# How persistent are Duplication of Purchase deviations?

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# Abstract

In competitive markets, brands predictably share more customers with bigger competitors and fewer with smaller ones. Yet this robust duplication of purchase pattern occasionally has deviations. Where two or more brands share excess additional customers with each other (within) and fewer than expected with the rest of the market (between) – there is a partition. If brands have excess sharing (within) but sharing as expected with the rest of the market (between) – there is a grouping. Partitions generally occur because of functional difference from other brands. While partitions observations occur in cross-sectional data, typically of a year or less, no empirical evidence exists showing whether they persist over extended periods. Examining expected partitions in the United Kingdom for ten consumer goods categories, the authors show that two in five expected partitions are groupings, and an overwhelming majority persists over the medium term of three years. The findings contribute to the theoretical knowledge around market stability and Dirichlet assumption and allow marketers to confidently add or remove products knowing the partitions/groupings are likely stable.

Keywords: duplication of purchase, partitions, consumer goods categories, market stationarity, Dirichlet, grouping

# 1 Introduction

Ragú, the leading brand of pasta sauce in the United States, shares 41% of its customers with Prego, 44% with Ragú Old World, and 40% with Francesco. In return, these brands share, on average, 47% of their customers with Ragú (Dawes, 2016). Experienced marketers understand that their brand’s customers are also their competitor’s customers, given that repertoire buying is normal. Analyzing consumer purchase data shows how brands within the same category share customers.

Such brand level analyses are a regular occurrence in consumer goods categories. However, to determine if the level of sharing is normal, benchmarks are needed. For example, is Ragú sharing too many or too few customers with Prego, or are they sharing customers as expected? Previous research finds that the level of sharing is predictable - brands share more customers with bigger brands and fewer customers with smaller brands (Ehrenberg and Goodhardt, 1970) – this is the duplication of purchase (DoP) pattern (Goodhardt and Ehrenberg, 1969b; Bennett and Graham, 2010; Anesbury et al., 2018b), or the DoP law (Sharp, 2010).

Deviations to the pattern (i.e., partitions or groupings) have easily identifiable causes (Sharp et al., 2012), often occuring when brands are functionally different. However, there are a range of other causes, including price tiers, quality perceptions, availability restraints including regional brands with different mental and physical availability or perhaps even nationalism or a combination of the above, as seen with the slight partitioning between Russian and foreign consumer goods brands reported by Kennedy and McColl (2012). It is, however, unclear whether such previously discovered partitions (Scriven and Danenberg, 2010; Dawes and Nenycz-Thiel, 2013) are partitions, or if they are groupings (with excess sharing within, but expected sharing between), and if they are isolated cases resulting from particular marketing interventions or if they persist over time (Scriven and Bound, 2004).

Consumers typically purchase 2-3 brands out of the dozens of alternatives within any consumer goods category a year (Banelis et al., 2013; Trinh, 2014). Consumers' repertoires may comprise brands sharing a particular functionality (e.g., decaffeinated coffee brands (Uncles et al., 1995)). Therefore, some brand offerings will meet the needs of a subset of consumers whose needs vary from the category norm - hence there is greater sharing across these offerings for those consumers who purchase those offerings compared to brands that do not have functionality. Manufacturers aim to appeal to the entire market by fielding brand portfolios to cover diverse needs (Tanusondjaja et al., 2018), so it becomes normal for all coffee brands to offer caffeinated and decaffeinated offers or other features that are popular. Hence some deviations or partitions may be temporary.

Most previous partition analyses has been limited to single periods of up to one year (Dawes et al., 2010; Ehrenberg and Uncles, 1999; Goodhardt et al., 1984). Only three studies have looked at partitions across consecutive years (Mansfield and Romaniuk, 2003; Mansfield et al., 2003; Ehrenberg and Bound, 1999), but these studies were limited to vehicles, and tourism destinations. The current research, therefore, provides novel knowledge about the persistence of partitions for consumer goods categories over time.

Building on the foundational work by Gerald Goodhardt (Goodhardt, 1966; Goodhardt et al., 1984; Goodhardt and Ehrenberg, 1969a), the current study provides two minor contributions:

* Further replication of the duplication of purchase pattern showing predictable customer sharing (Uncles and Ellis, 1989; Anesbury et al., 2018a; Goodhardt, 1966), and
* An extension of the knowledge of functional differences (Wrigley and Dunn, 1984b; Brewis-Levie and Harris, 2000; Goodhardt et al., 1984), and private labels (Ellis and Uncles, 1991; Dawes and Nenycz-Thiel, 2013) as causes of deviations to the expected pattern (i.e., are they partitions or groupings).

The papers major contribution is providing novel evidence for the stability of duplication of purchase deviations in light of the independence assumption (Scriven et al., 2017), and parameter stability (Stocchi and Wright, 2010) of the Dirichlet model (Ehrenberg, 1959; Goodhardt et al., 1984).

The fit of the Dirichlet model (Goodhardt et al., 1984), or the double jeopardy pattern which is incorporated within it (McPhee, 1963; Ehrenberg et al., 1990), is typically examined for a once-off, set period, often annual periods. Occasionally, the observations are conducted over continuous weekly (Wright and Sharp, 2001; Wright and Riebe, 2010; Danaher and Dagger, 2012), monthly (Dall'Olmo Riley et al., 1997), quarterly (Graham, 2009; Ma et al., 2010; McCabe et al., 2012; Habel and Lockshin, 2013), six-monthly (Bongers and Hofmeyr, 2010), and annual (Ehrenberg, 1997; Wright and Riebe, 2010; McCabe et al., 2012) periods. However, few studies examine the persistency of deviations to the pattern across time. For example, Pare et al. (2006) finds 51% of deviating brands in the first year continue to deviate in the second. Extending the analysis, Pare and Dawes (2007) find 40% persistent over three years.

# 2 Background and research questions

# 2.1 Brands share customers in line with their competitors' size

The discovery of the DoP pattern came from analysis of television viewing data. In this context it is known as the duplication of viewing pattern, where it is now expected that the number of duplicated viewers (i.e., the number of people watching any pair of television programs) for any two programs on different days is predictable from the programs’ audience size - irrespective of other factors including program content (Goodhardt, 1966; Goodhardt and Ehrenberg, 1969a). The same sharing pattern occurs for other media, including radio listening (Lees and Wright, 2013).

