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YILDIZ SOCIAL SCIENCE REVIEW

THE RESEARCH ON THE IMPACT OF CORPORATE TRUSTWORTHINESS AND CORPORATE IMAGE ON CUSTOMER SATISFACTION AND LOYALTY: CASE OF HEALTHCARE INSTITUTION

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ÖZET

Amaç, üniversite kafiliye eğitim araştırma hastanesinde hasta bakımı alan hastalar arasında kurumsal güvenilirlik ve kurumsal imajın müşteri memnuniyeti ve sadakat üzerindeki etkisini belirlemektir. Kurumsal güvenilirlik, kurumsal imaj, müşteri memnuniyeti ve müşteri sadakati için ölçekler belirlenmiş ve anket hazırlanmıştır. Ön test yapıldıktan sonra araştırmada son anket kullanılmıştır. Toplam 1410 form analiz edilmiştir. Güvenilirlik ve faktör analizi tamamlandıktan sonra karşılaştırmalı testler, korelasyon ve regresyon analizi yapılmıştır. Faktör analizinden sonra müşteri memnuniyeti 2 alana ayrılıp, müşteri sadakati de 2 alana ayrılmıştır. Her değişken arasındaki Pearson korelasyon katsayıları *(r)* belirlenmiş. Regresyon analizinde boyutlar arasında belirleme katsayısı (R^2) ortaya çıkmıştır. Müşteri savunuculuğundaki değişimin oranı, vakaların% 51,2'sindeki maddi ve manevi tatmin boyutlarıyla açıklanmaktadır. Müşteri savunuculuğundaki değişimin oranı, vakaların% 62'sinde somut ve gayri resmî tatmin, güvenilirlik ve imaj boyutları ile açıklanmaktadır. Müşteri tercihindeki değişim oranı, organizasyonel ve kişisel memnuniyet % 27,1'inde güvenilirlik boyutları ile açıklanmaktadır.

Keywords: *corporate trustworthiness, corporate image, customer satisfaction, customer loyalty*

ABSTRACT

The objective was to define the impact of corporate trustworthiness and corporate image on customer satisfaction and loyalty among patients who get in-patient care in a university affliated hospital.

The scales for corporate trustworthiness, corporate image, customer satisfaction and customer loyalty were determined and a survey questionaire was prepared. After a pre-test was done, the final questionaire was used in the research. Total of 1410 forms were analysed. After reliability and factor analysis were completed, comparative tests, correlation and regression analysis were done.

After factor analysis, customer satisfaction was divided into 2 domains, customer loyalty into 2 domains. Pearson's correlation coefficients (r) between each variable was determined. Regression analysis revealed coefficient of determination (R2) between dimensions. The proportion of variation in customer advocacy is explained by tangible and intangible satisfaction dimensions in 51,2 % of cases. The proportion of variation in customer advocacy is explained by tangible and intangible satisfaction, trustworthiness and image dimensions in 62% of cases. The proportion of variation in customer choice is explained by organizational and personel satisfaction, trustworthiness dimensions in 27,1% of cases.

1. INTRODUCTION

The satisfaction of customers is measured by two basic models, namely, transaction-specific model and cumulative satisfaction model. customer satisfaction has been modeled as a function of psychological constructs such as attitude, expectation and disconfirmation in transaction-specific model (Boulding et al., 1993; Oliver, 1993). However the benefits derived from product or service attributes form the primary antecedents to satisfaction in cumulative satisfaction model (Gustaffson and Johnson,2004). Personal control theory and cumulative satisfaction model is used to measure CS in healthcare services.

Satisfaction was defined as an evaluative, affective, or emotional response (Oliver 1989). Hence only after the object is interpreted then the customers can evaluate the object. Thus, satisfaction is the post-purchase evaluation of products or services as the expectations are before purchase (Kotler, 1991). The ability of the supplier to meet the customer's norms and expectations determines satisfaction. Yet customers will continually expect better services no matter how good the services are (Dwyer et al., 1987; Fornell, 1992; Oliva et al., 1992).

The image of a firm plays a pivotal role of attracting to a customer to the firm and give clues of which technical and functional qualities can be offered (Gro¨nroos 1982). The image affects the expectations of the customers. As a result it is crucial for the customers to bear realistic expectations. Therefore in healthcare services, the reputation of a hospital has to be considered as an element of marketing policies.

Image has an influence on service performance measures as image facilitates the prior knowledge of consumers about service performance. Gronroos (1984) considers image as the outcome of consumer perception about a firm. Furthermore Han and Back (2008) described the impressions, beliefs and feelings that an individual has about the company as image. Thus, image which represents the firm's highly subjective nature, is a consumer's mental representation of the firm. Consumer's perceived image of the firm has been cnsidered as an antecedent of their expectations (Kristensen, 1998; Gronroos, 1984).

Even though satisfaction and trust are closely related, they are also conceptually different. Each has some distinct antecedents, and also has different empirical effects on retention (Geyskens et al., 1998; Szymanski and Henard, 2001). Moreover, trust is considered as a stronger emotion than satisfaction and that it might predict retention better (e.g. Hart and Johnson, 1999).

The sense of well-being the patient feels in the hospital, security, etc. defines the trustworthiness of hospital. As a matter of fact it influences the confidence the patient has on the hospital. Consequently the overall evaluation of service provided is affected. Balasubramanian et al. (2003) considered "perceived trustworthiness" as a a determinant of customer satisfaction. Iyer and Muncy (2004) suggested that level of trust could vary across different patient segments. As a matter of fact they segmented the patients on the basis of the level of the trust they had for the service provider. Ramsaran-Fowdar (2008) found that reliability, and fair and equitable treatment' influenced patient satisfaction.

Andaleeb (1998) found that facility, communication, cost, demeanour and competence were the important determinants of patient satisfaction in hospital services. Pakdil and Harwood (2005), showed that patient satisfaction was increased more with positive physician-patient interaction than any other provider-customer relationship. Duggirala et al.'s (2008) found out that safety indicators, overall experience of medical care, personnel quality, process of clinical care, administrative processes, infrastructure, and social responsibility were significant predictors of patient satisfaction.

It is currently accepted that loyalty includes two dimensions: attitudinal; and behavioural (Oliver, 1999; Zeithaml, 2000; Chaudhuri and Holbrook, 2001; Anderson and Srinivasan, 2003; Koo, 2006). Attitudinal loyalty indicates a long-term and psychological commitment of a customer to continue a relationship with a service provider (Czepiel and Gilmore, 1987; Caruana, 2002; Shankar et al., 2003). Behavioural loyalty is defined as the proportion of purchases of a specific brand (Neal, 1999; Koo, 2006). However action loyalty is too difficult to observe and measure, so research tends to employ the conative or behavioural intention to measure customer loyalty (Yang and Peterson, 2004).

Repurchase intention refers to consumers' evaluation of future purchases from the same company based on their previous experience (Patterson and Spreng, 1997; Hellier et al., 2003; Durvasula et al., 2004; Seiders et al., 2005; Olaru et al., 2008).

The present study investigates the patients' overall satisfaction and its influence on patient loyalty. In accordance with data described in the literatüre, the satisfaction of patients' companions/visitors (Strasser et al., 1995) have been part of the current research. Hence, the current study also attempts to measure attendants' satisfaction of hospital services.

We begin the paper by introducing a framework from which we derive a number of hypotheses linking satisfaction, corporate trustworthiness and corporate image to customer loyalty. We then describe the large-scale, face to face survey conducted to collect data to test these hypotheses. Next we present the results of the study and discuss their significance. We end the paper with a conclusion of the implications for hospital managers.

2. Conceptual framework and research hypotheses

2.1. Customer satisfaction as a driver of customer loyalty

Many theories have been proposed to explain customer satisfaction. Customers purchase goods and services with pre-purchase expectations about anticipated performance, which is in accordance with Oliver's expectancy-disconfirmation theory (1980). Outcomes are compared against expectations after the product or service has been purchased and used. Confirmation occurs when the outcome matches expectations. When there are differences between expectations and outcomes disconfirmation occurs. Confirmation or positive disconfirmation of expectations cause satisfaction; whereas, negative disconfirmation of consumer expectations causes dissatisfaction.

Customer satisfaction reflects the degree to which the customer believes the service provider evokes positive feelings (Cronin et al. 2000). The link between satisfaction and behavioural intentions and behaviours such as customer retention and word of mouth have been reported (e.g. Anderson and Sullivan, 1993; Rucci et al., 1998; Bansal and Taylor, 1999; Cronin et al., 2000). This link which is fundamental to the marketing concept, is the key to repeat purchase as a result of satisfying customer needs and wants (Kotler et al., 2002). Furthermore, some major economies now measure satisfaction at the industry level using large sample surveys to predict customer retention and future financial performance (Fornell, 1992; Fornell et al., 1995), which is an indicator for the importance of satisfaction on retention. In line with previous research we therefore hypothesize that:

H1. The higher the level of satisfaction, the higher the level of customer loyalty.

2.2. Trust as a driver of customer loyalty

When one party has confidence in a partner's reliability and integrity then trust is formed (Morgan and Hunt, 1994). Indeed, trust could exist at the individual level (Rotter, 1967) or at the firm level (Moorman et al., 1993). Additionaly, trust could also be considered as "trust in the service itself" (Parasuraman et al., 1985, 1988). In the current study, we look at a customer's trust in his/her service provider, and thus, in the firm.

Sometimes service providers might not retain even those customers who are satisfied (e.g. Heskett et al., 1994; Schneider and Bowen, 1999). Hence, satisfaction per se might not be adequate to warrant long-term customer commitment to a single provider. That is why it may be necessary to look to other variables other than satisfaction that strengthen retention such as trust (Hart and Johnson, 1999). In order to ensure economically viable, long-term relationships firms often look beyond satisfaction to developing trust through marketing channels (e.g. Morgan and Hunt, 1994). It is thought that once trust is built into a relationship, the likelihood of either party ending the relationship decreases due to high termination costs.

Gremler and Brown (1996) proposed trust as a conceptual antecedent of customer loyalty. Hart and Johnson (1999) offered a similar argument. Gwinner et al. (1998) suggested trust as a relational

benefit. More specifically, they proposed trust as a confidence benefit rated highly by customers in long-term relational exchanges with service firms.

