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Assessing the validity of brand equity constructs

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ABSTRACT

This paper tests both the internal and external validity of the Erdem and Swait (1998) brand equity framework using two measurement modelling approaches, namely the relatively new Best-Worst scaling (BWS) method (Finn and Louviere, 1992; Marley and Louviere, 2005) and the more traditional confirmatory factor analysis (CFA) method. Data were collected from the Australian banking and mobile services sectors. We find the measurement models derived from BWS outperformed the models based on CFA of the rating data in predicting both stated and real brand choices. The findings have implications for both academics and practitioners in brand equity measurement and management.

1. Introduction

A review of brand equity literature indicates that there are three fundamental frameworks for understanding and measuring brand equity. They include (1) Aaker's (1991) framework, which is a managerial view of brand equity; (2) Keller's (1993) psychological, memory-based view of brand equity; and (3) Erdem and Swait's (1998) brand equity framework based on information economics and signalling theory. There are other brand equity frameworks that are built upon the above three frameworks. For example, Yoo et al. (2000) extended Aaker's (1991) framework by specifying the dimensions of brand equity and also the antecedents of brand equity. Krishnan (1996) used Keller's (1993) memory-based view of brand equity to identify various associations underlying consumer based brand equity. Netemeyer et al. (2004) enriched Keller's (1993) view of brand equity by developing and validating measures of the facets of customer based brand equity (CBBE). Park and Shrinivasan (1994) integrated both Aaker's and Keller's concepts of brand equity and developed a survey based method for measuring and understanding brand equity.

In this paper we adopt the Erdem and Swait (1998) brand equity framework for the following three main reasons. First, the framework is based on a formal theory about consumer decision processes that provides a comprehensive and dynamic view of brand equity, which explains how various brand equity constructs are interrelated to create brand utility and then brand choice. Second, the framework has been repeatedly tested empirically (e.g., Erdem et al., 2006; Wang et al., 2007). Third, the framework can be integrated with random utility theory (McFadden, 1974; Thurstone, 1927) to develop a practical way to model and measure brand equity.

In order to assess the validity of the Erdem and Swait (1998) brand equity constructs, we need an analysis procedure that takes into account measurement errors. It is well known that any observed variable contains measurement error which will bias parameter estimates (Bollen, 1989; Nunally and Bernstein, 1994). To examine the extent of measurement error, it is necessary that each construct be measured with multiple indicators (Churchill, 1979; Peter, 1979). Confirmatory factor analysis (CFA) makes it possible to identify errors and investigate how well the multiple indicators capture the construct of interest (Fornell and Larcker, 1981; Gerbing and Anderson, 1988).

CFA has been historically associated with the assessment of dimensionality, reliability and internal validity of measurement models (e.g. Akaike, 1987; Gerbing and Anderson, 1988; Hayduk, 1987; Jöreskog, 1971; Jöreskog and Sörbom, 1982). Typically CFA is conducted after exploratory factor analysis (EFA) and reliability analysis via Cronbach's (1951) coefficient alpha to ensure that the measurement items are internally consistent (Peter, 1979). The main purpose of CFA is to assess the psychometric properties of a multi-item measurement scale (Gerbing and Anderson, 1988; Nunally and Bernstein, 1994). However, measurement models formulated via this approach may not predict both stated and real brand choices in real markets (Louviere et al., 2000). It is important to evaluate both the internal and external validity of any proposed brand equity framework before it can be generally accepted. Surprisingly, very little empirical research has been conducted to assess the predictive validities of various brand equity frameworks.

Louviere and his associates (Finn and Louviere, 1992; Marley and Louviere, 2005) have developed a different measurement item

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selection approach to CFA, known as Best-Worst scaling (BWS), also known as Maximum difference (Max-Diff) scaling (Almquist and Lee, 2009). It uses experimental designs to manipulate the presence or absence of items in a choice task. As such, we use BWS to select measurement items to represent various constructs in the Erdem and Swait (1998) brand equity framework. We then compare this new BWS approach to that of traditional CFA, for predicting both stated and real brand choices in real markets. To the best of our knowledge, this form of comparison has yet to be conducted. We believe this comparison deserves empirical investigation, as it has the potential to advance our knowledge in the brand equity scale development literature.