The call for further investigations to improve the finding’s generalizability (Uncles et al., 1995) resulted in duplication analyses of store patronage (Romaniuk, 2005; Sharp and Sharp, 1997; Wright et al., 1998; Uncles and Kwok, 2008; Uncles and Hammond, 1995); financial services (focused on consumer segments (Lees et al., 2016; Lees and Winchester, 2014)); SKUs such as flavors and pack-sizes (Singh et al., 2008); and across varied countries including emerging markets (Uncles and Kwok, 2009; Uncles and Kwok, 2008; Bennett, 2008; Bennett and Graham, 2010; Kennedy and McColl, 2012). Other research has documented the pattern across varied consumer categories such as retail fuel (Wright et al., 1998), cars (Ehrenberg and Bound, 1999; Bennett and Graham, 2010), televisions (Bennett, 2008), and clothing (Dawes, 2009; Brewis-Levie and Harris, 2000) with lots of evidence from consumer goods categories (Uncles and Ellis, 1989; Scriven and Danenberg, 2010; Keng et al., 1998; Wrigley and Dunn, 1984a; Goodhardt et al., 1984; Anesbury et al., 2018a; Keng and Ehrenberg, 1984; Wrigley and Dunn, 1984b; Kennedy and McColl, 2012). DoP analysis was also applied to categories that require a minimum age to purchase (i.e., alcohol) (Dawes, 2008; Dawes, 2014) and expanded to leisure activities (Scriven et al., 2014), gambling (Hand and Singh, 2014; Lam and Ozorio, 2013), and tourism destinations (Mansfield et al., 2003; Mansfield and Romaniuk, 2003). The accumulated evidence confirms that consumers typically buy several brands within any category, that duplication levels between brands are predictable from brand size, and that when a partition occurs in a category, it often has a functional basis.

# 2.2 Deviations to the DoP pattern based on functionality, or private labels

There is empirical evidence that functional differences between brands cause deviations (i.e., partitions or groupings) within a market. For instance, consumers shared their instant coffee purchases between supermarkets geographically close to one another or located within the same shopping centers (Wrigley and Dunn, 1984b). Further, UK high street women’s wear stores that targeted younger women shared more customers than expected (Brewis-Levie and Harris, 2000). Other examples include fast-food chains that shared the same cuisine (Romaniuk, 2005); gender-specific bodysprays (Scriven and Danenberg, 2010); Australian beer brands that shared a parent company and distribution (Dawes, 2008); butter that was healthful (Scriven and Danenberg, 2010), and television sets that were global brands (potentially a price point partition) (Bennett, 2008).

Some consumers may restrict their purchases to private labels in specific categories perhaps because they occupy a lower price point or provide simple heuristic that makes purchase quicker and easier. However, the existing empirical evidence is still unclear. For example, in the UK coffee market, there was no evidence of partitioning or grouping between private label brands and manufacturer brands, while other categories, including fruit squash and fabric conditioner, showed little evidence of excessive sharing between private labels (Uncles and Ellis, 1989). Further studies in the US and UK for household cleaners, paper towels, cheese, and ketchup showed that private label buyers also buy national brands within the same store, also at other stores without the private label, and other private labels from other stores (Bound and Ehrenberg, 1997). Later analysis of 27 consumer goods categories in the UK reported excessive sharing amongst private label brands in 14 (52%) of the observed categories (Dawes and Nenycz-Thiel, 2013). Despite the mixed evidence regarding private label deviations (Dawes and Nenycz-Thiel, 2013), this study includes several categories that are likely to exhibit them to document whether private labels are partitions or groupings and if they are persistent over time.

The discussed examples only cover one analysis period ranging from 24 weeks (Wrigley and Dunn, 1984b), 48 weeks (Brewis-Levie and Harris, 2000), and 52 weeks (Scriven and Danenberg, 2010; Bennett, 2008; Uncles and Ellis, 1989; Dawes and Nenycz-Thiel, 2013). However, there is no evidence to show whether any deviations carried over into the following periods. Such evidence is vital. As Dawes and Nenycz-Thiel (2013) note, the finding that private labels compete against one another more intensely than expected shapes both a manufacturer and retailers’ strategy. However, if we find that the deviations are not persistent, then strategies alter.

# 2.3 Consumers limit their category purchases to a few brands

Deviations may occur because consumers generally purchase from a small number of brands within any consumer goods category. The NBD-Dirichlet model assumes category buyers purchase a small number of available brands (Scriven et al., 2017). Early evidence from the UK toothpaste category, for example, showed that consumers purchased on average 2.6 brands in 12 weeks (Goodhardt et al., 1984) or 2.4 brands of instant coffee over 24 weeks (Wrigley and Dunn, 1984b). Later, findings show Australians buy on average 2.8 beer brands (Dawes, 2008) over a year, while British consumers bought 2.3 brands of instant coffee, 2.4 brands of tea bags, and 2.9 brands of toilet tissue (Trinh, 2014). The most comprehensive study analyzed 48 categories in the UK and 74 categories in the US, finding that consumers bought between 2.0 and 2.4 brands per category on average (Banelis et al., 2013). These findings apply to in-store purchasing and online supermarket buying (Trinh et al., 2017).

Over a series of category purchases, the DoP pattern is clear in aggregate – most consumers limit their purchases to a few brands within a given category, with sharing inline with size. However, the brand repertoire literature is not clear about how consumers choose their particular brand portfolios nor how they choose to limit their purchases to specific brands. For example, do the shops in a repertoire of online supermarkets have functional similarities such as free delivery, everyday low price, or a specific delivery area? Do toothpaste brand repertoires share a functional difference such as tartar control, whitening, or formulations for sensitive teeth? Do instant coffee brand repertoires only consist of decaffeinated or caffeinated coffee brands reflecting the individual’s preference, or regularly include a brand of each to cover the range of needs a consumer may have over time or situations? DoP analysis can provide insights into how customers distribute their category purchases. If a deviation (i.e., partition or grouping) occurs, this would indicate that the restriction in buying relates to a functional difference or other cause, as discussed above.

# 2.4 Deviations to the duplication of purchase pattern over time

A variety of factors may influence the stability or persistence of deviations across time. First, functional deviations (i.e., diesel, leaded and unleaded petrol) may be subject to mandatory change where the legislation prevents the partition’s persistence (e.g., leaded petrol is no longer on the market). Second, the addition of product types or features into the category may only be a temporary deviation. For example, initially, hybrid cars (using energy recovery systems) were a separate vehicle category. Over time, such technology has been introduced across many vehicle types, blurring the distinctions that separate partitions in the automotive category. Third, brands may, through their actions, create new partitions or groupings, changing the category. In the coffee category, manufacturers have introduced branded machines that brew coffee contained in capsules. Machine design and patents may restrict which brands offer which type of capsules. Fourth, the creation of entirely new categories may remove existing partitions or groupings. For example, the shampoo and conditioner markets were previously separate categories, but the introduction of 2-in-1 shampoo plus conditioner variants created a new category and distorted the previously clear partition/grouping between shampoo and conditioner brands. Furthermore, brands copy each other’s sales effective attributes, so over time, deviations may disappear with all brands covering the full range of functional differences that matter to the market. Finally, deviations from the DoP law-like pattern occur much less often than one might think (Scriven and Danenberg, 2010) and are often a minor or a "second-order" effect) (Scriven and Danenberg, 2010; Uncles et al., 1995). If deviations are so minor, they may appear in one period and disappear in the next.

# 2.5 Persistent deviations to the Dirichlet Model and other fundamental patterns

To understand the value in documenting stable deviations to fundamental patterns there are useful lessons in other marketing laws.