Hart and Johnson (1999) have argued that the presence of trust reflects a stronger relationship commitment than satisfaction. In line with previous research we therefore hypothesize that:

H2. The higher the level of corporate trustworthiness, the higher the level of customer loyalty.

2.3. Image as a driver of customer loyalty

Image has an influence on service performance measures as image facilitates the prior knowledge of consumers about service performance. Gronroos (1984) considers image as the outcome of consumer perception about a firm. Furthermore Han and Back (2008) described the impressions, beliefs and feelings that an individual has about the company as image. Thus, image which represents the firm's highly subjective nature, is a consumer's mental representation of the firm. Consumer's perceived image of the firm has been considered as an antecedent of their expectations (Kristensen, 1998; Gronroos, 1984). Moreover the image of a firm informs the customer what the firm might offer in terms of technical and functional qualities. The image affects the expectations of the customers. That is why it is important to let the customers have realistic expectations. In line with previous research we therefore hypothesize that:

H3. The higher the level of corporate image, the higher the level of customer loyalty.

In accordance with the above literature we also hypothesize that:

H4. Corporate image affects patient satisfaction positively
H5. Corporate trustworthiness affects patient satisfaction positively.

The research model is given in Figure 1.

3. Methodology

3.1. Sample

The study took place in Marmara University Pendik Teaching and Research Hospital, Istanbul. Patients admitted in Surgical Clinics, their companions and their visitors at the wards were invited to fill out the questionnaires.

3.2. Data Collection

Five thousand questionnaires were distributed and 1410 valid questionnaires were received. The survey period was from 5th April 2018 to 20th July 2018. Respondents were asked to rate their level of agreement on a 5-point Likert Scale (1 = 'strongly disagree' and 5 = 'strongly agree').

3.3. Measures

3.3.i. Corporate trustworthiness

The 4-item scale adapted from Panchopakesan (2010) was used.

3.3.ii. Corporate image

The 3-item scale adapted from Panchopakesan (2010) was used.

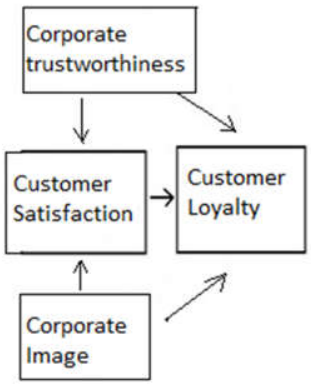
3.3.iii. Patient Satisfaction (PS)

The 10-item scale adapted from Sardana (2003), Chahal (2004), Chahal & Sharma (2005) was used.

3.3.iv. Patient Loyalty (PL)

The 15-item scale adapted from Chahal (2009), Raftopoulosus (2005), Harris & Gooda (2004) was used.

Figure 1. Research Model



3.4.Pilot study

First, the content of the questionnaires was developed by consulting relevant literature and then slightly modifying existing items to create initial questionnaires based on the research purpose and specific industry features. Then, three directors or supervisors from the medical centre were invited to perform an expert validation of the questionnaire, after which it was further revised. Next, a pilot run of the questionnaire was administered to 20 patients and the questions were revised according to the feed-backs.

3.5. Validity and reliability

Table 1 shows descriptive statistics, exploratory factor analysis and internal consistency (Cronbach's coefficient) for customer loyalty variables. Table 2 shows descriptive statistics, exploratory factor analysis and internal consistency (Cronbach's coefficient) for customer satisfaction variables.

Table 1. Factor naming and reliability analysis results for Customer Loyalty

Factor	Content of items, constructs and scales	Factor loading	Variance explained	Cronbach's alpha
Customer Advocacy	I recommend the same hospital to your friends and relatives I recommend the same physician to your friends and relatives The expertise skill of staff makes me to visit the hospital again The quality of care of public hospital is good I trust the services of the hospital Overall I am loyal to the health care unit I select this hospital as first choice	0,791 0,782 0,774 0,772 0,766 0,745 0,741	41,430	0,884
Customer choice	I would not like to come the same hospital again I will rather prefer private unit than this hospital In future, I may switch to other health service	0,842 0,834 0,781		0,760
		Total	61,917	
Kaiser Meyer Olkin Olkin Measure of Sampling Adequacy 0,846 **Bartlett Test of Sphericity Approx. Chi-square** 5998,403 **df** 45 **sig** 0,000				

Table 2. Factor naming and reliability analysis results for Customer Satisfaction

Factor	Content of items, constructs and scales	Factor loading	Variance explained	Cronbach's alpha
Objective Satisfaction	You always visit this hospital for all types of treatments Overall supportive facilities are excellent. The technical facilities blood bank, lab, etc. are good. Up-to-date health care techniques are well maintained Your expectations are fully meet with regard to doctors. Indoor services are satisfactory Doctors are available throughout their duty time	0,833 0,830 0,823 0,805 0,796 0,709 0,701	48,258	0,896
Subjective Satisfaction	Hospital is not fully conscious of your problems Hospital never welcomes your suggestion.	0,888 0,885		0,742
		Total	66,517	
Kaiser Meyer Olkin Measure of Sampling Adequacy 0,876 **Bartlett Test of Sphericity Approx. Chi-square** 5826,985 **df** 36 **sig** 0,000				

Table 3 shows descriptive statistics, exploratory factor analysis and internal consistency (Cronbach's coefficient) for corporate trustworthiness variables. Table 4 shows descriptive statistics, exploratory factor analysis and internal consistency (Cronbach's coefficient) for corporate image variables. The new model after factor analysis is shown in figure 2.

Table3. Factor naming and reliability analysis results for Corporate Trustworthiness

Factor	Content of items, constructs and scales	Factor loading	Variance explained	Cronbach's alpha
Corporate Trustwortiness	your level of confidence in the doctors who treated you hospital provided services as promised and on time extent to which the services, functioning and administration of the hospital are credible maintenance of patient privacy and confidentiality by the hospital	0,845 0,851 0,876 0,777		0,858
		Total	70,243	
Kaiser Meyer Olkin Measure of Sampling Adequacy 0,819 **Bartlett Test of Sphericity Approx. Chi-square** 2533,695 **df** 6 **sig** 0,000				

Table 4. Factor naming and reliability analysis results for Corporate Image

Factor	Content of items, constructs and scales	Factor loading	Variance explained	Cronbach's alpha
Corporate Image	sincerity, honesty and ethics followed by the hospital in providing medical services to you investment in new technologies and innovative practices by the hospital	0,875 0,875		0,693
		Total	76,505	
Kaiser Meyer Olkin Measure of Sampling Adequacy 0,500 **Bartlett Test of Sphericity Approx. Chi-square** 462,364 **df** 1 **sig** 0,000				

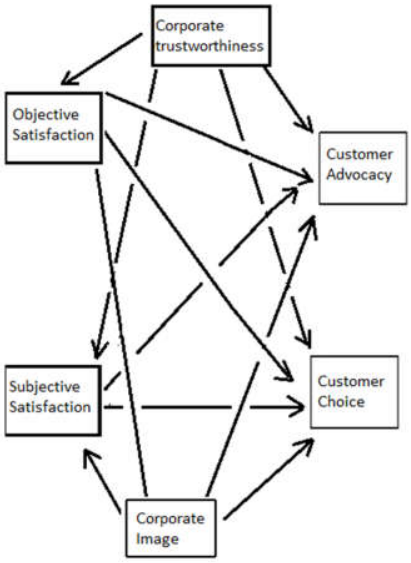
3.6. Data analysis

The data were analysed using SPSS 21.0 Windows (Statistical Packages for Social Sciences) with descriptive statistics indicating the demographics of the sample. To understand the relationships between the demographic characteristics of the healthcare receivers and their perceptions of customer satisfaction,

corporate trustworthiness, corporate image, customer loyalty, a one-way ANOVA was conducted with equal variance assumed (Macnee & McCabe 2007). Furthermore, this study implemented a Scheffe post hoc comparison, focusing on results with statistically significant differences.

Taking into consideration the factors extracted from the exploratory factor analysis we proceeded with the application of Multiple Regression Analysis.

Figure 2. Model after factor analysis



3.7. Results and Discussions

All tables are at appendix. Pearson's correlation coefficients (r) between each variable was determined (Table 7). Weak or no correlations were left out of the table. Regression analysis revealed coefficient of determination (R^2) between dimensions are shown in tables 8-10.

The current study investigated the impact of corporate trustworthiness and corporate image on customer satisfaction and loyalty among patients who get in-patient care in a university affliated hospital. Convenience sampling method was used among patients, their companions and those visiting them at the ward in a University affliated hospital. Surgical wards were chosen as the setting for data collection. Questionaires were handed out and those elligible for data preparation were collected for analysis. One thousand four hundred and ten valid forms were gathered.

After factor and reliability analysis, customer satisfaction and customer loyalty each were divided into two dimensions. Corporate trustworthiness and corporate image each had one dimension.

The proportion of variation in customer advocacy is explained by tangible and intangible satisfaction dimensions in 51,2 % of cases. The proportion of variation in customer advocacy is explained by tangible and intangible satisfaction, trustworthiness and image dimensions in 62% of cases. The proportion of variation in customer choice is explained by organizational and personel satisfaction, trustworthiness dimensions in 27,1% of cases.

Customer choice dimension loadings were higher among unemployed, patients and single persons. Patients had higher appreciation than those of the companions and visitors. The reason would be the patients are the true care-seekers and thus would value the health-caregivers more. Even though the hospital was a public hospital with social coverage, the patients with highest income had higher

customer choice loadings than the rest. However this difference was insignificant. Primary school graduates had significantly higher customer choice loadings than the high school graduates.
Customer advocacy loadings were higher among companions than visitors. Married persons had higher loadings than the single persons.

Subjective satisfaction was higher among married persons than single or divorced ones. The primary school graduates had higher subjective satisfaction than those of high school graduates. People with an income over 4000 tl had higher loadings than the rest.
When the factor loads were evaluated in general, the scores were above average. This would mean that the customer satisfaction and loyalty are above acceptable levels at least in a public academic hospital. Similarly corporate image and trustworthiness were determined to be higher than average.

