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Abstract:

Double Jeopardy is one of the most important empirical patterns of consumer brand purchase behaviour. It asserts that large brands benefit from having more consumers who are also generally more loyal. Traditional methods for detecting Double Jeopardy patterns in consumer purchasing behaviour rely heavily on the availability of panel data. Although alternative methods have been proposed, these too require large quantities of data, making them costly to implement for many managers and researchers. This study proposes a new method for detecting Double Jeopardy patterns that requires only small samples of data. Using the instant coffee market in the USA to test this new method, it is shown that repeated Discrete Choice Experiments can produce proximate measures to those used as inputs to Double Jeopardy calculations. This approach gives researchers an economical and easy method to test whether a market conforms to Double Jeopardy, allowing them to keep managers informed about the properties of consumer purchase behaviour in their markets.

Introduction

The empirical generalisation of Double Jeopardy is one of the most famous and important discoveries in marketing (Sharp *et al.* 2012). Double jeopardy describes the relationship between brand sizes and loyalties of competing brands. In essence, bigger brands are rewarded twice - they have more buyers, and those buyers purchase the brand more frequently. Conversely, smaller brands have fewer buyers who also make fewer purchases (Ehrenberg *et al.* 1990; Habel & Lockshin 2013). The competing brands also tend to differ more in the number of buyers than they do purchase rates of the buyers (Uncles *et al.* 1995).

The Double Jeopardy pattern has been repeatedly observed across different product categories, countries and time-periods (e.g. Ehrenberg 1972; Ehrenberg 1988; Ehrenberg *et al.* 1990; Martin 1973; McDowell & Dick 2001; Shuchman 1968; Wright & Riebe 2010). Investigations of this pattern have typically involved the analysis of panel data, such as the type gathered from Kantar, Nielsen, IRI, and others. Brand performance metrics from these data sources (e.g., market share, penetration, average purchase frequency) routinely exhibit relationships in line with Double Jeopardy (i.e., the metrics are correlated).

Knowledge of Double Jeopardy provides implications for marketing practitioners, both in the evaluation of performance and in strategic marketing planning. Double Jeopardy gives context to brand performance metrics. For instance, indicating whether a brand's penetration or average purchase frequency figures are to be expected, given the brand size relative to the competition. Knowing the persistence with which Double Jeopardy occurs in their market should also influence marketing activity. If a marketer wants to grow a brand, Double Jeopardy suggests that trying to do so through attracting more buyers will be more fruitful than through trying to encourage current buyers to purchase more often. As stated by Ehrenberg *et al.* (1990), "trying to buck the DJ (Double Jeopardy) trend might look suspiciously like trying to make aeroplanes fly by waiting for breakdowns in the law of gravity".

While Double Jeopardy has been repeatedly observed across markets, this pattern is often not well known or understood among marketing practitioners. The pattern can run counter to many commonly held beliefs in marketing about brand loyalty. Therefore it is important for marketers to establish whether Double Jeopardy holds for their particular category, and in their particular market. In cases where panel data is available, such as consumer packaged goods in developed markets, this can be achieved through rather simple examinations of brand performance metrics. However, marketers operating in other categories and markets often do not have the luxury of detailed information regarding these metrics, making it difficult to determine whether Double Jeopardy patterns apply to them.

Faced with this challenge, alternative methods to generate proximate measures of the metrics arising from panel data have been explored. Survey-based techniques have shown some success in reproducing Double Jeopardy patterns. These methods have included a mix of questions including recall of prior behaviour, preferences, attitudes and purchase probability scales (Donthu 1994; Wright *et al.* 2002; Yang *et al.* 2005). These approaches still require large quantities of data to be collected, which can be quite prohibitive for many marketers, and employ measures that are not always analogous to consumer purchase behaviour in real markets. At the same time, the growing usage and popularity of Discrete Choice Experiments to determine respondents' preferences provide another possible avenue to demonstrate Double Jeopardy at the same time.