Duplication of purchase is an empirical generalization associated with the NBD-Dirichlet model (hereafter referred to Dirichlet) (Wright et al., 2002), which Ehrenberg (1959) developed. In brief, one of the most important theoretical achievements of marketing science (Sharp et al., 2012) is a simple stochastic model of purchase incidence and brand choice (Goodhardt et al., 1984; Wright et al., 2002). The Dirichlet describes, for example, brand purchasing in consumer goods categories (Goodhardt et al., 1984; Rungie and Goodhardt, 2004) and choice-making in various contexts such as political polls (Kooyman and Wright, 2017), radio listening (Lees and Wright, 2013), and even subscription services (Lee et al., 2011).

The Dirichlet model has four Parameters K, A, M, and S. Of these, K and S have theoretical stability, while A and M vary with time and seasonality (Sharp et al., 2012). There are five assumptions of the Dirichlet model. Two relate to the product category (Gamma and Poisson), two relate to brand choice (multivariate and multinomial), and the fifth (and most relevant for this research) relates to product category and brand choice (i.e., independence of purchase incidence and brand choice) (Goodhardt et al., 1984; Ehrenberg et al., 2004; Lee et al., 2011). The simplest way to describe the assumptions is that within a fixed period, the model determines how many people buy a brand, how often, and what other brands they buy (Scriven et al., 2017).

While the model is remarkably robust, over the years and many replication studies, some Dirichlet deviations have been documented that are systematic. For example, the model tends to underpredict sole brand loyalty, the average purchase frequency of sole brand buyers, and the annual purchase frequency for bigger market-leading brands. On the other hand, it overpredicts the period-to-period repeat brand buying rate and erosion of repeat purchase loyalty. It also has flatter distributions of light, medium, and heavy category buyers (Scriven et al., 2017; Goodhardt et al., 1984; Ehrenberg et al., 2004). However, while these deviations are well-established, they tend to be relatively small when they do occur.

Most importantly for the present research, the Dirichlet makes an independence assumption that any brand’s purchase propensity is independent of buying any other brand. Therefore the Dirichlet assumes no partitions (i.e., somewhat isolated brands) within a market (Scriven et al., 2017). This is in direct contrast to partitions, when buying a brand makes it more likely for a customer to buy a similar brand, with the revealed sub-category or partition indicating higher levels of customer sharing amongst the sub-set of similar brands.

In considering such deviations, Ehrenberg (1988) suggested that most deviations to the Dirichlet would not persist over multiple years. However, his speculation did not have longitudinal empirical evidence. Subsequent analysis and support for Dirichlet’s parameter stability (Stocchi and Wright, 2010) showed little variation between two and three years – even when analyzing quarter-to-quarter measures which incorporate natural seasonality.

Overall, despite the large body of empirical evidence regarding how brands predictably share customers, including occasional deviations (excessive sharing), to the best of the authors' knowledge, only three studies have looked at deviations across multiple consecutive years (Mansfield et al., 2003; Ehrenberg and Bound, 1999; Mansfield and Romaniuk, 2003), and none of these were for consumer goods categories. Our study is, therefore, the first to address issues surrounding the consistency of deviations across time. Our research questions are, therefore:

**RQ1:** Which, if any, of the previously identified duplication of purchase deviations are partitions, or groupings?

**RQ2:** When deviations (partitions or groupings) occur, is the level of excessive sharing within (i.e., intra) persistent?

**RQ3:** When deviations (partitions or groupings) occur, is the level of under sharing between (i.e., inter) persistent?

# 3 Method

## 3.1 Analysis Method

The current study builds on methods used in previous DoP research (Scriven and Danenberg, 2010; Mansfield and Romaniuk, 2003; Lam and Ozorio, 2013) and Partition Sharing Index (PSI) studies (Anesbury et al., 2020; Anesbury et al., 2018b; Sjostrom et al., 2014) and extends the analyses over three consecutive years of data. The approach enables an exploration of whether deviations (partitions or groupings) persist from period to period and over the entire period. The data come from consumer goods categories in the United Kingdom. The analysis method begins with an algebraic approximation equation known as the DoP pattern (see Equation 1).

Equation 1 - the duplication of purchase pattern

In Equation 1, there are two brands – X and Y, where bY is the percentage of the population that buys brand Y, and bX is the percentage who buy brand X. Therefore, bY/X is the percentage of buyers of X who have also bought brand Y. D is the duplication coefficient (calculated by averaging the duplication percentages (i.e., to average the column averages in a DoP table) and then divide that by the average of the penetrations (Sharp et al., 2003; Scriven and Danenberg, 2010; Ehrenberg and Bound, 1999; Ehrenberg and Pouilleau, 1992; Lees and Wright, 2009)), and x is the multiplication sign. The analysis continues with Equation 2.

Equation 2– Partition Sharing Index

The formula involves dividing the duplicated purchases between two brands by multiplying the duplication coefficient by the penetration of the first brand. The PSIij between any brand i and j represents the duplication of purchases between the two brands divided by the expected sharing for brand i (Anesbury et al., 2018b; Sjostrom et al., 2014). A PSI of 1 indicates that the sharing of customers is as expected, a PSI of 2 means that the brands share twice as many customers as expected, and a PSI of 0.5 means the brands share half as many as expected. The inter and intra-PSI both use Equation 2, however; inter-PSI examines the level of sharing *between* two groups of brands, while intra-PSI examines the level of sharing *within* a group of two or more brands.

Partitions are classified as existing when the brands have an intra-PSI of 1.2 or higher *and* an inter-PSI of 0.8 or lower and therefore are managerially significant (Sjostrom et al., 2014; Anesbury et al., 2018b; Anesbury et al., 2020). Groupings occur when the brands have an intra-PSI of 1.2 or higher, *but* the inter-PSI is greater than 0.8.

In this study, we use Many Sets of Data (Bound and Ehrenberg, 1989) and descriptive models (Ehrenberg et al., 2000) to explore managerially significant results, rather than focusing on statistical significance (Kennedy et al., 2014). We utilize the software developed by Tanusondjaja et al. (2014) to calculate our inter and intra PSI values. Unlike earlier duplication of purchase studies (Keng and Ehrenberg, 1984; Wrigley and Dunn, 1984b), our study uses the PSI to identify excessive sharing instead of the Duplication coefficient that shows how likely a buyer in the market is to buy another brand or the expected proportion of brand A buyers who also buy brand B. The PSI, which incorporates the Duplication coefficient, indexes the level of sharing by the brand’s size and gives marketers an easier figure to interpret. To date, there has been no direct study analyzing or comparing the results.

## 3.2 Data

Our data source for this study was Taylor Nelson Sofres (TNS)/Kantar. TNS is a global panel provider established in 1991 that has grown to become Great Britain’s leading continuous demographically and regionally representative household consumer panel (Kantar, 2015). The average panel size is 20,027, with panel sizes ranging from 25,093 (nappies 2013) to 6,467 (yogurt 2000). TNS collects data twice a week from electronic terminals kept in the consumers’ homes, which marketers view through an interface called Powerview V.