3.8. Limitations and directions for future research

One of the limitations of our study was that the study only included patients who were hospitalized in a surgical clinic and had in-patient health-care service delivered to them. Patients who would apply to an out-patient clinic and get 1st level health-care services could show different results. Secondly, the study was conducted in a government teaching and research hospital. The same parameters should also be checked in foundation and private hospitals. Apart from non-financial performance metrics, financial indicators were not evaluated. Next, focus group discussions were not used. Questionaire forms were developed after secondary data was collected and analysed.

4. Conclusion

Customer loyalty is necessary for organizational longevity. In our case of health-care services, especially objective satisfaction had a high correlation with customer advocacy. Hence hospital administration should recruit highly qualified physicians and nurses for uptodate health care techniques to be well maintained, all types of treatments are given in the hospital. With right staff, the expectations of the patients are fully meet with regard to physicians and nurses. Subjective satisfaction had a good correlation with customer choice. Thus hospital administration should have a well designed interactive internal service quality stragey and internal communication policy so that hospital is not fully conscious of patient problems and patient's suggestion are likely to be welcomed. Customer advocay is well correlated with objective satisfaction, corporate trustworthiness and corporate image. Thus hospital administration should have a well designed integrated marketing communication strategy to increase the perception trust and image.

APPENDIX. Tables

Table 5. Factor loadings compared with regards to gender, marital status

Gender	Women (n=794)	Men (n=616)	
Objective Satisfaction	3,70	3,70	
Subjective Satisfaction	2,84	2,77	
Corporate Trustworthiness	3,79	3,82	
Corporate Image	3,73	3,74	
Customer Advocacy	3,76	2,18	
Customer Choice	3,04	3,06	
Marital status	**Single (n=341)**	**Married (n=963)**	**Divorced (n=106)**
Objective Satisfaction	3,62	3,73	3,64
Subjective Satisfaction	2,93 [d]	2,73 [d e]	3,11 [e]
Corporate Trustworthiness	3,75	3,83	3,75
Corporate Image	3,69	3,75	3,70
Customer Advocacy	3,66[f]	3,81[f]	3,83
Customer Choice	2,93[g]	3,26 [g h]	3,44 [h]

* mean ±sd ; [a-h] statistically significant comparisons

Table 6. Factor loadings compared with regards to employment and status of the participant at the hospital

	Public (n=229)	Private (n=388)	Own (n=260)	Unemployed (n=533)
Objective Satisfaction	3,59	3,75	3,65	3,73
Subjective Satisfaction	2,79	2,88	2,90	2,71
Corporate Trustworthiness	3,72	3,83	3,85	3,80
Corporate Image	3,68	3,76	3,73	3,73
Customer Advocacy	3,69	3,83	3,81	3,75
Customer Choice	3,09	3,18 [a]	3,08	2,91 [a]
	Patient (n=527)	**Companion (n=718)**	**Visitor (n=165)**	
Objective Satisfaction	3,73	3,70	3,58	
Subjective Satisfaction	2,70	2,79	3,20	
Corporate Trustworthiness	3,83	3,80	3,73	
Corporate Image	3,73	3,75	3,64	
Customer Advocacy	3,75	3,81 [a]	3,65 [a]	
Customer Choice	2,91 [b c]	3,08 [b d]	3,36 [c d]	

* mean ±sd ; [a-h] statistically significant comparisons

Table. 7 Factor loadings compared with regards to income and education

Income (TL)	**Less than 1000 (n=291)**	**1001-2000 (n=416)**	**2001-3000 (n=350)**	**3001-4000 (n=216)**	**Over 4001 (n=137)**
Objective Satisfaction	3,64	3,70	3,74	3,77	3,61
Subjective Satisfaction	2,85 [a]	2,82 [b]	2,95 [c]	2,75 [d]	2,42 [a b c d]
Corporate Trustworthiness	3,70	3,79	3,87	3,87	3,79
Corporate Image	3,63	3,71	3,78	3,84	3,74
Customer Advocacy	3,69	3,77	3,81	3,84	3,79
Customer Choice	3,09	2,96	3,15	3,09	2,90
Education	**Elementary (n=464)**	**High school (n=495)**	**University (n=362)**	**Masters (n=71)**	**Doctorate (n=18)**
Objective Satisfaction	3,71	3,72	3,65	3,74	3,41
Subjective Satisfaction	2,68 [a]	2,93 [a]	2,79	2,79	2,97
Corporate Trustworthiness	3,78	3,84	3,78	3,83	3,67
Corporate Image	3,73	3,75	3,72	3,73	3,53
Customer Advocacy	3,76	3,84	3,73	3,74	3,56
Customer Choice	2,98 [b]	3,15 [b]	3,08	3,15	3,02

* mean ±sd ; [a-h] statistically significant comparisons

Table 8. Pearson's coefficient of correlation

r	Objective Satisfaction	Subjective Satisfaction	Corporate Trustworthiness	Corporate Image
Corporate Trustworthiness	0,713			0,743
Corporate Image	0,688		0,743	
Customer Advocacy	0,710		0,736	0,663
Customer Choice		0,510		

* r= 0.25-0.50, weak correlation; r= 0.50-0.75, good correlation; r= 0.750-1.00, very good correlation, only good correlations were shown on the table.

Table 9. Multiple regression analysis for customer advocacy

Dependent variable	Customer Advocacy			
Independent variables	**Beta**	**T value**	**P value**	**VIF**
Objective Satisfaction	0,718	38,142	0,000	1,009
Subjective Satisfaction	-0,081	-4,303	0,000	1,009
R= 0,715	**R^2=** 0,512	**Fvalue=** 727,671	**P value=** 0,000	

* r= 0.25-0.50, weak correlation; r= 0.50-0.75, good correlation; r= 0.750-1.00, very good correlation, only good correlations were shown on the

Table 10. Multiple regression analysis for customer advocacy

Dependent variable	Customer Advocacy			
Independent variables	**Beta**	**T value**	**P value**	**VIF**
Objective Satisfaction	0,345	13,651	0,000	2,319
Subjective Satisfaction	-0,052	-3,133	0,002	1,018
Corporate Trustworthiness	0,381	13,875	0,000	2,737
Corporate Image	0,143	5,418	0,000	2,515
R= 0,787	**R^2=** 0,620	**F value=** 561,948	**P value=** 0,000	

* r= 0.25-0.50, weak correlation; r= 0.50-0.75, good correlation; r= 0.750-1.00, very good correlation, only good correlations were shown on the table.

Table 11. Multiple regression analysis for customer choice

Dependent variable	Customer Choice			
Independent variables	**Beta**	**T value**	**Pvalue**	**VIF**
Subjective Satisfaction	0,517	22,297	0,000	1,018
Objective Satisfaction	-0,098	-2,957	0,003	2,074
Corporate Trustworthiness	0,161	4,901	0,000	2,055
R= 0,520	**R^2=** 0,271	**F değer=** 171,086	**P değeri=** 0,000	

* r= 0.25-0.50, weak correlation; r= 0.50-0.75, good correlation; r= 0.750-1.00, very good correlation, only good correlations were shown on the table.

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YILDIZ SOCIAL SCIENCE REVIEW

ENERGY STORAGE and RENEWABLE ENERGY: AN ECONOMIC APPROACH

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ÖZET

Makalede, kesintili (veya değişken) yenilenebilir enerji üretimi, fosil enerji üretimi ve enerji depolama teknolojisinin var olduğu bir iktisadi modelde enerji depolamanın refahı artırdığı koşullar ve iktisadi-enerji değişkenlerin uzun dönem eğilimleri incelenmektedir. Sonuçlar iki başlık altında toplanmaktadır. Birincisi, marjinal fayda eğrisinin konveksitesi, marjinal maliyet eğrisinin konveksitesi ve yenilenebilir enerji üretimindeki dalgalanmaların derecesi enerji depolamayı artıran faktörlerdir. İkincisi, yenilenebilir enerji üretiminin düşük seviyelerde olduğu durumlarda doğrusal bir maliyet eğrisinin varlığı enerji depolamayı refah artırıcı olmaktan çıkarmaktadır. Enerji depolamanın enerji üretim kararları üzerindeki etkisini gösterdiğinden, mevcut çalışma, ileriki iktisadi-enerji modellerde enerji arzının enerji depolamayı da içine alacak şekilde modellenmesinin gerekliliğini orataya koymaktadır.

ABSTRACT

I consider an economy with fossil fuels, intermittent renewable energy, and energy storage, identify the conditions under which energy storage is optimal, and analyze the long-run tendencies of the economy-energy variables. The findings are twofold. First, the amount of energy stored in the economy is highly dependent on the shape of the demand and supply schedules. In particular, energy storage is fostered by the convexity of the marginal utility, convexity of the marginal cost function for fossil fuel energy, and the degree of volatility in renewable energy. Second, considering a low level of renewable energy capacity, storing energy is not welfare improving when the unit cost of providing fossil fuel energy is constant. By showing the influence that energy storage can have on energy generation decisions, I believe that the current work can be influential in a more generous treatment of energy supply in future energy-economy models.

Keywords: *Energy storage; Fossil fuel energy; Renewable energy; Precautionary savings; Collocation method; Monte Carlo simulations*
JEL codes: Q21, Q41, Q42, Q47, C61, C63, G31

1. INTRODUCTION

The average cost of onshore (land-based) wind energy decreased by 35% between 2008 and 2015. The figure was even more dramatic for solar photovoltaics. Accordingly, the average cost of solar PV decreased by 80% (Mueller et al., 2016). Even though this leads to optimism regarding the transformation of the energy industry, the growing concerns over man-made global warming show that the penetration of renewable energy to the power grid has been gradual and insufficient to cover the increasing global energy demand. As a result, fossil fuels still account for more than three-quarters of global energy use, and it is estimated that they will account for 78% by 2035 (EIA, 2011).

The real challenge may be found in the intermittent and variable nature of renewable energy that cause difficulties in accessing energy when it is needed. If tomorrow's electric power grid is expected to contain a considerable amount of renewable energy, the grid's stability, reliability, and security may be at risk due to intermittent and variable renewable energy generation. In avoiding the exposure to such risks, energy storage technology, including battery storage, will play a crucial role in the decades to come. Therefore, it's modeling for long-term economic and policy analysis becomes an integral issue.