This paper proposes and demonstrates a simple and economical alternative method that tests for the properties of Double Jeopardy in markets where panel data is unavailable or unreliable. Using sequential Discrete Choice Experiments on a relatively small number of consumers we are able to produce the necessary information for the properties of Double Jeopardy to be demonstrated. This method for testing for Double Jeopardy patterns gives marketers a new approach to understanding the empirical properties of their market.

Background

Double Jeopardy

Double Jeopardy describes a predictable relationship between a brand's size in the market and its level of consumer loyalty. The pattern was initially identified by McPhee (1963) across behaviours such as the reading of comic strips and listening to radio presenters. The pattern was then found in the purchase behaviour of consumer goods (e.g., Ehrenberg 1969; Ehrenberg 1972; Martin 1973), and has since been found to generalize across a wide range of areas including television viewing, store choices and durable purchases (Ehrenberg *et al.* 1990; Habel & Lockshin 2013). Double Jeopardy is also one of the key empirical patterns underpinning the NBD-Dirichlet (Goodhardt *et al.* 1984) - a comprehensive model of buyer behaviour. The model has been fitted to many different products/services, brand types, countries, consumers and market conditions (Ehrenberg *et al.* 2000; Ehrenberg *et al.* 2004), and in doing so, providing evidence of Double Jeopardy in those instances.

In order to observe a Double Jeopardy pattern, household panel data is generally summarised and analysed according to each brand (Habel & Lockshin 2013). In these summaries, Double Jeopardy presents as correlations between the brand performance metrics of market share, penetration and average purchase frequency. Penetration indicates the number of buyers, while the purchase frequency is a measure of loyalty. Additional loyalty metrics, such as share of category requirements and 100% sole loyalty, can also be used when assessing Double Jeopardy, but are not essential.

Attempts have been made to overcome the need for panel data when testing for the presence of Double Jeopardy. Such attempts usually involved using consumer surveys to obtain number of different proxies for the brand performance metrics (e.g., Donthu 1994; Yang *et al.* 2005). For example, using a metric of brand most frequently purchased (based on consumer recall) as a measure of loyalty. Wright *et al.* (2002) used an alternative method involving Juster scales to estimate brand performance metrics akin to those obtained through panel data (e.g. market share, penetration, average purchase frequency). This Juster-based research went beyond assessing Double Jeopardy in the Juster estimates, to fitting the NBD-Dirichlet model to the data.

Unfortunately, even with the survey-based methods, the data requirements are still extremely high for assessing Double Jeopardy, typically needing thousands of respondents. While still more cost-effective than panel data in many cases, the need for large samples makes these methods impractical for many marketers. Hence, there is a clear need to consider new methods that are less data intensive.

Discrete Choice Experiments

Discrete Choice Experiments (DCEs), sometimes referred to as choice-based conjoint experiments, are a widely applied method used to simulate the real purchase decisions of consumers (Chrzan 2010). Used in commercial research for several decades now, DCEs allow marketers to examine consumer choice behaviour using survey based techniques (Louviere *et al.* 2000). DCEs provide marketers with substantial information about the preferences consumers have for specific products.

DCEs function by providing consumers with sets of hypothetical products. The products are designed to manipulate the product features on offer in the real market, but can also include proposed features that are yet to be introduced. Typical product features include such things as price, flavour, packaging, branding, among others. By observing consumers' repeated choices among sets of these products, it is possible to determine the features that consumers are using to drive their choice behaviour (Carter 2010; Chrzan 2010; Louviere *et al.* 2000).

The choices observed in these experiments can also be used as a basis for estimating market shares (Louviere *et al.* 2000). Accurate estimates of market shares for brands and/or products can be generated by taking the choice frequencies for each of the products included the experiment, or a relevant subset of them, weighting the sample to reflect the composition of the population, and then transforming the choices to estimate market level outcomes (Carson *et al.* 1994; Louviere & Hensher 1983; Louviere *et al.* 2000; McFadden 1986). Numerous approaches to such transformation have been proposed and tested in the literature (Carson *et al.* 1994).