The remainder of this paper is organized as follows: we first introduce the Erdem and Swait (1998) brand equity framework. Second, we describe the two research methods used in this study, namely the CFA and BWS approaches. We also report the data collection process and the testing method for internal and external validity. Third, we present the conditional logit model results to examine the internal and external validity of our two methods. Finally, we discuss this study's implications and directions for further research.

2. The Erdem and Swait (1998) brand equity framework

Drawing upon Spence's (1974) signalling and information economics theory, Erdem and Swait (1998) developed a brand equity framework for markets characterized by imperfect and asymmetric information (Stigler, 1961). When a firm knows more about its product(s) than its customers, an information asymmetry will occur (Erdem and Swait, 1998). This causes a lack of complete information on the part of its customers regarding the product offerings, a phenomenon known as imperfect information (Nelson, 1970).

The Erdem and Swait (1998) brand equity framework consists of seven constructs, namely, (i) Brand investments; (ii) Consistency; (iii) Clarity; (iv) Credibility; (v) Perceived quality; (vi) Perceived risk; and (vii) Information costs saved, leading to the latent dependent variable of expected utility, as depicted in Fig. 1.

According to the Erdem and Swait (1998) brand equity framework, the clarity and credibility of brands as signals of product positions increase perceived quality, decrease consumer perceived risk and information costs, and hence increase consumer expected utility. Fig. 1 suggests that imperfect and asymmetric information leads to uncertainty, which in turn influences customers' perceptions of brand attributes. Uncertainty about product quality also suggests that customer beliefs may vary from person to person

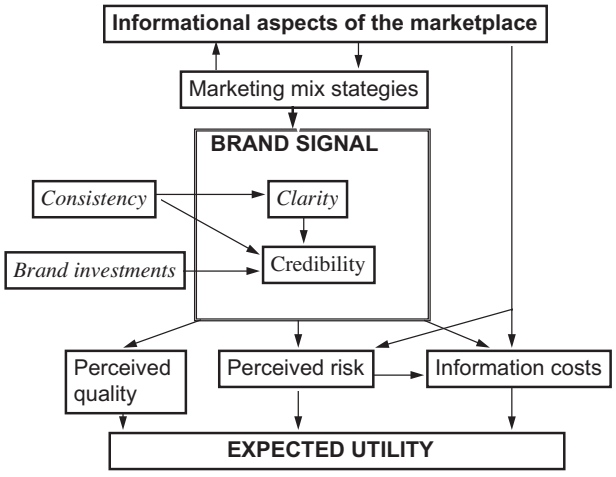

Fig. 1. The conceptual model of the Erdem and Swait (1998) brand equity framework.

on the aspect of quality. This creates perceived risk on the part of the customer, which is something customers try to avoid. Risk-averse customers are not comfortable with ambiguous and uncertain product quality assessments. When quality is uncertain, customers are likely to search for more information. Erdem and Swait (1998) argue that customers use brands as a signal for quality. Brand credibility is hypothesized to be the key antecedent or mediator to brand quality, brand perceived risks and brand information costs.

The Erdem and Swait (1998) signalling perspective on brand equity explicitly considers imperfect and asymmetric information in real markets, unlike Keller's (1993) cognitive psychological view of brand equity. Firms can use brands as signals to inform customers about product positions when its customers are uncertain about product attributes.

The Erdem and Swait (1998) brand equity framework has been successfully applied to a number of research settings, including the study of the impact of brand credibility on consumer price sensitivity (Erdem et al., 2002) and the role of brand credibility on brand consideration, consumer learning and choice (Erdem et al., 1999; Erdem and Swait, 2004). Kim et al. (2008) assessed antecedents of brand loyalty including brand credibility. Brodie et al. (2002) drew upon the Erdem and Swait (1998) framework to develop a theory of marketplace equity. Washburn et al. (2004) examined how customer-based brand equity of partner brands affects consumer evaluations of the search, experience, and credence attribute performance of the alliance brand. Wang et al. (2007) investigated the external validity of the Erdem and Swait (1998) framework using both structural equation modelling and discrete choice modelling approaches.