Table 1 about here

Table 1 outlines the current study data, including three consumer goods categories that have previously demonstrated functional partitions: decaffeinated coffee (Ehrenberg and Uncles, 1999), male-orientated body sprays (Scriven and Danenberg, 2010), and butter (Scriven and Danenberg, 2010). We add six additional categories that have evidence of private label partitions: yogurt, deodorant, toothpaste, margarine, colas, and nappies (Dawes and Nenycz-Thiel, 2013). The categories’ annual penetrations vary considerably, with a maximum of 99.3% (yellow fats 2009) and a minimum of 14.8% (nappies 2014) adding nice variation across the many sets of data for pattern spotting. The annual average purchase frequencies range from 31 (yogurt in 1998) to six occasions per year (toothpaste 2010). The wide assortment, high percentage of the population buying, and how often those consumers buy the categories increases our investigation's generalizability into the partition or groupings’ existence and the persistence (or not) of deviations.

# 4 Analysis and Results

The top five brands, covering substantial proportions of the purchases of each potential partition, were analyzed. For example, in the coffee category in 2014, the top five national brands accounted for 50% of all national brand sales, and the top five private label brands accounted for 26% of all private label sales. On average, the top five brands account for 49% of their respective overall sales. If a consumer was going to purchase outside of their functionally based repertoire, the previous empirical evidence suggests they would buy the largest non-functionally similar brand (Dawes, 2016). Limiting the analysis to just the top brands within a category is common (Anesbury et al., 2018b; Ehrenberg et al., 1990; Hammond et al., 1996), especially for initial studies in an area, with one study analyzing the top three national and private label brands (Bound and Ehrenberg, 1997).

Having a consistent number of brands inside and outside a potential partition (e.g., five decaffeinated and five caffeinated brands) also ensures sharing levels are not because of the number of available options or any changes from year to year. For example, including the top ten caffeinated coffee brands and only the top five decaffeinated coffee alters the duplication coefficient and, therefore, PSI. Further, having five decaffeinated coffee brands in year one, ten in year two, and four in year three similarly influences the PSI through the duplication coefficient. Therefore, in the first instance to determine if the functional difference is causing deviations and check the stability of the deviations, we remove the bias from an unequal or inconsistent number of brands.

To demonstrate the approach, data from the coffee category over three years (2012 to 2014) is used. For each brand, the percentage of buyers who bought other brands was calculated. For example, in Table 2, of the 4,639 consumers (19% penetration) who bought Nescafe Original Instant Coffee, 835 (18%) bought Nescafe Gold Blend Standard, 557 (12%) bought Douwe Egbert Pure Gold, and 65 (1%) bought Tesco Classic Gold Decaffeinated Instant Coffee.

Table 2 about here

Applying the PSI formula involves dividing the duplicated purchases between two brands by multiplying the duplication coefficient by the penetration of the first brand. Therefore, the first stage calculates the duplication coefficient (i.e., the average duplication divided by the average penetration (Ehrenberg and Bound, 1999; Ehrenberg and Pouilleau, 1992)). In this case 10.25 divided by 7.15 = 1.434. In Table 3, the PSI of Douwe Egbert Pure Gold (DEPG) and Nescafe Gold Blend Standard (NGBS) is 1.4335. Using the data in Table 2, DEPG shares 24.1(%) of its customers with NGBS, divided by the 1.434 (duplication coefficient) multiplied by 11.73(%) (NGBS’s penetration), which equals 1.43. The calculations involve whole numbers and not percentages (e.g., 11.73, not 0.1173). Second, NGBS shares 20.7(%) of its customers with DEPG, divided by 1.434 (duplication coefficient) multiplied by 10.06(%) (DEPG’s penetration), which equals 1.429. As the PSI is an index, the two figures average – giving the intra-PSI between DEPG and NGBS of 1.431. The inter-PSI (i.e., the averaging of the PSI between the two groups of brands) is 0.82 (the average of the cells in the bottom left or top right of Table 3). The result highlights that slightly fewer buyers than expected of caffeinated coffee also buy decaffeinated coffee and vice versa – but in the UK in 2014, there is a decaffeinated grouping, not partition.

Table 3 about here

We calculate the average intra-PSI and inter-PSI for each previously evidenced functional partition, including decaffeinated coffee (Ehrenberg and Uncles, 1999), male-orientated body sprays (Scriven and Danenberg, 2010), and butter (Scriven and Danenberg, 2010), and six categories with perceived private label partitions (Dawes and Nenycz-Thiel, 2013). When intra-PSIs are 1.2 or larger, and the inter-PSI is 0.8 or smaller, they are classified as managerially significant (i.e., a partition). When intra-PSIs are 1.2 or larger, but the inter-PSI is greater than 0.8, there is a grouping. In Table 3, the decaffeinated intra-PSI is 2.5, meaning that the top five decaffeinated coffee brands share customers almost two and a half times more than expected. The inter-PSI is 0.82, meaning that they share 18% fewer customers with the top five regular coffee brands. Table 5 within the Appendix contains the intra-PSI and inter-PSI for the coffee category for 2010 to 2013.

The initial analysis replicates the existing knowledge that in some categories, functional similarities amongst a group of brands, which are different from the other brands, share more customers. We now move on to extend the analysis to all categories and years systematically.

Table 4 about here

Table 4 shows a successful replication of the previous partitions of decaffeinated coffee (2010, 2012, and 2013) (Ehrenberg and Uncles, 1999) and private label toothpaste (2008 to 2010) (Dawes and Nenycz-Thiel, 2013). The other previous partitions, including male-orientated body sprays (Scriven and Danenberg, 2010), butter (Scriven and Danenberg, 2010), and consumer goods categories with private label partitions (Dawes and Nenycz-Thiel, 2013), are in fact groupings. In this instance, the functional difference or private labels causes excess sharing (i.e., intra-PSI >1.2), but they are not isolated from the rest of the category (i.e., inter-PSI >0.8). Overall, in 40% of cases, previous partitions are indeed partitions, not groupings.

To determine when deviations (partitions or groupings) occur if the level of excessive sharing within (i.e., intra), and under sharing between (i.e., inter) persistents – we use a coefficient of variance (CV). The measure is simple – a division of the standard deviation by the indexes mean (Brown, 1998). We use three thresholds: a very good CV is <10, a good CV is between 10 and 20, and an acceptable CV is between 20 and 30.

Results in Table 4 show that 63% of the PSI have a very good CV, 21% a good CV, and 13% an acceptable CV. Only 4% (i.e., only the intra-PSI for decaffeinated coffee for 2010 to 2012) had an unacceptable CV. On further examination, the results show a high level of sharing of consumers for the same brand of caffeinated coffee with decaffeinated coffee in 2011 (e.g., an intra-PSI of 3.7 between Nescafe and an intra-PSI of 3.0 between Tesco Gold Instance Coffee). These may have been a result of the range being price promoted or advertised at the same time. Overall, our results show in the 24 category/years examined, just five (21%) had partitions - all others (79%) were groupings. Further, any excess level of sharing between brands or under sharing between the remaining brands (either partitions or groupings) is persistent in 96% of cases.