In the current paper, I consider an economy with a capacity to store electricity and investigate the implications of this capacity on economic welfare. In particular, I study the electricity generation and storage decisions when the industry demand and supply schedules can take different forms, such as a convex demand and supply schedules, and show how such decisions are affected by the industry and technological characteristics. Focusing on the convexity of the demand and supply schedules allows me to demonstrate the influence of precautionary behavior (e.g., prudence) on economic decisions. In view of the analytical results, my second aim is to fully solve the problem numerically, then calculate the long-run tendencies of the economic variables, such as the steady-state mean values for fossil fuel energy and energy storage. The present literature on the economics of energy storage, which questions the relationship between precautionary behavior and industry cost structures, and alternative sources of energy and energy storage is in its infancy. Accordingly, the current study contributes to the relevant literature by explicitly considering intermittent renewable energy and balancing services coming from energy storage activities.

The remainder of the paper is structured as follows. Section 2 reviews the related literature. Section 3 presents the model and evaluates it under different scenarios. Calibration and simulation results are presented in Section 4. Section 5 concludes. The description of the numerical method is presented in the appendix.

2. Literature Review

Crampes and Moreaux (2001) develop an economic model that focuses on storage in the form of reservoirs for hydropower generation, which have a deterministic supply and compete with a thermal producer. The authors address the optimal energy mix and examine its compatibility with market mechanisms when the two producers compete. They show that optimal energy generated from the thermal station is determined by the industry-specific costs and the intertemporal specification of utility.

In a two-period framework, Crampes and Moreaux (2010) consider the optimal use of a pumped storage facility that consists of thermal and hydro energy technologies. In their model,

hydro energy is generated from controlled inflows that require energy from the thermal technology. After solving for the optimal allocation, they show that there are social gains from storing water in an off-peak interval (where more energy from the thermal source is generated than consumed), which can then be used in the peak interval (where energy consumption will be more than energy generation).

Considering various cases such as fossil fuel or renewable energy generation with pumped hydroelectric storage[1], Førsund (2012) examines the economic fundamentals of energy storage in a two-period model. Given the growing interest in Norwegian hydroelectric reservoirs on the grounds that they will allow for a higher penetration of renewable energy into the European power grid, the paper also examines the effect of trade in electricity between regions. It finds that unless there are sufficiently large interconnection systems, the price differentials between the regions diminish. As a consequence, this reduces the scope for trade.

When there is a certain number of large conventional plants that have to be online (such as combined cycle gas turbines or the equivalent), intermittent wind energy and a planning horizon of 36 hours (hence one model period constitutes one hour), Tuohy and O'Malley (2011) show that, when modeling energy generation and dispatch of the power system, accounting for the intermittency is important in capturing the benefit of the flexibility offered by pumped storage. Accordingly, intermittent wind makes energy storage more attractive, and its role becomes more significant when wind power is curtailed due to high wind.

The role of hydro storage in enabling a greater penetration of renewable energy into the grid has been investigated in Kanakasabapathy (2013), where the author looks at the impact of pumped storage energy trading on the sum of consumer and producer surplus of the individual market in a static model. The results show that while energy trading by pumped storage plants improve welfare in general, the economic implications for consumers and individual energy generators can be different.

In Korpaas et al. (2003) a method for the scheduling and operation of energy storage for wind power is presented. Solving the optimization problem using dynamic programming, they show that energy storage enables wind power plant owners to take advantage of variations in the spot price.

In a stylized model of energy investment and generation with two sources of energy, Ambec and Crampes (2012) address the optimal energy mix and analyze the optimal capacity investments in the absence of a storage technology. Hence, the focus is on the economics of the interplay between thermal and intermittent renewable energy and their capacities. After characterizing the optimal energy dispatch and capacities, they look at the economic policies that achieve first-best and second-best policies in decentralized markets.

In Van de Ven et al. (2011), the focus is on the decisions to satisfy the demand either directly from the grid or from the energy stored in batteries when the energy demand and prices are variable. Modeling the problem as a Markov decision process, they calculate a threshold to which the battery is charged whenever it is below the threshold, and discharged whenever it is above.

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[1] Presently, pumped-storage hydropower (PSH) is considered the most mature method for electricity storage. Of the 140 gigawatts of large-scale energy storage that are currently installed in the electricity grids worldwide, over 99% corresponds to PSH (IEA, 2014). PSH comprises thermal and hydraulic technologies. The system requires two reservoirs with differing elevations. The uphill reservoir (i.e., a mountain lake) is used to generate electricity by allowing the water to fall and turn the blades of turbines. The lower-level reservoir is used to collect water, which is then pumped to the uphill reservoir using thermal systems.

This study, while sharing several characteristics of these papers, will depart from them in a significant way. First of all, in the presence of intermittency and balancing services, I investigate analytically the conditions that will cause welfare improvements when energy is stored, and show how the convexity of the demand and supply schedules can stimulate energy storage decisions. Secondly, I solve numerically for the optimal energy mix and storage decisions, i.e., the optimal decision rule, which I then supplement with Monte Carlo simulations in order to evaluate the long-run tendencies of the economic variables.

3. Model

Consider an infinite horizon economy with a representative consumer. There is a single commodity, i.e., energy, which can be supplied from fossil fuels, renewables, and energy storage systems:

$$Q_t = Q_{dt} + z_t Q_{ct} - R_t,$$

where Q_t is energy consumption, Q_{dt} is fossil fuel energy, Q_{ct} is renewable energy, $z_t \in [0,1]$ is current weather condition (normalized to one) that is known prior to taking economic decisions, and R_t represents the energy storage decision. When R_t is positive, energy is stored to be used in the following periods. When R_t is negative, previously stored energy is used.

The equation of motion for the stored energy is the following:

$$S_{t+1} = \phi S_t + R_t$$

where S_t is the level of stored energy at time. Whenever energy is stored, a certain percentage of it will be lost in time. This is captured by the round-trip efficiency parameter, $\phi \in (0,1)$, which is the ratio of the energy recovered to the initially stored energy.

The timing of the model is depicted in Figure 1. At the beginning of period t, the economy inherits stored energy; S_t. Having observed S_t and the weather conditions z_t, the fossil fuel and renewable energy decisions, Q_{dt} and Q_{ct}, respectively, are made. After taking into account the loss in stored energy, $(1-\phi)S_t$, and Q_{dt} and Q_{ct}, the levels for energy storage, R_t, and therefore, energy consumption, Q_t, are decided. I assume that the power grids are smart (Ambec and Crampes, 2012; Van de Ven et al., 2011). Therefore, production and consumption almost coincide so that no energy is lost in this process. Given the energy storage decision, the level of energy that will be stored and transferred into period t+1 is $S_{t+1} = \phi S_t + R_t$.

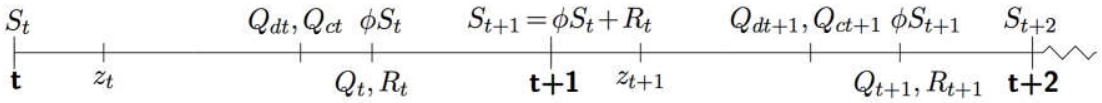

Figure 1: *Timing of the model.*

We assume that energy demand is stationary (Førsund, 2007, Ch. 9). $U(Q_t)$, is the per period utility function, which is thrice continuously with $U' > 0,\ U'' < 0$, and $U''' \geq 0$. Preferences over energy consumption take the additively separable form given by:

$$\mathbb{E}\left[\sum_{t=0}^{\infty} \delta^t U(Q_t)\right] \qquad (1)$$

where $0 < \delta < 1$ is the discount factor and $\mathbb{E}[\cdot]$ denotes the expectation operator.

The cost function of fossil fuel energy generation, $C_d(Q_d)$, is thrice differentiable with $C_d' > 0$, $C_d'' \geq 0$, and $C_d''' \geq 0$. When the unit cost is constant, one can relate this to a constant-cost industry. On the other hand, when the cost function is convex, this resembles an increasing-cost industry. Moreover, when the third-order derivative of the cost function is strictly positive, that is, the marginal cost is convex, there is an increasingly increasing-cost industry. Given that there is a unique merit order of using individual generators, so that first the power plants with the lower marginal costs of energy generation would be brought online (like a coal-fired power plant), followed by costlier ones (such as a natural gas power plant with carbon capture and storage), a convex marginal cost function is a plausible assumption. This is also confirmed by studies, which recover cost function estimates for electricity generation based on bidding behavior (Bunn et al., 2000; Wolak, 2003). Lastly, $C_c(Q_c)$ is the cost function for the renewable energy generation. As the cost structure of renewable energy will be discussed later on, I do not make any assumption regarding its functional form at this stage.

When solving the energy generation problem, my aim is to maximize Eq. (1), the intertemporal welfare of the representative agent, through energy generation and storage decisions. For S_0 being the inherited energy, and for z_0 being the initial weather condition, the planner's problem, formulated in the form of a Bellman equation, is the following:

$$\begin{aligned} V(S_t, z_t) = \max_{\{Q_t, Q_{dt}, Q_{ct}, R_t, S_{t+1}\}} & \{U(Q_t) - C_d(Q_{dt}) - C_c(Q_{ct}) + \delta \mathbb{E}[V(S_{t+1}, z_{t+1})]\} \\ subject\ to \quad & Q_t = Q_{dt} + z_t Q_{ct} - R_t, \\ & S_{t+1} = \phi S_t + R_t, \\ & \overline{Q}_d \geq Q_{dt} \geq 0, \\ & \overline{Q}_c \geq Q_{ct} \geq 0, \\ & \overline{S} \geq S_t \geq 0, \\ & S_0 \geq 0, \text{ and } 1 \geq z_0 \geq 0, \end{aligned} \qquad (2)$$

where $V(S_t, z_t)$ is the value function, which is the maximum attainable sum of the current and future rewards given the current (inherited) level of stored energy and current weather conditions. Moreover, $\overline{Q}_d$, $\overline{Q}_c$, and $\overline{S}$ are the capacity constraints for fossil fuel energy, renewable energy, and energy storage, respectively. I assume a sufficiently large capacity for fossil fuel energy throughout the analysis such that it never binds. Furthermore, in this section, I only focus on cases in which dispatchable generators always supply the residual load (Joskow, 2011; Tsitsiklis and Xu, 2015). Thus, $Q_{dt} > 0$. I will relax this assumption when I numerically investigate the solution. Future weather conditions, $z' \equiv z_{t+1} \in [0,1]$ are imperfectly known *ex ante,* and the surrounding uncertainty is removed only at the end of the current period; i.e., after Q_{dt}, Q_{ct}, and R_t are determined.