The original Erdem and Swait (1998) brand equity framework's structural model shown in Fig. 1 contains a clarity construct. The clarity construct is excluded from Erdem and Swait's later work (e.g., see Erdem and Swait, 2002, 2004; Erdem et al., 2002, 2006). We followed the Erdem and Swait precedent of excluding the clarity construct for two main reasons. First, the clarity construct is the least important variable amongst the antecedents of brand investments and consistency to the credibility construct. Second, this study was part of a larger study and involved lengthy discrete choice experiments and therefore for practical reasons of reducing respondent cognitive burden, we decided to exclude the less important clarity construct.

3. Two methods for selecting construct items

Traditionally, the method used for the selection of items to measure a latent variable or construct has been confirmatory factor analysis (CFA). In this paper we introduce a new alternative method for the selection of construct items known as Best-Worst scaling (BWS).

3.1. Confirmatory factor analysis (CFA): the traditional approach

The traditional approach for selecting construct items started with exploratory factor analysis (EFA) and reliability analysis, to purify multi-item rating scales (Churchill, 1979; Cronbach, 1951; Peter, 1979). This is then followed by confirmatory factor analysis (CFA) to further assess the psychometric properties of the multi-item measurement scale (Gerbing and Anderson, 1988; Nunally and Bernstein, 1994).

3.2. Best-Worst scaling (BWS): an alternative approach

Typically, a BWS task asks respondents to choose the *best* and the *worst* option from a set of alternatives. The measurement item

combinations in a BWS task are typically controlled by an experimental design. We used a balanced incomplete block design (BIBD) (Green, 1974; Lee et al., 2008) to construct the BWS tasks that determined the combinations of brand equity multi-items that respondents evaluated.

In keeping with Churchill's (1979) scale development procedure, we defined the domain for each of the six constructs in the Erdem and Swait (1998) brand equity framework via qualitative research. Eight qualitative focus group interviews were conducted to develop seven items for each of the six brand equity constructs. Table 1 contains three sample items for each brand equity construct. The experimental design that governed the alternatives in the BWS choice sets was a Youden BIBD (Coulburn and Dinitz, 2007). The *item numbers* in Table 1 come from the BIBD that was used.

Each respondent was presented with seven sets of BWS tasks for each of the six brand equity constructs. In each BWS task with three items, respondents were asked to indicate which item was the *best* statement and which item was the *worst* statement for each brand equity construct. Table 2 illustrates the first set of seven BWS tasks that respondents were presented for the construct of brand investments where they were asked to provide two choices. First, respondents chose the brand investments statement that they viewed most applicable when a company is investing in its brand. Second, respondents chose the brand investments statement that they viewed least applicable when a company is investing in its brand.

4. Data collection process and the testing method

4.1. Data collection process

In this study we used two services categories to compare the traditional approach of construct item selection, CFA, to the proposed alternative approach of BWS construct item selection. Our *first service category* comprised daily banking transaction account service providers, including the major Australasian banking brands such as Australia New Zealand Banking Group (ANZ), Commonwealth Bank of Australia (CBA) and Westpac Banking Corporation (WBC). Our *second service category* comprised mobile phone network service providers, including Optus, Telstra and Vodafone.

We chose these two service categories for the following reasons. First, the original Erdem and Swait (1998) brand equity framework has been predominantly tested in tangible product categories. Given the increasingly important intangible services categories today, we decided to carry out this research in services categories. Second, we chose banking service providers and mobile phones service providers, because they represent two of the most popular service categories that consumers can easily relate to.

To answer our research questions, we used a professional marketing research firm to collect data for our two service categories. Respondents were randomly selected from a national online research panel in Australia known as The ORU, which has been accredited by the Australian Marketing Research Society's (AMSRS) Quality Standard for Online Research (QSOAP). The ORU comprises an online marketing research panel designed and maintained to be representative of the Australian and New Zealand population, which consists of over 450,000 members. Panel members are offered incentives in the form of bonus points that enable them to redeem accumulated points once they reach prescribed thresholds.

Respondents were randomly assigned to each of the two service categories. A total of 257 Australian respondents completed the banking service provider survey, and a total of 251 Australian respondents completed the mobile phone service provider survey. Both of the samples that were collected match the general population of Australia on the variables of gender, age and personal income. In order to qualify for the survey, respondents were required to have been with their service provider for at least 12 months.