Of interest for this research, is the ability for DCEs to produce estimates of market level outcomes, with often surprisingly small samples (Carson *et al.* 1994). While DCEs have traditionally been used to predict changes to a market (e.g., price change, new flavour), the method also has potential to provide deeper insights into consumer behaviour in a stationary market. DCEs can be used to generate proximate measures for market share, penetration and average purchase frequency in order to examine whether a market exhibits Double Jeopardy patterns. Commercially, the ability to demonstrate Double Jeopardy whilst observing consumers' repeated choices among different sets of products is of great use to organisations. It enables them to obtain proxies of various brand performance metrics such as penetration and average purchase frequency whilst testing the value that consumers put on different elements of the products (price, packaging, brand, and so forth).

Method

Experiment Design

This paper presents a method demonstrating Double Jeopardy patterns using sequential Discrete Choice Experiments. The product category used in the research is Instant Coffee, which has previously been tested in multiple studies with panel data and has consistently been shown to exhibit Double Jeopardy patterns (Ehrenberg *et al.* 1990; Habel & Lockshin 2013). Hence, replicating that pattern indicates success of the proposed approach.

The method involves distributing a DCE of Instant Coffee product alternatives to a participant group. An identical DCE is then re-distributed to the same group at one-week intervals, allowing for the capture of realistic market behaviour regarding a number of purchase occasions. In total, the DCE is run four times over an approximate one-month period.

The products in the DCE were designed using the features of brand and caffeine level (decaf or regular). The brands chosen for the study are the largest brands available in the domestic US market, the context for this study. They are Maxwell House, Starbucks, Folgers, Nescafe, Douwe Egberts, Carte Noire, Nespresso, and Jacobs. A full factorial design provides 16 products for the experiment (8 brands x 2 caffeine levels). The products provide a realistic representation of the market as seem by the majority of consumers.

The full experiment involves 48 choice sets, with each choice set comprising five of the products. These choice sets were designed using a Balanced Incomplete Block Design to ensure that the co-occurrence of all pairs of products is equal across all of the choice sets, reducing availability effects in the data set. For each choice set, participants are prompted to report the product they would most likely purchase from each set.

Sample

The sample was recruited through the website reddit.com, an entertainment and social networking website. Filtering was applied to those who signed up to ensure that they had purchased instant coffee at least once in the last 12 months and were based in the USA. Participants were asked to sign up to a four week study; a weekly remuneration was offered and also a chance at winning a final prize for two participants.

In total 173 participants met this criteria and commenced the study. However, there was sample attrition throughout the study, and some participants did not complete all of the DCE surveys. To ensure suitable *repeated* measurements of the sample, only those that participated in at least three of the four DCEs were retained for analysis. The final sample was 79 participants, 46 of which completed three waves and 33 that completed all four waves. Using just this relatively small number of consumers, the necessary information was produced for the properties of Double Jeopardy to be demonstrated.

Analysis Approach

DCEs present data that can parallel market share, penetration and average purchase frequency, but it is not identical in form to the data arising from consumer panels. The data from DCEs captures repeated choices from small sub-sets of products, rather than single choices from a complete store offering at time of purchase. It must therefore be considered how the data from DCEs can be suitably transformed so as to provide reasonable and justifiable proxies for the brand performance metrics.

Within the panel based approaches to assessing brand performance, market share is defined as the proportion of total individual sales that are attributable to a specific brand (Ehrenberg *et al.* 2004). This definition is in line with common sense interpretations of market share. Penetration refers to the number of buyers of a brand as a proportion of the total number of buyers present in the market (Ehrenberg *et al.* 2004). A buyer of a product is simply a person that has purchased a particular brand at least once during the period of interest. Average purchase frequency is the mean number of time that brand buyers purchase the brand over the period of interest (Ehrenberg *et al.* 2004).