# 5 Discussion

The current research finds that in all cases, where a group of brands excessively shares customers in one year, they continue to do so in the following two years. The results provide additional evidence of market stationarity in the medium-term (Graham, 2009; Trinh and Anesbury, 2015; Vaughan, 2020), specifically within the UK market.

# 5.1 Theoretical Implications

# 5.1.1 Consumer’s purchase brands that do not share functional differences

The research provides multiple theoretical contributions. The first is to support the repertoire literature that shows that on average, consumers buy 2-3 brands from consumer goods categories (Banelis et al., 2013; Goodhardt et al., 1984; Dawes, 2008; Wrigley and Dunn, 1984b; Trinh, 2014). The study offers initial evidence that consumers generally buy brands that share similarities (e.g., functions, price-tiers), but crucially, those purchases are not exclusively within that partition (i.e., they purchase other brands from the category as well in line with popularity on average).

# 5.1.2 Markets continue to be stable in the medium-term

The second contribution is to provide additional empirical support for markets' medium-term stability (Graham, 2009; Trinh and Anesbury, 2015; Vaughan, 2020). The finding aligns with previous research showing that most brands remain at the same market share levels in the medium term, with only exceptional circumstances such as innovation altering their performance. Further, the study also shows that the competitive structure of consumer goods categories is also mostly stable in the medium-term – reinforcing previous research with similar market share stability findings (Dekimpe and Hanssens, 1995; Graham, 2009; Trinh and Anesbury, 2015; Vaughan, 2020). If a brand competes heavily with other brands that share similar functionality, it will continue to do so over the extended timeframe; hence partitioning or grouping is mostly stable. While there are many reasons that deviations might not persist, very few were present in the categories analyzed here.

# 5.1.3 Dirichlet assumption of independence holds, except for sub-categories

The research continues to show that the Dirichlet model, a simple stochastic model of purchase incidence and brand choice (Ehrenberg, 1959; Goodhardt et al., 1984), is valid. Further, we show that that the independence assumption of the model (i.e., the purchase propensity for any brand is independent of buying any other brand) which assumes that there are no partitions within a market (Scriven et al., 2017)) holds. However, when it does not hold (i.e., where partitions occur), the analysis contains data from two sub-categories. The result reinforces the claim from Sharp et al. (2012) that partitions are easily identifiable. The research contradicts an earlier suggestion by Ehrenberg (1988) that over multiple years deviations would not persist – supporting the research on Dirichlet parameter stability (Stocchi and Wright, 2010), and that approximately half of all deviations are stable (Pare et al., 2006; Pare and Dawes, 2007).

# 5.2 Practical Implications

Marketers must decide which products and variants they will sell, including adding or deleting offers (Day et al., 1979; Srivastava et al., 1981) or which promotion strategies they should employ (Fraser and Bradford, 1983; Urban et al., 1984). Such decisions ideally are made after researching competitive market structures. The DoP allows for this analysis (Goodhardt and Ehrenberg, 1969a; Uncles and Ellis, 1989; Anesbury et al., 2018a). The results of this study help decision makers know that market structures will typically remain stable in the short to medium-term. The reassurance of market stability helps mitigate the risks of taking decisions based on a volatile or unpredictable market structure.

Over the medium and long term, marketers decide which brands to introduce or remove from their brand portfolio, depending on market structure. For example, as the global decaffeinated coffee market experiences growth (Grand View Research, 2020), brand managers can examine the level of competition between brands and variants to determine whether the decaffeinated partition or grouping offers attractive opportunities (depending on the size, growth rate, and intensity of competition) for expansion through new product development or brand extension. A wrong decision may be costly—it is much better for a brand to compete - share more customers with competitor brands, than to share customers within its own portfolio and cannibalize itself. Our paper aids that decision making by providing a simple answer to the novel question about whether duplication of purchase deviations, such as the decaffeinated coffee, are persistent. The affirmative answer helps marketers make evidence-based medium-term decisions about brand introductions, new product development, and marketing interventions. Marketers who understand the DoP pattern make different decisions and allocate resources differently to those who do not (Kennedy and McColl, 2012).

Understanding the structure of a market and the persistence of deviations can help marketers make informed communications and positioning decisions. With persistent deviations, it may be wise to invest in building the long-term mental availability of particular brands and brand attributes. It also raises the question of brand portfolio management, e.g., should a company have a brand for the entire category or differentiated variants or brands for partitions or groupings?

# 5.3 Limitations and Priorities for Future Research

Future research should address the limitations of this study. Although the research tests the persistence of known deviations over time, this limits the analysis to nine consumer goods categories. Ideally, future researchers should have access to more data to test the stability of deviations in other diverse situationsß. These may include, and are certainly not limited to the wine markets (Wilson and Winchester, 2019), physical activities (Wilson et al., 2019), voting preferences (Kooyman and Wright, 2017), entertainment choices (viewing) (Lees and Wright, 2013), gambling (Lam and Ozorio, 2013; Lam, 2006), and memory associations (Romaniuk, 2005). Second, the data analyzed in this study is limited to consumer goods categories, yet partitions occur in other markets such as television sets (Bennett, 2008), cars (Ehrenberg and Bound, 1999), or tourism destinations (Mansfield and Romaniuk, 2003). Third, an examination of deviations from other NBD-Dirichlet patterns (e.g., double jeopardy, natural monopoly) (Pare et al., 2006; Pare and Dawes, 2007; Stocchi et al., 2017; Dawes, 2020), and their persistency may prove fruitful. Last, the study analyses data purely from the United Kingdom. Similarly, previous studies have identified deviations in other markets such as Russia, Thailand, and China (Uncles and Kwok, 2009; Uncles and Kwok, 2008; Bennett, 2008; Bennett and Graham, 2010; Kennedy and McColl, 2012). Future research should investigate these and other markets.

tables

Table 1: Summary of data

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Year** | **Category Penetration** | **Category Purchase Frequency** |
| Cola | 2010 | 72 | 14 |
|  | 2011 | 73 | 14 |
|  | 2012 | 74 | 15 |
|  | 2013 | 75 | 15 |
|  | 2014 | 75 | 15 |
| Coffee | 2010 | 84 | 9 |
|  | 2011 | 83 | 9 |
|  | 2012 | 82 | 9 |
|  | 2013 | 82 | 10 |
|  | 2014 | 81 | 9 |
| Toothpaste | 2008 | 89 | 6 |
|  | 2009 | 89 | 6 |
|  | 2010 | 89 | 6 |
| Deodorant | 2008 | 76 | 6 |
|  | 2009 | 74 | 7 |
|  | 2010 | 75 | 7 |
| Nappies | 2010 | 15 | 8 |
|  | 2011 | 16 | 8 |
|  | 2012 | 16 | 8 |
|  | 2013 | 16 | 7 |
|  | 2014 | 15 | 7 |
| Yoghurt | 1998 | 87 | 31 |
|  | 1999 | 88 | 29 |
|  | 2000 | 88 | 29 |
| Margarine | 2008 | 92 | 22 |
|  | 2009 | 92 | 22 |
|  | 2010 | 91 | 21 |
| Yellow Fats | 2008 | 99 | 22 |
|  | 2009 | 99 | 22 |
|  | 2010 | 99 | 22 |