The survey consisted of (i) brand equity measurement items using seven-point Likert-type rating scales (to be used in the CFA measurement models); (ii) six BWS tasks for the six brand equity constructs; and (iii) demographic questions such as gender, age and income.

4.2. Testing method

The initial seven measurement items were reduced via CFA using a number of psychometric criteria, namely (i) construct convergent validity, established when average variance explained (AVE) is greater than the value of 0.50; (ii) construct discriminant validity, established when AVE is greater than the highest shared variance (HSV); and (iii) construct reliability (CR), established when CR is greater than 0.70 (Fornell and Larcker, 1981; Gerbing and Anderson, 1988; Jöreskog, 1971; Nunally and Bernstein, 1994). Consistent with Finn and Louviere (1992) and Marley and

Table 1
Sample items to measure the brand equity constructs.

Construct number	Construct name	Item number	Item
1	BI	2	The company makes sure it's up to date
1	BI	6	The company is a leader in using technology
1	BI	4	The company is constantly evolving
2	CO	1	The company's image is stable
2	CO	4	The company's services are predictable
2	CO	5	You know what to expect from the company
3	CR	4	The company is open about its capabilities
3	CR	7	The company has a good reputation
3	CR	3	The company has a name you can trust
4	PQ	3	The company's staff is of a high standard
4	PQ	2	The company has stood the test of time
4	PQ	1	The company is more exclusive that its competitors
5	PR	7	The company has staying power
5	PR	5	I'm sure about the company
5	PR	2	I can count on the company being there in the future
6	ICS	6	The company's website is easy to use
6	ICS	1	You can quickly find out about the company
6	ICS	7	Looking into the company is straightforward

Note: BI = Brand investments; CO = Consistency; CR = Credibility; PQ = Perceived quality; PR = Perceived risk; ICS = Information costs saved.

Table 2
One of seven sets of the brand investments construct Best-Worst tasks.

Brand investments items	Most applicable	Least applicable
The company makes sure it's up to date	☑	☐
The company is a leader in using technology	☐	☐
The company is constantly evolving	☐	☑

Note: This is an example responses from one respondent.

Louviere (2005), BWS measurement model items were reduced based on the rank order of the frequency of best minus the frequency of worst. In order to facilitate a comparison between CFA and BWS, we used the same number of items for the reduced BWS measurement models, as that for the reduced CFA measurement models.

Respondents were asked to report their most recent brand choices in the Australian banking sector for the banking transaction account service provider category. These real brand choices allowed us to test the external validity of the three banking brands, namely ANZ, CBA and WBC. Note that in the BWS task, respondents were asked to indicate which item (not which bank) was the "best" and "worst" statement for each brand equity construct.

Similarly, for the mobile phone service provider category, respondents were asked to report their most recent brand choices in the Australian mobile phone service sector. These real brand choices allowed us to test the external validity of the three mobile network service providers, namely Optus, Telstra and Vodafone.

In both service categories, we compared CFA versus BWS measurement models for both *internal* and *external* validity using McFadden's (1974) conditional logit model. The *independent* variables were the means of either CFA or BWS selected items for each of the six constructs.

We use two *dependent* variables for each services category, namely banking and mobile phones. For example, in the case of the banking services category, each respondent was asked to rate each of three banking brands presented in the survey, thereby creating our *first dependent variable*, where 1 represents the respondent's most preferred brand out of the three brands that were evaluated and 0 representing the other two brands. We use this dependent variable as the comparison between BWS and CFA item selection methods to test for *internal validity (IV)* because the data for this variable is generated within this study.

Continuing with the banking example, the *second dependent variable* is a dummy indicator variable for the respondent's most recent actual brand choice in the banking service sector. We use this dependent variable to test for *external validity (EV)*, because the data for this variable exists outside of this study, pertaining to their actual daily transaction account choices among the three banking brands as stated above. Similarly, the same procedure was used to create the first and second dependent variables for the mobile phone service provider category.

