multiple retailers. Consumers appear quite prepared to take advantage of a technological change that allows them to buy from an expanded repertoire of retailers in a time period, even if to do so some upfront effort is involved in setting up multiple retailer online accounts. As the incumbent retailer brands in this market are all well-known to consumers (Tesco, Asda, Sainsbury's), a growing number of consumers trust the providers enough to set up accounts with several of them. As such the findings support the role of familiarity and trust in consumer adoption of e-commerce as highlighted in past work (Gefen, 2000).

The outcome of online-induced consumer cross-purchasing is increased competitive intensity for the retailers involved. One response to competitive pressure that retailers have reportedly turned to is the strategic use of private label brands (Kumar and Steenkamp, 2007). Retailers reportedly see private labels as an important component to differentiate themselves from competition (Ailawadi et al., 2008). Despite the heavy investment by UK retailers in private labels, the analysis here found high and increasing levels of purchase duplication among them, suggesting lessened differentiation or heightened substitutability. With an increased number of shopping websites, which allow direct basket price comparisons across retailers (e.g. http://www.mysupermarket.co.uk/), such cross-purchasing at many different retailers is likely to increase further. In response, retailers may need to consider additional strategies, perhaps in co-operation with manufacturers, to make their online offerings more distinct from competitors. The results reported here also challenge the rationale for making heavy investments in store loyalty

programs. Consumers shop at multiple stores, both online and offline, and are likely members of multiple loyalty programs. Arguably, the money the retailers spend on trying to make their consumers more loyal could be spent on improving distribution, online store navigability, and building retailer brand image.

From a general consumer behaviour viewpoint, the results highlight several important aspects of consumer loyalty. We see that online shopping has resulted in greater cross-retailer purchasing, implying many consumers are less loyal to any specific retailer than before. However, at the same time consumer loyalty to the brands they buy from those retailers is approximately similar, in fact slightly higher, online. We suggest these opposing outcomes pertain to opportunity, and to the value consumers derive from at least limited variety. First, it has been known for many years that repeat-buying loyalty is influenced by opportunity – more buying opportunity is linked to lowered brand-loyalty (Ehrenberg et al., 2004). Online buying has provided an opportunity – by removing locational constraints – for shoppers to do more cross-retailer purchasing, and many have taken that opportunity. Online buying also offers features such as saveable lists that could potentially increase brand loyalty with a commensurate reduction in brand repertoires. Yet the results here suggest only a small increase in loyalty to brands. Therefore, perhaps consumers are less prepared to accept a significant reduction in the number of brands they buy, because they do derive real value from variety.

Next, brand manufacturers as well as retailers may be interested to see that private label market share was only slightly higher in the online channel. Therefore, continued growth of the online channel suggests concomitant erosion of manufacturer-brand share may occur, but only at a small level. There are several possible explanations for the slightly higher share for PLs online found here. First, past research shows that people who do not use specific private labels simply do not

notice them on-shelf, with an explanation being a lack of out-of-store advertising for PLs (Nenycz-Thiel, 2010). Online retailers can enhance the likelihood that even non-PL users will notice their private label brands by directly suggesting them as cheaper alternatives for national brands or giving consumers the opportunity to shop on a sub website with solely private label options (e.g. *Asda Chosen by you* offers). Furthermore, in the online environment brands are presented alphabetically by default. This presentation takes away the national brand equity advantage on shelf in terms of brand image and distinctive assets, making other cues – such as the lower price of many PL brands – more salient. Similarly, some retailers offer the function of filtering out options according to certain criteria, one of them being a private label. This filtering could potentially increase the share of private labels – although the results here suggest such effects are small.

This study has made four contributions. It has adapted an approach used to analyse multi-brand and in-store buying, to examine competition across in-store and online channels. The study has reported a series of findings that are managerially relevant to brand owners and retailers. Several general insights into consumer behaviour have been drawn out, and the study has highlighted the importance of familiarity and trust in adoption of online purchasing.

To conclude, the results reported present interesting avenues for future research. The first is that this study, while using ten product categories, is limited to the grocery sector. The grocery sector features quite regularised shopping behaviour, so an interesting question for future work would be to see how online and in-store buying compare in less regularly-purchase categories such as apparel, pharmaceuticals or electronics. Another category that offers potential for learning is the luxury goods category. We might expect consumers to engage in high levels of comparison

shopping for luxury goods, given their price level, therefore the extent of retailer cross-purchasing could be very high.

Next, the study here used purchase incidence as the unit of analysis. Past work on multi-store buying has examined dollar spend across retailers (e.g. Dunn and Wrigley, 1984), and found shoppers allocated a large proportion of their total spend toward a most-favoured store. Therefore, future work comparing online and in-store brand and category buying could examine a more comprehensive suite of brand and retailer metrics, such as average volume and dollars bought per purchase. The outcomes from such an investigation of that sort would doubtless be of interest to retailers as well as brand owners.

Another avenue would be to systematically benchmark online and in-store brand and category metrics against those of the Dirichlet model. Work spanning several decades (e.g. Keng and Ehrenberg, 1984; Uncles and Ehrenberg, 1990; Uncles and Kwok, 2008; Wrigley and Dunn, 1984b) shows how model-based benchmarks can be used not only to identify patterns but also highlight deviations – an extension would be to do this as part of a comprehensive comparison of online and in-store shopping modes. A final recommendation for future work is to expand the scope of analysis from brands in specific categories to a 'whole of basket' analysis, for example to determine the shopper's loyalty towards various retailers in online and in-store modes, for their entire grocery (or other) category needs.

Appendix 1: Calculation of SCR

The steps to calculate comparable SCR for online and in-store modes were:

1. Calculate the brand SCR's for 52-weeks of in-store purchasing and 52 weeks of online purchasing for a focal category. Note the category purchase rate for in-store and online purchases.
2. Calculate the brand SCR's again for differing time periods such that the average category purchase rate for online purchasing matches the 52-week rate for in-store purchasing; and the average category purchase rate for in-store purchasing matches the 52-week rate for online purchasing. For example, find an appropriate time period for online breakfast cereal purchasing such that the average category purchase rate is 17, which is then the same as for 52 weeks of in-store purchasing.
3. Calculate the average SCR for each brand, for the two time periods of online purchasing, and for the two time periods of in-store purchasing respectively.
4. Compare the resultant brand SCR's across online and in-store purchasing, for each category.

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