Parallels of these measures using choice experiments are available. First, for each of the four DCEs, the brand choice frequencies are calculated individually for each respondent. Choice frequencies are counts of the number of times each brand was selected out of the total 48 choice sets. For the purposes of this research, the top two products with the highest choice frequencies are termed as having been 'purchased' by each participant in each of the DCEs. Therefore, when a respondent completes four DCEs, they are considered to have purchased eight products across the study.

The reason for selecting two products per DCE, rather than a single product, is to reflect that consumers purchase in assortments and, by and large, do not remain exclusive to a single product in a market (Sharp *et al.* 2002). However, larger studies can certainly opt to only include the top product selected by each participant. Without reflecting assortment choice, the random component of people's decision making is likely to exhibit undue influence in the formation of measures.

In the DCE context, brand performance metrics are calculated from the total number of 'purchases' across the study (i.e. total market purchases = no. of respondents x no. of DCEs completed x 2 product 'purchases'). Market share is operationalised as the proportion of total purchases that a particular product accounts for from all purchases in the study. Penetration is defined as the proportion of participants that purchased a brand in at least one of the experiments. The average purchase frequency is the average number of times that a brand was purchased across the experiments. To create reasonable approximations of penetration and average purchase frequency, consumers need to have had multiple opportunities to inspect and potentially purchase the brands. This is why the method involves the same participants responding to multiple DCEs. Detailed step-by-step analytical instructions for the data collection and transformation have also been provided as a Technical Appendix at the end of the paper.

With these three proxy metrics of market share, penetration and average purchase frequency, the presence and strength of Double Jeopardy can be determined. As per Bandyopadhyay and Gupta (2004), this study uses two methods for evaluating whether Double Jeopardy patterns arise in the data:

(1) Pearson correlation coefficients between brand performance metrics; and
(2) Ehrenberg's w(1-b) model

The first method involves assessing the relationships between the actual brand performance metrics using Pearson correlation coefficients (e.g., Bandyopadhyay & Gupta 2004; Dawes 2009; McDowell & Dick 2005). Larger correlations coefficients between metrics, indicates stronger Double Jeopardy effects.

The second method involves comparing the actual average purchase frequency metrics with predicted average purchase frequency metrics from the w(1-b) model (Ehrenberg 1972; Ehrenberg 1988; Kahn et al. 1988; Bandyopadhyay & Gupta 2004). The model is expressed as:

$$w_x(1-b_x) = w_0$$

Where w_x is average purchase frequency of a 'brand X', b_x is the penetration of a 'brand X', and w_0 is a constant for the category. To develop the theoretical average purchase frequencies, the first step requires calculating w(1-b) individually for each brand. The mean w(1-b) across the brands forms the category constant (w_0). Therefore, with the category constant (w_0) and penetration for a 'Brand X' (b_x), predicted average purchase frequencies can be calculated with the formula is given as $w_0/(1-b_x)$.

Results

Data collected from the four DCE surveys was transformed into the measures of market share, penetration and average purchase frequency at the brand-level (i.e. aggregate of decaf and regular variants) as per the analysis approach. Table 1 shows these measures from each of the four DCE waves. The results are reported at the brand-level, which incorporates both the caffeine and decaf variants. This explains why the average purchase frequency is greater for some brands - caffeine and decaf variants for a brand could be both 'purchased' in one wave.

[Insert table 1 about here]

The market shares, penetration and average purchase frequencies are noticeably stable across the four periods, a phenomenon seen in panel data also (Goodhardt *et al.* 1984). Such stability, at least in the moderate term, is widely accepted in the literature and supports the reliability of the DCEs in capturing consumer preferences.

The brand performance metrics, as calculated from 'purchases' across all DCEs, are presented in Table 2. The brands are ordered in the table from largest market share (Maxwell House, 28%) to smallest market share (Jacobs, 3%). In line with Double Jeopardy, the Penetration and Average Purchase Frequency metrics also line up in descending order (with the only exception being the Nespresso Purchase Frequency).