Once the renewable energy system is installed, the unit cost of generating renewable energy becomes so low that it can be considered as zero (Ambec and Crampes, 2012; Evans et al., 2013; Førsund and Hjalmarsson, 2011). Hence, for $C_c'(Q_c) = 0$, and it is optimal to operate the renewable energy at its capacity at all times: $Q_{ct} = z_t\overline{Q}_c$ for $t = 0,1,2,\dots,\infty$.[2]

Given that $\mathrm{F(z)}$, which is the cumulative distribution function of z over the compact support $[0,1]$, and that the model parameters are time invariant, the problem is stationary. Thus, the problem faced by the planner at every period is identical: $\mathrm{V_t(S,z) = V_{t+y}(S,z)}$ for all $\mathrm{y} > 0$. Unless it causes confusion, I shall drop the time subscripts and use primes to denote next-period values (not to confuse with partial derivatives). Then the dynamic stochastic decision problem has the following structure. At every period, the planner observes the state of the economy, $\mathrm{(S,z)}$, i.e. ,how much energy storage has been inherited, and the state of the weather conditions, how strong the wind blows or the sun shines. The benevolent planner then decides on the optimal actions $\mathrm{Q, Q_d, R}$, and S'. Therefore, the planner searches for an optimal decision rule $\{\mathrm{Q^*(S,z), Q_d^*(S,z), R^*(S,z), S'^*(S,z)}\}$ that solves $\mathrm{V(S,z)}$.

The problem is not fully tractable analytically. Therefore, I leave the problem of finding the optimal decision rule to the numerical analysis section. Nevertheless, I can simplify the problem to identify the conditions under which storing energy is optimal and gain intuition that I can benefit from when interpreting the numerical results. To do this, I consider a scenario in which $S = S' = 0$, and ask whether a marginal increase in S', and therefore, R, is welfare improving.

Using a second-order Taylor approximation, and owing to the fact that $Q_d > 0$ and, therefore, $U'(Q) = C_d'(Q_d)$, the welfare effect of increasing energy storage, S', marginally from zero when $S = 0$ is as follows (see Appendix A for the calculations):

$$\left.\frac{\partial\{\cdot\}}{\partial S'}\right|_{S'=0} \cong -U'\left(\mathrm{Q}_d(0,z) + z\overline{\mathrm{Q}}_\mathrm{c}\right) + \delta\phi\left(\mathrm{C}_d'(\mathrm{Q_d}(0,\overline{z})) + \frac{1}{2}\overline{\mathrm{Q}}_c^2\left[\frac{(C_d'')^3}{(C_d''-U'')^3}U''' + \frac{(-U'')^3}{(C_d''-U'')^3}C_d'''\right]\sigma^2\right) \quad (3)$$

where $\overline{\mathrm{z}}$ and σ^2 are the expected value and variance of the random variable z', respectively. From Eq. (3), I can establish the following proposition:

Proposition 1. *If the cost of engaging in energy storage is sufficiently low and the benefit expected from storing energy is sufficiently high, energy storage is welfare improving. Convexity in the marginal utility, and convexity in the marginal cost function of fossil fuel energy generation, and the degree of intermittency are factors that foster energy storage decisions.*

Notice from the expression given by (3) that the value on the RHS diminishes when $U''' = 0$. Therefore, the convexity of marginal utility is a crucial factor that increases the willingness of the economy to engage in energy storage. One other thing that can be noticed from expression (3) is that a convex marginal cost of fossil fuel energy does play a significant role in determining the impact of uncertainty on the optimal energy storage strategy. It can be seen that even when $U''' = 0$, a non-negative C_d''' is necessary for "precautionary " saving of energy. Notice also that a higher

[2] The only cost in generating renewable energy is actually the opportunity cost of not generating more energy than the renewable energy capacity.

volatility in renewable energy increases the expected (social) benefit from energy storage. Lastly, risk aversion and convexity in the cost function play crucial roles for the results. The main reason for this is that uncertainty is welfare deteriorating for the society when the utility function is concave, $U'' < 0$, and the cost function is convex, $C_d''>0$.

The decision to engage in energy storage given the uncertainty in renewable energy relates to the literature on precautionary saving, where a positive third-order derivative of the utility function governs the precautionary behavior. The analysis regarding the precautionary saving under uncertainty was first introduced by Leland (1968) and Sandmo (1970). A modern treatment of precautionary saving can be found in Kimball (1990), where he coins the term 'prudence' when the marginal utility of consumption is convex and shows that prudence is sufficient for a demand in precautionary savings in standard intertemporal models of consumption.

The convexity of the marginal cost function is an important property of the electricity industry. This property owes to the fact that there is a unique merit order of using individual generators. Accordingly, the power plants with the lower marginal costs of energy generation are the first to be brought online (like a coal-fired power plant). These power plants are followed by others with higher unit cost of producing energy, such as a condensing plant and gas turbine, and a natural gas power plant with carbon capture and storage. As a result, an increasing and a convex curve can successfully characterize the industry supply. Such property can also be identified empirically. For instance, using auction data, Wolak (2003) recovers a convex marginal cost function estimate in the Australian electricity market.

Note that as there are no externalities or other distortions in the model, the competitive equilibrium quantities correspond to the social planner's allocation. Therefore, the results from the analysis of the social planner's problem can be carried to a decentralized equilibrium. Assuming that the consumers have identical preferences, and modeling their behavior by a representative consumer, the marginal utility function can be denoted by $P = U'(Q)$ where $Q \equiv Q(P)$ is the aggregate demand function of electricity given the electricity tariff, P.[3] Additionally, the marginal cost function $\mathrm{C}_d'(Q_d)$ is the aggregate supply function of electricity generated by fossil fuels.

To have better a understanding of the results and their implications, let us focus on a special case, and consider that energy is only supplied by fossil fuels; i.e., $\overline{Q}_c = 0$. In this case, when S' is increased marginally from zero, the following welfare effect occurs:

$$\left.\frac{\partial\{\cdot\}}{\partial S'}\right|_{S'=0} = -(1-\delta\phi)\left(\mathrm{C}_d'(\mathrm{Q_d}(0,0))\right) < 0 \qquad (4)$$

From (4), I can establish the following corollary:

Corollary 1. *When the economy does not have access to renewable energy, storing energy is welfare deteriorating.*

The intuition is as follows. Without renewable energy, the electricity needed the storage systems will be obtained from the fossil fuel energy industry. Then the unit cost of storing energy becomes $\mathrm{C}_d'(\mathrm{Q_d}(0,0))$. When energy is stored, its present value adjusted for the discount factor

[3] I consider a quasi-linear utility function over electricity consumption, and a numéraire commodity. Accordingly, $U(Q)$, is the monetary value of utility derived from Q kilowatt-hour of electricity consumption. Such preferences are standard in economic theory when discussing issues related to a single market in a general equilibrium framework.

and the loss in energy becomes $\delta\phi C_d'(\mathrm{Q_d}(0,0))$. Comparing the cost of storing energy to its value adjusted for the discount factor and the round-trip efficiency, it is seen that energy storage is suboptimal. As a result, energy consumption, Q, equals fossil fuel energy generation, $\mathrm{Q_d}$, at every period.

Suppose now that there is renewable energy capacity in the economy. As another special case, assume away the intermittency problem. Thus, z' is constant at every period; i.e., $z = z' = \mathbb{E}[z] = \mathbb{E}[z']$. Therefore, $\sigma^2 = 0$. From (3) one arrives at the following outcome:

$$\frac{\partial\{\cdot\}}{\partial s\prime}\Big|_{S'=0} = -(1-\delta\phi)\left(C_d'\big(\mathrm{Q_d}(0,z)\big)\right) < 0, \qquad (5)$$

which allows us to establish the following corollary:

Corollary 2. *In an economy with fossil fuel and renewable energy, storing energy is welfare deteriorating in the absence of an intermittency problem.*

Accordingly, intermittency in renewable energy, and hence, uncertainty in the levels of energy generated by the renewable energy capacity, is the cause that assigns a positive value to energy storage in this model. Without the uncertain generation of energy from the renewable sources, it will only be welfare deteriorating to engage in energy storage.

Considering again that renewable energy is intermittent and variable, let us assume a constant-cost fossil fuel energy industry. Thus, the cost function is linear, and the fossil fuel energy industry supply curve can be characterized by a horizontal supply curve. In this case, Eq. (3) becomes

$$\frac{\partial\{\cdot\}}{\partial s\prime}\Big|_{S'=0} = -(1-\delta\phi)c_d < 0, \qquad (6)$$

where $c_d = C_d'\big(\mathrm{Q_d}(0,z)\big) > 0$, which is a constant, is the marginal cost of generating fossil fuel energy when the fossil fuel energy industry supply function is linear. This result leads us to the following corollary:

Corollary 3. *When the fossil fuel energy cost function is linear, i.e., there is a constant-cost fossil fuel energy industry, storing energy is welfare deteriorating, and therefore, never optimal. The positive third-order derivative of the utility function loses its impact on storage decisions.*

The intuition is that in an economy in which the fossil fuel energy is the source for energy storage, the present value adjusted for the discount factor and the loss in energy becomes $\delta\phi c_d$, which is smaller than the marginal cost of storing energy, c_d. It can then be seen from (6) that energy storage turns out suboptimal. Hence, although the renewable energy is stochastic, there is indeed no real risk in the economy as long as the dirty carrier has no barriers to produce energy in the following period. Therefore, storage technology will not be employed even if it is perfectly efficient; i.e., even if $\phi = 1$.