Table 2: percentage of households sharing coffee brands (UK, 2014)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category Penetration (%) | 81.4 | who also bought… | | | | | | | | | |
|  | Category Purchase Frequency | 9.4 | Caffeinated | | | | | Decaffeinated | | | | |
|  | Buyers of... | Pen (%) | Nescafe Original I.Coffee | Nescafe Gold Blend Std | Douwe Egbert Pure Gold | Kenco Mllcno Whlbn Ins Cf | Nescafe CM Cappuccino | Kenco Decaf Coffee | Nescafe Orgnl Decaf I.Cfe | Kenco Mllcno Whlbn Dcf IC | Aldi Gold Decaff | Tesco Classic Gld Dcf I.C |
| Caffeinated | Nescafe Original I.Coffee | 18.6 |  | 18 | 12 | 7 | 9 | 4 | 8 | 2 | 2 | 1 |
| Nescafe Gold Blend Std | 11.7 | 28 |  | 21 | 10 | 8 | 6 | 4 | 2 | 1 | 2 |
| Douwe Egbert Pure Gold | 10.1 | 22 | 24 |  | 14 | 8 | 7 | 3 | 3 | 2 | 2 |
| Kenco Mllcno Whlbn Ins Cf | 9.0 | 15 | 14 | 15 |  | 9 | 5 | 2 | 12 | 2 | 2 |
| Nescafe CM Cappuccino | 6.9 | 24 | 14 | 12 | 12 |  | 5 | 5 | 3 | 4 | 2 |
| Decaffeinated | Kenco Decaf Coffee | 5.0 | 16 | 14 | 13 | 9 | 7 |  | 15 | 11 | 7 | 8 |
| Nescafe Orgnl Decaf I.Cfe | 3.4 | 42 | 13 | 10 | 7 | 9 | 22 |  | 5 | 7 | 8 |
| Kenco Mllcno Whlbn Dcf IC | 2.5 | 11 | 10 | 13 | 44 | 7 | 21 | 7 |  | 6 | 5 |
| Aldi Gold Decaff | 2.1 | 13 | 8 | 7 | 7 | 12 | 16 | 11 | 7 |  | 12 |
| Tesco Classic Gld Dcf I.C | 2.1 | 13 | 10 | 10 | 9 | 6 | 19 | 13 | 6 | 12 |  |
|  | **Average Duplication** |  | **20** | **14** | **13** | **13** | **8** | **12** | **8** | **6** | **5** | **5** |

Table 3: Partition Sharing Indexes coffee brands (UK, 2014)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category Penetration (%) | 81.4 | who also bought… | | | | | | | | | | |
|  | Category Purchase Frequency | 9.4 | Caffeinated | | | | |  | Decaffeinated | | | | |
|  | Buyers of... | Pen (%) | Douwe Egbert Pure Gold | Kenco Mllcno Whlbn Ins Cf | Nescafe CM Cappuccino | Nescafe Gold Blend Std | Nescafe Original I.Coffee |  | Aldi Gold Decaff | Kenco Decaf Coffee | Kenco Mllcno Whlbn Dcf IC | Nescafe Orgnl Decaf I.Cfe | Tesco Classic Gld Dcf I.C |
| Caffeinated | Douwe Egbert Pure Gold | 10.1 |  | 1.0 | 0.8 | 1.4 | 0.8 |  | 0.5 | 0.9 | 0.9 | 0.7 | 0.7 |
| Kenco Mllcno Whlbn Ins Cf | 9.0 | 1.0 |  | 0.9 | 0.8 | 0.6 |  | 0.5 | 0.7 | 3.4 | 0.5 | 0.7 |
| Nescafe CM Cappuccino | 6.9 | 0.8 | 0.9 |  | 0.8 | 0.9 |  | 1.3 | 0.7 | 0.7 | 0.9 | 0.6 |
| Nescafe Gold Blend Std | 11.7 | 1.4 | 0.8 | 0.8 |  | 1.1 |  | 0.5 | 0.8 | 0.6 | 0.8 | 0.6 |
| Nescafe Original I.Coffee | 18.6 | 1.0 | 0.6 | 0.9 | 1.1 |  |  | 0.5 | 0.6 | 0.4 | 1.6 | 0.5 |
|  | Partition Sharing Index |  |  |  | **0.92** |  |  |  |  |  | **0.82** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Decaffeinated | Aldi Gold Decaff | 2.1 | 0.5 | 0.5 | 1.3 | 0.5 | 0.5 |  |  | 2.2 | 2.0 | 2.3 | 3.8 |
| Kenco Decaf Coffee | 5.0 | 0.9 | 0.7 | 0.7 | 0.8 | 0.6 |  | 2.2 |  | 2.9 | 3.1 | 2.7 |
| Kenco Mllcno Whlbn Dcf IC | 2.5 | 0.9 | 3.4 | 0.7 | 0.6 | 0.4 |  | 2.0 | 2.9 |  | 1.5 | 1.5 |
| Nescafe Orgnl Decaf I.Cfe | 3.4 | 0.7 | 0.5 | 0.9 | 0.8 | 1.6 |  | 2.3 | 3.1 | 1.5 |  | 2.7 |
| Tesco Classic Gld Dcf I.C | 2.1 | 0.7 | 0.7 | 0.6 | 0.6 | 0.5 |  | 3.8 | 2.7 | 1.5 | 2.7 |  |
|  | Partition Sharing Index |  |  |  | **0.82** |  |  |  |  |  | **2.47** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Decaffeinated PSI = 2.47, Caffeinated PSI = 0.92, Intra-partition sharing index = 0.82