[Insert table 2 about here]

As the first test of Double Jeopardy, Pearson correlations coefficients are used to inform the strength of the relationships between the brand performance metrics. These are presented in Table 3, and all demonstrate strong and positive relationships. In accordance with Double Jeopardy, larger market share brands have more buyers (i.e. greater penetration) ($r = .97$, $p < .01$), as well as having more loyal buyers (i.e. greater purchase frequencies) ($r = .98$, $p < .01$). Figures 1 and 2 further demonstrate this Double Jeopardy pattern, through graphing market share against penetration and average purchase frequency respectively.

[Insert table 3 about here]
[Insert figures 1 and 2 about here]

The second test of Double Jeopardy involves comparing the actual average purchase frequencies with the w(1-b) predicted average purchase frequencies (as detailed in the approach to analysis). Looking at the relationship between the observed frequencies and the predicted frequencies (shown in Table 4), we find that they are strongly positively correlated ($r = .94$, $p < .01$). Such a strong correlation further suggests that the data collect from the DCE experiments conforms to expected Double Jeopardy patterns.

[Insert table 4 about here]

The DCE methodology has produced patterns of brand performance metrics that demonstrate Double Jeopardy. This result is in line with the well-documented patterns in the Instant Coffee market observed through the analysis of consumer panel data (Ehrenberg *et al.* 1990).

Conclusions and Implications

Double Jeopardy is one of the most significant discoveries among the empirical generalisations in the marketing literature (Ehrenberg *et al.* 1990; Habel & Lockshin 2013). By recognising that larger brands have more customers who exhibit greater levels of loyalty to the brand, marketing managers can make more realistic assessments of brand performance and tailor marketing activity. Smaller brands should anticipate that their marketing effort will not attract as many customers, nor as many loyal purchasers as that of larger brands. This is a natural disadvantage that is a feature of the market, and not necessarily a flaw in strategy.

However, knowing whether Double Jeopardy patterns are present in any particular market remains a challenge. Numerous markets have been shown to conform to Double Jeopardy, with relatively few exceptions (Ehrenberg 1972; Ehrenberg 1988; Ehrenberg *et al.* 1990; Martin 1973; McDowell & Dick 2001; Shuchman 1968; Wright & Riebe 2010). Yet this generalisability is not well known within industry and prudent marketers need to be certain that Double Jeopardy applies in their market – without such certainty evaluations of marketing efforts may not be appropriate. Present methods for detecting Double Jeopardy patterns rely heavily on the availability of panel data for the market in question. Unfortunately, panel data is not always available for a market, and when it is available can be very expensive to acquire. More recent proposals for self-report and Juster scale approaches are much cheaper, but are still very reliant on large quantities of collected data (Donthu 1994; Wright *et al.* 2002; Yang *et al.* 2005); an expense, both in time and money, that many marketers may not be able to afford.

Recognising the limitations facing many marketing managers and researchers this paper has demonstrated a new method for testing whether Double Jeopardy patterns are present in a market. Using repeated runs of a DCE that contains the major relevant brands in a market we are able to formulate proximate measures of market share, penetration and average purchase frequency. Using these we demonstrate that the method captures the Double Jeopardy pattern in a well-known market, instant coffee.

Market researchers can easily adapt this use of DCEs to determine whether Double Jeopardy applies in their own markets. By selecting the product features believed to be most responsible for consumer preferences, and the critical brands in the market in question, representations of the products available in the market can be generated. These products can then be structured into choice sets and the resultant DCE survey distributed to a relevant segment of the market. The observed choices can then be used to investigate the patterns of consumer behaviour in the market giving managers new insights into the market that they are operating in.