Notice, however, that this result is valid only for cases where fossil fuel energy is always generated, i.e., $\mathrm{Q_d} > 0$. Consider a case in which renewable energy capacity is sufficiently high such that fossil fuel power plants would be taken offline from time to time. When such a setup is present, the unit cost of storing energy can become sufficiently low when the renewable energy generation is sufficiently high, making energy storage beneficial for the society. We will consider such cases in the next section, where we solve the problem numerically.

Now assume that there is only renewable energy capacity. Thus, $\mathrm{Q_d} = 0$. Here, I assume that $\mathrm{z} \in (0,1]$ (Helm and Meier, 2016). Therefore, no matter how small it is, there is always some renewable energy generation. The welfare effect of a marginal increase in S' yields

$$\left.\frac{\partial\{\cdot\}}{\partial s\prime}\right|_{S'=0} \cong -U'\left(z\overline{Q}_c\right) + \delta\phi U'\left(\overline{z}\overline{Q}_c\right) + \frac{1}{2}\delta\phi\overline{Q}_c^2 U'''(\overline{z}\overline{Q}_c)\sigma^2 \qquad (7)$$

To fix ideas, suppose that the current realization of z coincides with its expected future realization, i.e., $z = \overline{z}$. Then,

$$\left.\frac{\partial\{\cdot\}}{\partial s\prime}\right|_{S'=0} \cong (1-\delta\phi)U'\left(\overline{z}\overline{Q}_c\right) + \frac{1}{2}\delta\phi\overline{Q}_c^2 U'''(\overline{z}\overline{Q}_c)\sigma^2 \qquad (8)$$

One sees that $U''' \geq 0$ is a necessary condition for storage to be optimal in this case.

3.1. Discussion

Regarding the relationship between the volatility of renewable and energy storage, one comes across similar results in the operations research and economics literature. Tuohy and O'Malley (2011) argue that intermittency increases the benefit driven from the flexibility offered by pumped hydroelectric storage and makes energy storage more attractive. The numerical results in Evans et al. (2013) also confirm the positive relationship between variance of renewable energy and storage (stored water, in particular); that is, storage becomes more welfare enhancing with higher uncertainty. The fact that the demand schedule is linear in Evans et al. (2013), that is, $P'' = U'''$, however, suggests that the quantitative results can change once a convex demand schedule is considered. Bobtcheff (2011) numerically demonstrates that a benevolent planner keeps more water in a reservoir when faced with higher uncertainty and explains that this action is due to prudence. Nevertheless, the author does not present a formal analysis. In Bobtcheff (2011), the marginal cost of fossil fuel energy generation is constant, $C_d'(Q_d) = c_d$, and not subject to any capacity constraints. As can be understood from my analysis, it is the convexity in the demand schedule that leads to higher levels of energy storage when the economy is confronted with a higher volatility in renewable energy.

3.1.1. Numerical Analysis

My purpose with the numerical analyses and simulations in this section is not to provide a comprehensive quantitative evaluation. Rather than that, I want to highlight the roles different industry cost and market demand structures, can play in an economy with fossil fuel and renewable energy, and energy storage capacities. In solving the dynamic stochastic decision problem given by (2), I employ dynamic programming based on Bellman's principle of optimality: regardless of the decisions taken to enter a particular state in a particular stage, any optimal policy has the property that the remaining decisions given the stage resulting from the current decision must constitute an optimal policy. Hence, I look for an optimal decision rule $\{Q^*(S,z), Q_d^*(S,z), Q_c^*(S,z), R^*(S,z), S'^*(S,z)\}$, which solves $V(S,z)$. To make sure that the numerical problem has a solution and this solution is unique, I establish the contraction property of the dynamic program in Appendix B.1.

Suppose that there exists an economy in which the level of energy consumption is $\mathrm{Q} = 450\mathrm{MWh}$ (megawatts per hour). To begin with, suppose that the demand is met by a fossil fuel

power plant.[4] Thus, the fossil fuel energy generation, $\mathrm{Q_d}$, equals energy consumption, Q: $\mathrm{Q} = \mathrm{Q_d} = 450\mathrm{MWh}$.

In the economy, the energy demand is assumed to be stable. I, therefore, focus on weekly data: $\mathrm{Q} = \mathrm{Q_d} = 450\mathrm{MWh} = 450 \times 24 \times 7\mathrm{MWw} = 75.6\mathrm{GWw}$, where w and GW stand for week and gigawatt, respectively. Note that $1\mathrm{GW} = 1000$ MW. For ease of notation, I drop 'per time period' notation and focus only on the thermal units. I take an annual discount rate of 5%. This corresponds to a weekly discount factor, $\delta = 0.9991$.

For the fossil fuel power plant, I assume that the ramp-up level equals $\underline{\mathrm{Q}}_\mathrm{d} = 8.4\mathrm{GW}$, which corresponds to 50MW per hour. The capacity constraint for fossil fuel power generation is given by $\overline{Q}_d = 100.8\mathrm{G}W$,corresponding to 600MW, which, in the simulations, will not be binding as $\mathrm{Q} = 75.6\mathrm{GW}$.

In the simulations, I will make use of a constant relative risk aversion (CRRA) utility function, $\mathrm{Q}^{1-\gamma}/(1-\gamma)$, where γ and $\gamma + 1$ are the coefficients of relative risk aversion and relative prudence, respectively. I take $\gamma = 2$.[5] From the necessary first-order condition with respect to Q_d, given by (13a) in the appendix, I get $\mathrm{Q}^{-\gamma} = C_d'(Q_d)$. Assuming a linear cost function for fossil fuel energy, $C_d'(Q_d) = c_l Q_d$, where c_l is a constant, one gets, $c_l = \mathrm{Q}^{-\gamma}$. For $\mathrm{Q} = 75.6\mathrm{GW}$, $c_l = 0.000175\mathrm{UoN}$ (units of the numéraire). If, however, the cost function is quadratic, I have $C_d'(Q_d) = c_q Q_d^2$, where c_q is another constant. Finally, for a cubic cost function $C_d'(Q_d) = c_c Q_d^3$, where c_c is also a constant.

In order to be consistent in the analysis, I assume that when the fossil fuel energy generation is at the ramp-up level, $\mathrm{Q_d} = \underline{\mathrm{Q}}_\mathrm{d}$, the marginal costs are equal among the different cost functions. This gives

$$c_l = 2c_q \underline{\mathrm{Q}}_\mathrm{d} = 3c_c \underline{\mathrm{Q}}_d^2.$$

Accordingly, $c_l = 0.000175\mathrm{UoN}$, $c_q = 1.0417 \times 10^{-5}\mathrm{UoN}$ and $c_c = 8.2672 \times 10^{-7}$. For $Q_d > \underline{\mathrm{Q}}_\mathrm{d}$, it can be seen that $c_l < 2c_q Q_d < 3c_c Q_d^2$.

Suppose that a wind farm with a maximum capacity of $\overline{Q}_c = 100.8\mathrm{G}W$, which corresponds to 600MW per hour is then introduced to the economy.[6] Moreover, the economy has access to an energy storage capacity of 100MW, corresponding to $\overline{S} = 16.8GW$ per week.[7] I first assume that 1% of stored energy would be lost every week, hence $\phi = 0.99$. I address the effects of different round-trip efficiency parameters by making a sensitivity analysis in Appendix D.

As is discussed in the Appendix for method description (Appendix C.1), I approximate

[4] Although I do not aim for a comprehensive quantitative evaluation, it is possible to find a range of examples to associate with 450MWh of energy consumption. As an example, see Kaldellis et al. (2012).

[5] Heal (2009) argues that [2,6] is a reasonable range for the relative risk aversion parameter.

[6] The Fantanele-Cogealac Wind Farm, which opened in 2012 in Romania, and the Whitelee Wind Farm, which opened in 2012 in the United Kingdom, have capacities of 108GW and 90.5GW, respectively.

[7] Considering battery storage, even though such a capacity is not present as of today, it is achievable given the current battery technology. The biggest battery storage capacity exists in west Texas located at 153MW Notrees wind farm where 36MW battery storage system became operational in December 2012. The 36MW battery storage is a scalable assembly of thousands of 12 volt, 1 kWh, dry cell batteries based on a proprietary formula of alloys including copper, lead and tellurium.

the expected value for the intermittent renewable energy production using Gaussian quadrature nodes and weights. In determining the weights and nodes (normalized wind speed), I make use of a beta distribution defined on the interval [0, 1] and parametrized by two positive shape parameters, a and b. As an example, for $a = 2$ and $b = 2$, the probability density function, $f(z)$, for the beta distribution looks like the one in Figure 2.

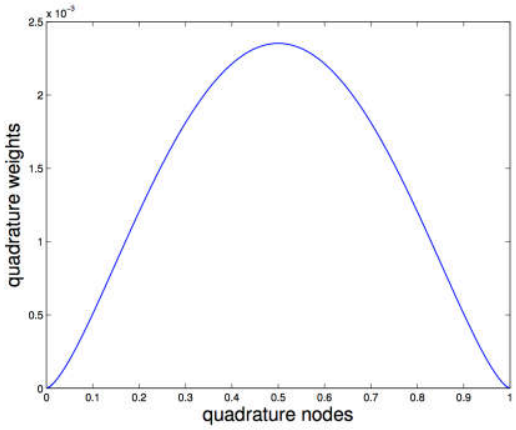

Figure 2: *Beta probability density function for the (normalized) wind speed (a=2, b=2).*

Finally, in evaluating the long-run steady-state behavior of the controlled economic process, I make use of Monte Carlo Simulations (see Appendix C.1).

4.2. Discussion

Figure (3) presents the optimal decision rules for three different (linear, quadratic and cubic) cost functions. To be consistent with my earlier analysis, I present only the decision rules regarding the fossil fuel energy generation, $Q_d^*(S, z)$, and energy storage that will be transferred to the next period, $S'^*(S, z)$.

Considering the case with the linear cost function in generating the fossil fuel energy one can see that when the wind strength is highest, i.e., $z = 1$, and $z\overline{Q}_c = 100.8\text{GW}$, then it is optimal to generate the fossil fuel energy at its ramp-up level (see Figure (3a)-i). It is also optimal to store energy up to its capacity, $16.8GW$, which is an outcome independent of the level of stored energy in this case (see Figure (3a)-ii). Furthermore, when the wind strength is less than 0.5, all stored energy will then be consumed, which is a result independent of how much energy was transferred into the current period.