5. Results

Table 3 presents the conditional logit models for the *two* dependent variables for the banking service provider category, using the brand most preferred to test for internal validity and using the actual brand chosen to test for external validity. In addition to the six brand equity constructs, we included two new independent variables in the conditional logit models in the form of alternative specific constants (ASCs), to represent the three banking service provider brands.

As shown in Table 3 for the column CFA IV versus column BWS IV, the log-likelihood for the BWS model is −59.04 and −67.48 for the CFA model. As such, the BWS measurement item selection method better predicts the most preferred brand when compared to the CFA item selection process. Both the AIC and the BIC values show that the BWS item selection predicts internal validity better than the CFA item selection approach.

Table 3
Conditional logit models for testing internal and external validity for the banking service provider category.

Parameters	CFA IV	BWS IV	CFA EV	BWS EV
BI	0.86 (2.96)	1.13 (2.25)	1.55 (3.97)	1.76 (4.37)
CO	0.12 (0.35)	0.35 (2.92)	0.33 (1.59)	0.58 (2.66)
CR	0.10 (2.03)	2.15 (3.14)	1.14 (1.77)	2.39 (3.73)
PQ	1.11 (2.12)	3.15 (4.33)	1.26 (3.49)	1.34 (3.73)
PR	2.92 (5.07)	3.78 (4.89)	1.31 (4.18)	1.27 (3.77)
ICS	2.10 (4.97)	2.24 (4.72)	3.09 (6.44)	3.46 (6.73)
ASC 1	−0.18 (−0.51)	−0.13 (−0.36)	0.49 (2.12)	0.64 (3.06)
ASC 2	0.78 (2.32)	0.79 (2.34)	1.15 (3.66)	1.29 (4.07)
Fit statistics				
AIC	150.96	134.08	189.36	179.18
BIC	188.14	171.26	226.54	216.36
LL	−67.48	−59.04	−86.68	−81.59

Note: Values in parentheses are *z*-values (significant at the 0.05 level if the absolute value of *z* is greater than 1.96); BI = Brand investments; CO = Consistency; CR = Credibility; PQ = Perceived quality; PR = Perceived risk; ICS = Information costs saved; ASC = Alternative specific constant; IV = Internal validity; EV = External validity; and LL = Log-likelihood.

Similarly as shown in Table 3 for the column CFA EV versus column BWS EV, the log-likelihood for the BWS model is −81.59 and −86.68 for the CFA model. As such, the BWS measurement item selection method better predicts actual brand choice when compared to the CFA item selection process. Both the AIC and the BIC values show that the BWS item selection predicts external validity better than the CFA item selection approach.

Table 4 presents the conditional logit models for the *two* dependent variables for the mobile phone service provider category, using the brand most preferred to test for internal validity and using the actual brand chosen to test for external validity. In addition to the six brand equity constructs, we included two new independent variables in the conditional logit models in the form of alternative specific constants (ASCs), to represent the three mobile phone service provider brands.

As shown in Table 4 for the column CFA IV versus column BWS IV, the log-likelihood for the BWS model is −75.24 and −78.50 for the CFA model. As such, the BWS measurement item selection method better predicts the most preferred brand when compared

Table 4
Conditional logit models for testing internal and external validity for the mobile network service provider category.

Parameters	CFA IV	BWS IV	CFA EV	BWS EV
BI	0.22 (2.18)	0.23 (2.11)	0.52 (3.45)	0.45 (3.06)
CO	0.10 (1.16)	0.23 (2.62)	0.18 (1.40)	0.27 (1.82)
CR	0.21 (2.06)	0.03 (0.15)	0.04 (0.10)	0.43 (1.86)
PQ	0.46 (3.25)	0.34 (2.64)	0.93 (3.54)	1.02 (4.20)
PR	0.80 (5.46)	0.66 (4.61)	2.12 (6.90)	2.14 (7.20)
ICS	1.32 (8.61)	1.46 (9.25)	1.31 (5.26)	1.40 (5.93)
ASC 1	−0.01 (−0.11)	−0.04 (−0.27)	−0.24 (−1.24)	−0.18 (−0.94)
ASC 2	0.63 (4.27)	0.65 (4.60)	0.39 (1.88)	0.41 (1.98)
Fit statistics				
AIC	173.01	166.47	170.67	160.53
BIC	210.00	203.46	235.40	220.64
LL	−78.50	−75.24	−71.33	−67.27

Note: Values in parentheses are *z*-values (significant at the 0.05 level if the absolute value of *z* is greater than 1.96); BI = Brand investments; CO = Consistency; CR = Credibility; PQ = Perceived quality; PR = Perceived risk; ICS = Information costs saved; ASC = Alternative specific constant; IV = Internal validity; EV = External validity; and LL = Log-likelihood.

to the CFA item selection process. Both the AIC and the BIC values show that the BWS item selection predicts internal validity better than the CFA item selection approach.