The method developed in this paper can also be expanded upon to build even more realistic estimates of market metrics. In this study we used only the biggest brands and deliberately sought a small sample to demonstrate the robustness of the method for showing the Double Jeopardy pattern (Ehrenberg *et al.* 1990). By expanding the experiment to include all brands in the market and expanding the sample to all key market segments the results from the DCEs would be able to be compared to in-market sales data from the same time period. This would further validate the DCE method proposed, and indeed offer continued support for the relevance of DCE methods in the wider literature. Such applications would also provide insights into how sensitive the approach is to identifying ‘niche’ and ‘change-of-pace’ brands (Kahn *et al.* 1988).

Discrete Choice Experiments have traditionally been used as a method for investigating consumers’ preferences and determining how the market will react to changes, rather than the patterns underlying consumer behaviour. Further to this, descriptive models, such as the NBD-Dirichlet, have almost exclusively been used with consumer panel data. The research presented in this paper is the first to breach the divide between Discrete Choice Experiments and predictions made in the NBD-Dirichlet modelling literatures. Combining these two areas is likely a fruitful area for further investigation. DCEs may be able to provide much deeper insight into other ‘Dirichlet-type’ patterns of consumer behaviour.

Technical Appendix

In order to analyse the DCE data, it needs to undergo the following transformations:

For each wave of data collection

1. Using the instruction of *"Which would you be MOST likely and LEAST likely to purchase?"*, the selected product for each choice set is recorded for each of the participants. For our calculations, only the responses for *"Most Likely"* are recorded, but the selection of *"Least Likely"* can also be translated as the product not being in the consideration set and in the participants' product category repertoire.

2. The first step would provide a sub-total *(s)* of choice for each product, that is, the total number of times participants selected the item.

3. For larger data sets, the product that is selected the most by the participant could be considered as proxy for a purchase. For our analysis, we selected the top two products to demonstrate the concept using a smaller sample as the products that have been purchased by each participant. In the event that there are multiple products sharing the top or top two positions, a random selection is applied.

4. For **Market Share** calculations, the total of all of the product selections, i.e. $\sum s$ would be considered as the total sales for the period.

5. For **Penetration** calculations, the participants who select the particular product as their top or top-two products are considered as the product buyers.

To simulate periodic purchases, we collect data on a weekly basis – this can be tailored according to the actual purchase period if the information is available. Although longer periods may be desirable in some markets, this would also translate to a longer data collection period and subsequently a delay in the analysis.

Taking into account the stochastic nature of product purchases, each data collection can be drawn from the original list of invitees. Invitees who choose not to participate in a particular period are considered as a non-buyer for that period. Alternatively, subsequent data collections may only include those who have participated in the previous iterations. As such, a large number of initial invitees will be required to arrive at the final sample figure.

Should data collection be drawn from the original list of invitees, a minimum number of participation may also be desired for the simplicity of calculation. For the purpose of demonstration, we only included those who participated in three out of the four data collections.

At the end of all waves of data collection

1. An overall *Market Share* may be calculated through averaging the weekly figures, or by taking the sum of the number of selections for each product throughout the whole period.

2. For the calculation of *Penetration* figures, a participant is considered as a product buyer if they *ever* select the particular product as their top or top-two product in each periodic data collection.

3. *Purchase Frequency* (PF) is derived from the number of survey participations, for the number of times that a specific product is selected over the course of periodic data collections.

4. *Category Buying Rate* (CBR) is calculated from the number of times that the participants opt to respond throughout the periodic data collections. If the top-two products are considered, this figure should be doubled accordingly.

5. On top of any other Discrete Choice Experiment analysis to determine the participants' preferences towards specific product elements, Market Share and Penetration calculations can be derived from

aggregating products from the same brands, for example: in our case we analysed 16 coffee products from eight different brands that are split into full-caffeine and decaffeinated products.

6. Other loyalty metrics such as *Share of Category Requirements* (SCR) (= PF/CBR) and *Sole Loyalty* (i.e. the number of respondents whose top product remains constant throughout the periodic data collections) can also be constructed from the data using this approach.