The optimal decision rules for the two remaining cases are quite distinct. In line with Proposition 1, one can see that the costlier it gets to generate the fossil fuel energy, the lower the corresponding generation levels and the higher the level of energy transferred into the next period.[8] For example, if $z = 0.5$ and there is no stored energy, $S' = 0, 5.2, 6.9\text{GW}$ for a constant $-$, increasing $-$ and increasingly increasing $-$ cost fossil fuel energy industry,

[8] For all variations of z and S, while the fossil fuel energy generation takes its lowest values, the energy levels transferred to the next period are the highest for a cubic cost function, i.e., $C_d''' > 0$.

respectively.

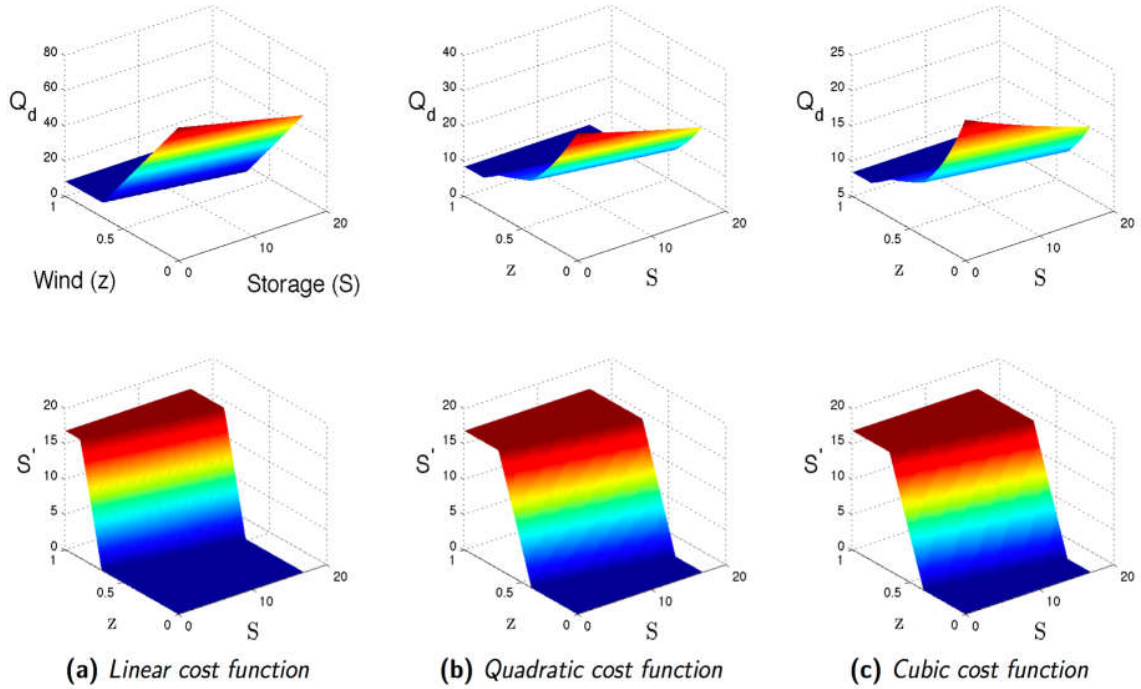

Figure 3: *Optimal decision rules for fossil fuel energy generation, Q_d, and energy storage, S', for different cost functions.*

A lower level of stored energy for each pair of z and S when the cost function is linear can be attributed to the lower opportunity cost of not storing energy in the current period: if the wind power is low, and energy is not stored, then, in case it is required, the cost of generating the required energy from fossil fuels will not be too costly. However, this is not necessarily the case when the cost function is nonlinear: if there is no stored energy and suddenly the wind ceases to blow, then the economy would have to incur greater costs to get the desired level of energy from fossil fuels.

Having solved for the optimal decision rules, I can examine the long-run tendencies of the model variables. Here, I aim at computing the steady-state mean values for the model variables and analyze how they respond to different specifications of the cost function and model parameters.

In doing this, I simulate the representative paths for the model variables using Monte Carlo simulations. Given that I work with a stationary distribution, i.e., that the transition probabilities are time-invariant, I can argue that the problem possesses a steady-state distribution so that I can calculate the steady-state mean values for the economic variables.

Assuming three different cost functions in generating fossil fuel energy, the results of the simulations are summarized by Figure (4a). As expected from the previous discussion regarding the optimal decision rule, the fossil fuel steady-state (SS) mean levels are the smallest, approximately 10GW, for the case with the cubic-cost function. On the contrary, the SS mean value for the stored energy is the highest, 10.2GW for the same case. Moreover, when one considers the long-run tendencies given that the cost structure of the fossil fuel energy industry is constant, i.e., a linear cost function, I see that the fossil fuel energy SS mean takes its highest

value, $27GW$, while the stored energy gets much lower, approximately $2GW$. In line with Proposition 1, the simulation results show the impact a positive third-order derivative of the cost function can have on energy storage decisions.

Another fundamental result I got previously was the effect of prudence on precautionary energy storage decisions. In looking at the effect of a more prudent economy, I take $\gamma = 3$. The results indicate that a higher level of prudence can alter the results significantly. Compared to the previous cases with different cost structures, a higher level of prudence can indeed result in a much higher level of SS energy savings, even if the cost function is linear (see Figure 4b).

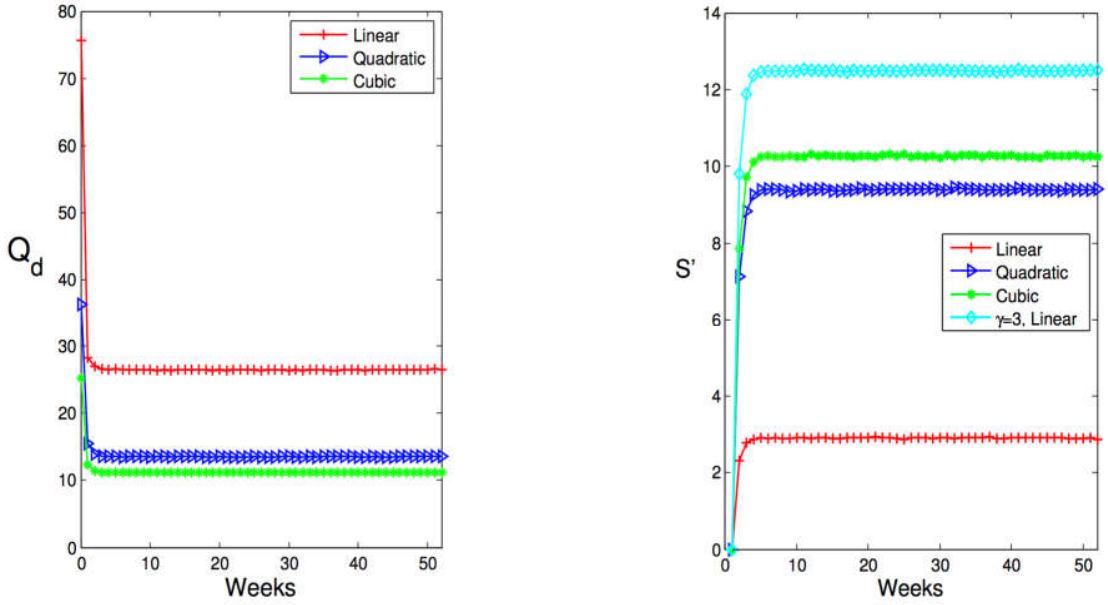

Figure 4: *Steady-state analysis - mean values*

5. Conclusion

In line with the global efforts to reduce CO2 emissions, renewables have an extensive potential to substitute for the fossil fuels. However, they also have their shortcomings. One of them, maybe the most crucial one, is the intermittency problem that can jeopardize immediate access to energy. One technology considered to alleviate, or even cause the intermittency problem to be negligible, is energy storage. Yet the economics of energy generation lacks the treatment of intertemporal welfare decisions in the presence of intermittent renewable energy and energy storage technology. This may become a serious drawback, as without taking this into account, long-term analysis and the policy decisions in this respect can be biased and even misleading.[9]

By approaching the problem both analytically and numerically, I attempted to fill this gap. The

[9] It is also important to note that the long-term policy suggestions of assessment models need be taken with a grain of salt not only because they are big abstractions of complex dynamics, but also the intermittency problem (thus, shorter time periods) and, with it, the energy storage decisions are excluded. This can have cogent influence on the ongoing research in assessment modeling and climate change, as their calculations and conclusions extend to the near and distant futures.

analytical results show the conditions where a convex demand schedule can have considerable effect on industry-wide energy storage. I also show how the cost structures, including the third-order derivative of the cost function in generating the fossil fuel energy, can influence energy storage decisions. Utilizing numerical simulations, I then calculated the optimal decision rules, i.e., optimal policy functions, which are vital in navigating decisions regarding how much energy to generate from fossil fuels and how much to use from stored energy (or how much to store). I benefited from these policy functions when analyzing long-term tendencies, or alternatively, the steady-state mean levels, of the economic variables.

The results not only reveal that prudence and a third-order derivative of the cost function are important for energy storage decisions, but also show that a prior knowledge of the prudence level and the cost-structure of the fossil fuel industry can be quite fundamental in the optimal management of energy sources. Such knowledge will also be crucial when evaluating energy investment decisions.

The present study can be extended in several directions. First, one can extend the current model by taking into account investment decisions in capacities. It is also interesting to incorporate a climate module and investigate the effects of climate change, and hence, the climate policies on the use of fossil fuels, intermittent renewable energy, and energy storage. One can also consider R&D investments and technological change, and analyze how the use of different energy sources and their technologies evolve over time depending on both climate and R&D policies. Last but not least, a further investigation of the effects of prudence and the cost structures on the economic decisions can be quite important not only in the literature in energy economics but also in the literature on prudence in general. The decentralization of the optimal allocation decisions by market mechanisms and the investigation of how allocations are modified when risk attitudes and time preferences change is another interesting avenue.