Table 4: Summary of Partition Sharing Indexes – Intra-PSI (Inter-PSI) (UK, 1998 to 2014)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Mean (x̅)** | | **Standard Deviation (σ)** | | **Coefficient of Variation** | | **Year One** | | **Year Two** | | **Year Three** | |
| **Category** | **Partition** | **Intra** | **Inter** | **Intra** | **Inter** | **Intra** | **Inter** | **Intra** | **Inter** | **Intra** | **Inter** | **Intra** | **Inter** | |
| Toothpaste (2008 to 2010) | Private Label | 3.6 | 0.6 | 0.4 | 0.0 | 10\*\* | 6\* | 3.7 | 0.6 | 4.0 | 0.6 | 3.2 | 0.7 | |
| Coffee (2012 to 2014) | Decaffeinated | 2.9 | 0.8 | 0.4 | 0.1 | 15\*\* | 7\* | 3.3 | 0.7 | 2.9 | 0.8 | 2.5 | 0.8 | |
| Nappies (2012 to 2014) | Private Label | 1.5 | 0.8 | 0.3 | 0.0 | 23\*\*\* | 4\* | 1.8 | 0.8 | 1.4 | 0.8 | 1.2 | 0.8 | |
| Nappies (2010 to 2012) | Private Label | 1.7 | 0.8 | 0.2 | 0.0 | 9\* | 5\* | 1.5 | 0.9 | 1.8 | 0.8 | 1.8 | 0.8 | |
| Coffee (2010 to 2012) | Decaffeinated | 2.4 | 0.9 | 0.8 | 0.2 | 34 | 20\*\*\* | 2.1 | 0.8 | 1.7 | 1.1 | 3.3 | 0.7 | |
| Colas (2012 to 2014) | Private Label | 3.5 | 0.9 | 0.4 | 0.0 | 12\*\* | 3\* | 3.8 | 0.9 | 3.0 | 0.9 | 3.6 | 0.9 | |
| Yoghurt (1998 to 2000) | Private Label | 1.3 | 0.9 | 0.1 | 0.0 | 10\*\* | 4\* | 1.2 | 0.9 | 1.3 | 0.9 | 1.5 | 0.9 | |
| Colas (2010 to 2012) | Private Label | 3.1 | 0.9 | 0.6 | 0.0 | 20\*\*\* | 3\* | 2.8 | 0.9 | 2.6 | 0.9 | 3.8 | 0.9 | |
| Deodorant (2008 to 2010) | Private Label | 2.4 | 0.9 | 0.4 | 0.0 | 16\*\* | 1\* | 2.7 | 0.9 | 1.9 | 0.9 | 2.4 | 0.9 | |
| Margarine (2008 to 2010) | Private Label | 1.4 | 0.9 | 0.1 | 0.1 | 8\* | 7\* | 1.5 | 1.0 | 1.3 | 0.9 | 1.4 | 0.9 | |
| Yellow Fats (2008 to 2010) | Butter | 1.3 | 0.9 | 0.0 | 0.0 | 2\* | 2\* | 1.2 | 0.9 | 1.3 | 1.0 | 1.3 | 0.9 | |
| Deodorant (2008 to 2010) | Male Orientated | 1.3 | 1.1 | 0.0 | 0.0 | 2\* | 2\* | 1.3 | 1.1 | 1.3 | 1.1 | 1.4 | 1.1 | |
| Average |  | 2.2 | 0.9 | 0.3 | 0.0 | 14\*\* | 5\* | 2.3 | 0.9 | 2.0 | 0.9 | 2.3 | 0.9 | |