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Table 1 Coffee DCE Results by Period

		Market Share (%)	Penetration (%)	Avg Purchase Frequency
Wave 1 (n=79)	Maxwell House	28	48	1.16
	Starbucks	23	41	1.16
	Folgers	15	30	1.00
	Nescafe	13	24	1.11
	Douwe Egberts	11	20	1.06
	Carte Noire	2	4	1.00
	Nespresso	4	9	1.00
	Jacobs	3	6	1.00
Wave 2 (n=79)	Maxwell House	28	54	1.02
	Starbucks	24	41	1.19
	Folgers	19	37	1.03
	Nescafe	9	19	1.00
	Douwe Egberts	6	11	1.11
	Carte Noire	6	11	1.00
	Nespresso	4	8	1.00
	Jacobs	4	8	1.00
Wave 3 (n=65)	Maxwell House	27	42	1.06
	Starbucks	25	34	1.22
	Folgers	16	27	1.00
	Nescafe	13	20	1.06
	Douwe Egberts	6	10	1.00
	Carte Noire	5	8	1.00
	Nespresso	4	6	1.00
	Jacobs	4	6	1.00
Wave 4 (n=47)	Maxwell House	30	34	1.00
	Starbucks	19	19	1.20
	Folgers	15	18	1.00
	Nescafe	12	14	1.00
	Douwe Egberts	9	10	1.00
	Carte Noire	7	9	1.00
	Nespresso	6	8	1.00
	Jacobs	2	3	1.00

Table 2 Instant Coffee DCE Brand Performance Metrics from across DCEs

	Market Share (%)	**Penetration (%)**	**Average Purchase Frequency**
Maxwell House	28	62	3.1
Starbucks	23	54	2.9
Folgers	16	48	2.3
Nescafe	12	37	2.2
Douwe Egberts	8	35	1.5
Carte Noire	5	23	1.4
Nespresso	4	18	1.7
Jacobs	3	16	1.4
Average	**13**	**37**	**2.1**

Table 3 Double Jeopardy Pearson Correlations

	r	***p***
Market Share & Penetration	0.97	<0.01
Market Share & Avg. Purchase Frequency	0.98	<0.01
Penetration & Avg. Purchase Frequency	0.92	<0.01

Table 4 w(1-b) model purchase frequency predictions

	Observed Penetration (%) b_x	**Observed Purchase Frequency w_x**	**Predicted Purchase Frequency $w_x/(1-b_x)$**	**Deviation $w_0 - w_x/(1-b_x)$**
Maxwell House	62	3.1	3.2	-0.1
Starbucks	54	2.9	2.7	0.3
Folgers	48	2.3	2.3	0.0
Nescafe	37	2.2	1.9	0.3
Douwe Egberts	35	1.5	1.9	-0.4
Carte Noire	23	1.4	1.6	-0.2
Nespresso	18	1.7	1.5	0.2
Jacobs	16	1.4	1.5	-0.1
Average	**37**	**2.1**	**2.1**	

Figure 1 Market Shares versus Penetration

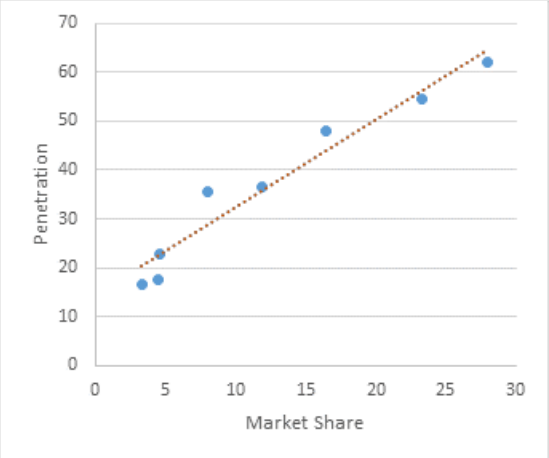

Figure 2 Market Shares versus Average Purchase Frequency