Similarly as shown in Table 4 for the column CFA EV versus column BWS EV, the log-likelihood for the BWS model is −67.27 and −71.33 for the CFA model. As such, the BWS measurement item selection method better predicts actual brand choice when compared to the CFA item selection process. Both the AIC and the BIC values show that the BWS item selection predicts external validity better than the CFA item selection approach.

6. Discussion and conclusions

This paper has compared the predictive performance between the new BWS approach and the more traditional CFA measurement model approach across two service categories, namely the banking transaction account service category and the mobile phone network services category. One of the reasons we chose banking and mobile phones categories is because they represent two of the most popular service categories. For instance, Mari (2008) noted that mobile banking would attract 110 million users in Europe and 80 million users in North America by 2014. Mobile handsets are in an excellent position to become the primary digital channel for providers of banking and related financial services on emerging markets.

Similarly, Nash (2008) noted that the future of mobile phone technology is limitless. Mobile phones are likely to eliminate the need for any land based phone systems. As technology increases, mobile phones will quickly become smaller in size, more versatile and highly adaptable.

Although measurement models built by the traditional CFA method may satisfy various psychometric criteria for model fit such as coefficient alpha, convergent validity, and discriminant validity, our results suggest that the CFA method may not exhibit either internal or external validity as well as our proposed BWS method does.

As noted by Cohen (2003) and Lee et al. (2007, 2008), BWS has been found to overcome response style bias associated with the CFA method, due to CFA's reliance on the use of rating scales. When using rating scales, each respondent may use the rating scale in their own unique way. Respondents are notorious for rating measurement items very rapidly, using simplification heuristics so that they may speed through the task. Some respondents may use the extreme ends of the rating scale, whilst others may spread their ratings across the entire scale range, yet others may rate the scale towards the centre of the scale (Steenkamp et al., 2010). This may and oftentimes does, result in low discrimination amongst rating scales. In contrast, BWS requires respondents to make trade-offs amongst the measurement items (Marley and Louviere, 2005). By so doing, we force respondents to evaluate the measurement items in exactly the same way, thus avoiding response style bias (Auger et al., 2007). As a result, the BWS approach is gaining popularity especially in the commercial marketing research community (Almquist and Lee, 2009).

In summary, this paper contributes to the scale development literature in general and the Erdem and Swait (1998) theoretical framework of brand equity in particular. We have developed a new and promising alternative to the dominant paradigm of CFA for selecting multiple indicators for an unobserved construct, such as the six brand equity constructs discussed in this paper. Many if not most marketing constructs, for example customer satisfaction, marketing orientation, and service quality, have many facets and cannot be directly observed. They can only be measured through valid indicators. The ultimate validity check is to test whether marketing constructs can predict real choices in real markets. To the best of our knowledge, our research represents one of few studies that test such external validity of marketing constructs.

Although we found that BWS outperformed CFA for both internal and external validity tests, we are not suggesting that the BWS method is a substitute for the CFA method in all cases, as we believe the latter has its rightful place in theory testing (Bagozzi and Yi, 1989; Bollen, 1989). As the first study of its kind, this paper provides a starting point for further comparative research in this area. To enhance the generalizability of our research findings, it is worthwhile to replicate the study across various research contexts, such as different product categories and different cultural settings.

Another avenue for future research is to compare BWS with item response theory (IRT) or Rasch modelling which overcomes measurement invariance problems associated with CFA (Andrich, 1988; Bond and Fox, 2001). Nevertheless, we believe that in commercial applications BWS can play a very important role to predict real market choices. This is because BWS requires fewer statistical assumptions and is simple to develop and test when compared to CFA or Rasch modelling.

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