*\* CV<10 =very good, \*\* 10<CV>20 = good, \*\*\* 20<CV>30 = acceptable*

# Appendix

Table 5: Partition Sharing Indexes coffee brands (UK, 2010 to 2013)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category Penetration (%) | 83.7 | who also bought… | | | | | | | | | | |
|  | Category Purchase Frequency | 9.0 | Caffeinated | | | | |  | Decaffeinated | | | | |
| **2010** | Buyers of... | Pen (%) | Kenco Really Rich | Kenco Really Smooth | Nescafe Cappuccino | Nescafe Gold Blend Std | Nescafe Original I.Coffee |  | Kenco Decaf Coffee | Nescafe Orgnl Decaf I.Cfe | Nescafe Unswt Dcff Cppcno | Tesco ClassiGld Dcf I.C | Tesco ClsI.Coffee Decaf |
| Caffeinated | Kenco Really Rich | 8.9 |  | 2.0 | 1.0 | 1.2 | 0.9 |  | 1.3 | 0.8 | 0.7 | 0.7 | 0.4 |
| Kenco Really Smooth | 10.7 | 2.0 |  | 1.0 | 1.2 | 0.8 |  | 1.2 | 0.6 | 0.8 | 0.6 | 0.3 |
| Nescafe Cappuccino | 7.9 | 1.0 | 1.0 |  | 1.0 | 0.9 |  | 0.7 | 0.7 | 3.1 | 0.8 | 0.5 |
| Nescafe Gold Blend Std | 17.0 | 1.2 | 1.2 | 1.0 |  | 1.0 |  | 0.7 | 0.7 | 0.8 | 0.4 | 0.3 |
| Nescafe Original I.Coffee | 21.2 | 0.9 | 0.8 | 0.9 | 1.0 |  |  | 0.5 | 1.3 | 0.8 | 0.5 | 0.6 |
|  | Partition Sharing Index |  |  |  | **1.10** |  |  |  |  |  | **0.80** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Decaffeinated | Kenco Decaf Coffee | 5.0 | 1.3 | 1.2 | 0.7 | 0.7 | 0.5 |  |  | 2.6 | 1.7 | 2.4 | 1.2 |
| Nescafe Orgnl Decaf I.Cfe | 5.2 | 0.8 | 0.6 | 0.7 | 0.7 | 1.3 |  | 2.6 |  | 1.6 | 2.0 | 2.2 |
| Nescafe Unswt Dcff Cppcno | 2.2 | 0.7 | 0.8 | 3.1 | 0.8 | 0.8 |  | 1.7 | 1.6 |  | 1.3 | 0.8 |
| Tesco ClassiGld Dcf I.C | 3.7 | 0.7 | 0.6 | 0.8 | 0.4 | 0.5 |  | 2.4 | 2.0 | 1.3 |  | 5.3 |
| Tesco ClsI.Coffee Decaf | 1.6 | 0.4 | 0.3 | 0.5 | 0.3 | 0.6 |  | 1.2 | 2.2 | 0.8 | 5.3 |  |
|  | Partition Sharing Index |  |  |  | **0.80** |  |  |  |  |  | **2.11** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Category Penetration (%) | 82.9 | who also bought… | | | | | | | | | | |
|  | Category Purchase Frequency | 8.9 | Caffeinated | | | | |  | Decaffeinated | | | | |
| **2011** | Buyers of... | Pen (%) | Kenco Really Smooth | Nescafe Cappuccino | Nescafe Gold Blend Std | Nescafe Original I.Coffee | Tesco Gold I.Coffee |  | Kenco Decaf Coffee | Kenco Eco Rich | Nescafe Decaff Cappuccino | Nescafe Orgnl Decaf I.Cfe | Tesco Classic Gld Dcf I.C |
| Caffeinated | Kenco Really Smooth | 10.0 |  | 0.8 | 1.2 | 0.9 | 1.1 |  | 1.0 | 2.4 | 0.6 | 0.4 | 0.7 |
| Nescafe Cappuccino | 8.0 | 0.8 |  | 0.9 | 0.9 | 0.9 |  | 0.6 | 1.0 | 3.7 | 0.7 | 0.8 |
| Nescafe Gold Blend Std | 16.0 | 1.2 | 0.9 |  | 0.9 | 1.1 |  | 0.7 | 1.7 | 0.7 | 0.7 | 0.7 |
| Nescafe Original I.Coffee | 20.0 | 0.9 | 0.9 | 0.9 |  | 0.7 |  | 0.5 | 1.2 | 0.7 | 1.2 | 0.5 |
| Tesco Gold I.Coffee | 6.0 | 1.1 | 0.9 | 1.1 | 0.7 |  |  | 0.6 | 1.2 | 0.4 | 0.7 | 3.0 |
|  | Partition Sharing Index |  |  |  | **0.93** |  |  |  |  |  | **1.06** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Decaffeinated | Kenco Decaf Coffee | 4.0 | 1.0 | 0.6 | 0.7 | 0.5 | 0.6 |  |  | 1.5 | 2.1 | 2.3 | 2.6 |
| Kenco Eco Rich | 3.0 | 2.4 | 1.0 | 1.7 | 1.2 | 1.2 |  | 1.5 |  | 0.5 | 0.8 | 0.9 |
| Nescafe Decaff Cappuccino | 2.0 | 0.6 | 3.7 | 0.7 | 0.7 | 0.4 |  | 2.1 | 0.5 |  | 1.7 | 2.6 |
| Nescafe Orgnl Decaf I.Cfe | 5.0 | 0.4 | 0.7 | 0.7 | 1.2 | 0.7 |  | 2.3 | 0.8 | 1.7 |  | 2.4 |
| Tesco Classic Gld Dcf I.C | 3.0 | 0.7 | 0.8 | 0.7 | 0.5 | 3.0 |  | 2.6 | 0.9 | 2.6 | 2.4 |  |
|  | Partition Sharing Index |  |  |  | **1.06** |  |  |  |  |  | **1.75** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category Penetration (%) | 82.0 | who also bought… | | | | | | | | | | |
|  | Category Purchase Frequency | 9.3 | Caffeinated | | | | |  | Decaffeinated | | | | |
| **2012** | Buyers of... | Pen (%) | Douwe Egbert Pure Gold | Kenco Mllcno Whlbn Ins Cf | Nescafe Gold Blend Std | Nescafe Original I.Coffee | Tesco Gold I.Coffee |  | Asda Dcff Golden Roast | Kenco Decaf Coffee | Kenco Eco Decaf | Nescafe Orgnl Decaf I.Cfe | Tesco Classic Gld Dcf I.C |
| Caffeinated | Douwe Egbert Pure Gold | 10.2 |  | 1.1 | 1.2 | 0.7 | 1.1 |  | 0.4 | 0.6 | 0.7 | 0.6 | 0.7 |
| Kenco Mllcno Whlbn Ins Cf | 8.4 | 1.1 |  | 0.9 | 0.6 | 0.7 |  | 0.5 | 0.9 | 0.9 | 0.7 | 0.7 |
| Nescafe Gold Blend Std | 13.5 | 1.2 | 0.9 |  | 0.9 | 0.9 |  | 0.6 | 0.7 | 0.8 | 0.7 | 0.5 |
| Nescafe Original I.Coffee | 19.6 | 0.7 | 0.6 | 0.9 |  | 0.6 |  | 0.5 | 0.5 | 0.6 | 1.3 | 0.4 |
| Tesco Gold I.Coffee | 8.8 | 1.1 | 0.7 | 0.9 | 0.6 |  |  | 0.9 | 0.4 | 0.4 | 0.5 | 2.4 |
|  | Partition Sharing Index |  |  |  | **0.87** |  |  |  |  |  | **0.72** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Decaffeinated | Asda Dcff Golden Roast | 1.8 | 0.4 | 0.5 | 0.6 | 0.5 | 0.9 |  |  | 2.1 | 2.4 | 2.3 | 4.2 |
| Kenco Decaf Coffee | 3.2 | 0.6 | 0.9 | 0.7 | 0.5 | 0.4 |  | 2.1 |  | 9.6 | 3.5 | 2.1 |
| Kenco Eco Decaf | 3.0 | 0.7 | 0.9 | 0.8 | 0.6 | 0.4 |  | 2.4 | 9.6 |  | 2.9 | 2.0 |
| Nescafe Orgnl Decaf I.Cfe | 4.3 | 0.6 | 0.7 | 0.7 | 1.3 | 0.5 |  | 2.3 | 3.5 | 2.9 |  | 2.2 |
| Tesco Classic Gld Dcf I.C | 3.5 | 0.7 | 0.7 | 0.5 | 0.4 | 2.4 |  | 4.2 | 2.1 | 2.0 | 2.2 |  |
|  | Partition Sharing Index |  |  |  | **0.72** |  |  |  |  |  | **3.32** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Category Penetration (%) | 82.1 | who also bought… | | | | | | | | | | |
|  | Category Purchase Frequency | 9.56 | Caffeinated | | | | |  | Decaffeinated | | | | |
| **2013** | Buyers of... | Pen (%) | Douwe Egbert Pure Gold | Kenco Mllcno Whlbn Ins Cf | Nescafe CM Cappuccino | Nescafe Gold Blend Std | Nescafe Original I.Coffee |  | Kenco Decaf Coffee | A Kenco Eco Decaf | Kenco Mllcno Whlbn Dcf IC | Nescafe Orgnl Decaf I.Cfe | Tesco Classic Gld Dcf I.C |
| Caffeinated | Douwe Egbert Pure Gold | 9.1 |  | 1.0 | 0.8 | 1.3 | 0.8 |  | 0.8 | 0.8 | 0.8 | 0.4 | 0.5 |
| Kenco Mllcno Whlbn Ins Cf | 10.3 | 1.0 |  | 0.8 | 0.7 | 0.5 |  | 0.9 | 0.9 | 3.1 | 0.5 | 0.7 |
| Nescafe CM Cappuccino | 6.3 | 0.8 | 0.8 |  | 0.8 | 0.8 |  | 0.6 | 0.5 | 0.6 | 0.6 | 0.7 |
| Nescafe Gold Blend Std | 13.0 | 1.3 | 0.7 | 0.8 |  | 0.9 |  | 0.8 | 0.7 | 0.6 | 0.6 | 0.6 |
| Nescafe Original I.Coffee | 19.0 | 0.8 | 0.5 | 0.8 | 0.9 |  |  | 0.5 | 0.4 | 0.5 | 1.2 | 0.5 |
|  | Partition Sharing Index |  |  |  | **0.85** |  |  |  |  |  | **0.75** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Decaffeinated | Kenco Decaf Coffee | 3.9 | 0.8 | 0.9 | 0.6 | 0.8 | 0.5 |  |  | 8.2 | 2.9 | 3.0 | 2.4 |
| Kenco Eco Decaf | 3.0 | 0.8 | 0.9 | 0.5 | 0.7 | 0.4 |  | 8.2 |  | 3.3 | 2.5 | 1.7 |
| Kenco Mllcno Whlbn Dcf IC | 3.4 | 0.8 | 3.1 | 0.6 | 0.6 | 0.5 |  | 2.9 | 3.3 |  | 1.6 | 1.6 |
| Nescafe Orgnl Decaf I.Cfe | 3.5 | 0.4 | 0.5 | 0.6 | 0.6 | 1.2 |  | 3.0 | 2.5 | 1.6 |  | 2.3 |
| Tesco Classic Gld Dcf I.C | 2.7 | 0.5 | 0.7 | 0.7 | 0.6 | 0.5 |  | 2.4 | 1.7 | 1.6 | 2.3 |  |
|  | Partition Sharing Index |  |  |  | **0.75** |  |  |  |  |  | **2.95** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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