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Appendices

A. Derivation of Eq. (3)

The Bellman equation is the following:

$$V(S,z) = \max_{Q_{dt}} \left\{ U\left(Q_d + z\overline{Q}_c - S' + \phi S\right) - C_d(Q_d) + \delta \mathbb{E}[V(S',z')] \right\}\Big|_{S'=0} \quad (12)$$

for which the first order condition (FOC) with respect to (w.r.t) $\mathrm{Q_d}$ yields

$$U'(Q) - C_d(Q_d) \leq 0, \quad (13)$$

with equality whenever $\mathrm{Q_d}>0$. Let the optimal decision (the optimal response function) be $\mathrm{Q_d(S,z)}$. The welfare effect of S' when it is increased marginally from zero can be shown as

$$\frac{\partial V(S,z)}{\partial S'}\Big|_{S'=0} = -U'\left(Q_d(S,z) + z\overline{Q}_c + \phi S\right) + \delta\ \mathbb{E}\left[\frac{\partial V(S',z')}{\partial S'}\right]\Big|_{S'=0}. \quad (14)$$

From the Envelope Theorem, only the direct effect of a marginal change in the state variable matters on the value function. Given that I evaluate the problem when $S' = 0$, the derivative of the associated value function w.r.t S shows:

$$V_1(S,z) = \phi U\left(Q_d + z\overline{Q}_c - S' + \phi S\right),$$

where $\mathrm{V_1}(S,z)$ is the derivative of the value function w.r.t its first argument S. This is the Benveniste-Scheinkman (Envelope Theorem) condition. Iterating this one period forward, and plugging the result in (14) yields:

$$\frac{\partial V(S,z)}{\partial S'}\Big|_{S'=0} = -U'\left(Q_d(0,z) + z\overline{Q}_c + \phi S\right) + \delta\phi\mathbb{E}\left[U'(Q_d(0,z') + z'\overline{Q}_c)\right]. \quad (15)$$

As I restrict the analysis to $S = 0$, and hence, assume no inherited energy, then from (15) I arrive at the following expression:

$$\frac{\partial V(S,z)}{\partial S'}\Big|_{S'=0} = -U'\left(Q_d(0,z) + z\overline{Q}_c\right) + \delta\phi\mathbb{E}\left[U'(Q_d(0,z') + z'\overline{Q}_c)\right]. \quad (16)$$

Let $g(z') \stackrel{\text{def}}{=} C_d'\left(Q_d(0,z')\right)$. Taking the expectation of a second-order Taylor approximation around $\overline{z}$ gives

$$\mathbb{E}[g(z')] \simeq g(\overline{\mathrm{z}}) + \frac{1}{2}g''(\overline{\mathrm{z}})\sigma^2\,. \quad (17)$$

In the following, I will calculate $g''(\overline{\mathrm{z}})$. First, $g'(z') = C_d''\left(Q_d(0,z')\right)\frac{\partial Q_d(0,z')}{\partial z'}$, where

$$\frac{\partial Q_d(0,z')}{\partial z'} = \frac{U''(Q(0,z'))\overline{Q}_c}{C_d''(Q_d(0,z')) - U''(Q(0,z'))} < 0. \quad (18)$$

Following (18) one gets

$$g''(\mathrm{z}') = C_d'''\left(\frac{\partial Q_d(0,z')}{\partial z'}\right)^2 + C_d''\frac{\partial^2 Q_d(0,z')}{\partial z'^2},$$

and

$$\frac{\partial^2 Q_d(0,z')}{\partial z'^2} = \frac{\overline{Q}_c^{\,2}}{(C_d'' - U'')^3}\left(C_d''^2 U''' - U''^2 C_d'''\right),$$

where U''' is the third-order derivative of the utility function.

These outcomes allow me to write

$$g''(\mathrm{z}') = \overline{Q}_c^{\,2}\left[\frac{(C_d'')^3}{(C_d'' - U'')^3}U''' + \frac{(-U'')^3}{(C_d'' - U'')^3}C_d'''\right].$$

Using the results from the second-order Taylor approximation, and owing to the fact that $Q_d > 0$, and therefore, $U'(Q) = C_d'(Q_d)$, the welfare effect of increasing S' marginally from zero when $S = 0$ will yield the desired expression given by Eq. (3).

B. Applying Blackwell's sufficient conditions for a contraction to the model

Blackwell's sufficient conditions for a contraction

The right-hand side of a Bellman equation is a mapping of the value function $V(\cdot)$ and $V = TV$ is a fixed point of the mapping, where T is a function mapping V into itself. For there to be a unique solution to the dynamic programming problem, one needs show that the mapping for the Bellman equation is a contraction mapping. In showing this, one makes use of Blackwell's sufficient conditions for a contraction.

Theorem *(Blackwell's sufficient conditions for a contraction) Let $X \subseteq R^l$, and let $B(X)$ be a space of bounded functions $f: X \to R$, with supremum norm $\|\cdot\|_\infty$. Let $T: B(X) \to B(X)$ be an operator satisfying*

1. *(Monotonicity) for $f, g \in B(X)$ and $f(x) \leq g(x), \forall x \in X$, implies $(Tf)(x) \leq (Tg)(x)$, $\forall x \in X$;*
2. *(Discounting) there exists some $\delta \in (0,1)$ such that*

$$[T(f+a)](x) \leq (Tf)(x) + \delta a, \ \text{all } f \in B(X), a \geq 0, \ x \in X.$$

Then T is a contraction with modulus δ.[10]

In the following, I prove that the energy generation and storage model I work with satisfies Blackwell's sufficient conditions for a contraction.

Proposition *The energy generation and storage model, satisfies Blackwell's sufficient conditions for a contraction.*

Proof. Looking at the equation of motion for stored energy, S, one can see that it takes its maximum value when energy consumption is null and $\mathrm{z} = 1$; i.e., $S^{max} = (\mathrm{Q_d} + \mathrm{Q_c})/(1-\phi)$. This defines the state space $X \subseteq [0, \overline{Q}_d + \overline{Q}_c] \subseteq R$ and $B(X)$ the function space of the bounded functions $f: X \to R$ with supremum norm.

In the energy storage problem, I defined an operator T by:

[10] $(f+a)(x)$ is the function defined by $(f+a)(x) = f(x) + a$. For the proof I refer the reader to Stokey (1989).

$$(TV)(S,z) = \max_{\{Q,Q_d,Q_c,R,S\prime\}} \{U(Q) - C_d(Q_d) - C_c(Q_c) + \delta\mathbb{E}[V(S',z')]\}$$

If $\mathrm{V}(\mathrm{S}',\mathrm{z}') \leq \widehat{\mathrm{V}}(\mathrm{S}',\mathrm{z}')$ for all values of S', then the objective function for which $\mathrm{T}\widehat{\mathrm{V}}$ is the maximized value is uniformly higher than the function for which TV is the maximized value, which makes the monotonicity requirement obvious.

The discounting requirement is satisfied from the following:

$$\begin{aligned}\big(T(V+a)\big)(S,z) &= \max_{\{Q,Q_d,Q_c,R,S'\}} \{U(Q) - C_d(Q_d) - C_c(Q_c) + \delta\mathbb{E}[V(S',z') + a]\} \\ &= \max_{\{Q,Q_d,Q_c,R,S'\}} \{U(Q) - C_d(Q_d) - C_c(Q_c) + \delta\mathbb{E}[V(S',z')]\} + \delta a \\ &= (TV)(S,z) + \delta a.\end{aligned}$$

□

Accordingly, there exists a unique fixed point for the mapping of the value function, i.e., a unique solution to the dynamic programming problem.

C. Numerical implementation of the model

Method description

I solve the dynamic stochastic decision problem by collocation method. In doing this, I approximate the value function by an approximant $\widetilde{\mathrm{V}}(\mathrm{S})$ that is parameterized by and solved for a vector of parameters, $\boldsymbol{\beta}$.

Abstracting from intermittency, a function can be approximated by a combination of n linearly independent basis functions, $\{\psi_i\}_{i=0}^{n}$, and basis coefficients, $\{\beta\}_{i=0}^{n}$, where n represents the number of collocation points:

$$\mathrm{F}(\mathrm{x}) \approx \tilde{\mathrm{F}}(\mathrm{x}) = \sum_{i=1}^{n} \beta_i \psi_i(x).$$

The interpolation problem in one dimension is then to find $\{\beta\}_{i=0}^{n}$, satisfying F at n interpolation points. In vector notation this can be written as the following:

$$F(\boldsymbol{x}) = \Psi(\boldsymbol{x})\boldsymbol{\beta}$$

where $\boldsymbol{\Psi}(\boldsymbol{x}) = [\psi_1(x)\ \psi_2(x)\ \psi_3(x)\ \ldots\ \psi_{n+1}(x)]$ is the Chebyshev Vandermonde matrix, $\boldsymbol{\beta} = [\beta_1\ \beta_2\ \beta_3\ \ldots\ \beta_{n+1}]'$ and $\boldsymbol{x} = [x_1\ x_2\ x_3\ \ldots\ x_{n+1}]'$,

$$\boldsymbol{\Psi}(\boldsymbol{x}) = \begin{bmatrix} \psi_1(x_1) & \cdots & \psi_{n+1}(x_1) \\ \vdots & \ddots & \vdots \\ \psi_1(x_{n+1}) & \cdots & \psi_{n+1}(x_{n+1}) \end{bmatrix}$$

Similarly, in approximating a value function, I search for a coefficient vector, β, that ensures that the approximant satisfies the Bellman equation and the equilibrium conditions at the n collocation nodes (one can think of collocation nodes as discrete states of the economy).
In the current energy consumption and storage problem, I approximate a bivariate function, $\mathrm{V}(\mathrm{S},\mathrm{z})$, as the planner considers the amount of stored energy and weather conditions before taking decisions. Therefore, I apply the collocation method solution strategy in a multidimensional setting (i.e.,

multidimensional interpolation).

I numerically solve Eq. (2) which is simplified to give:

$$V(S,z) = \max_{\{Q_d, S'\}} \left\{ \frac{\left(Q_d + z\overline{Q}_c - S' + \phi S\right)^{1-\gamma}}{1-\gamma} - C_d(Q_d) + \delta \mathbb{E}[V(S', z')] \right\}$$
$$subject\ to \quad \overline{Q}_d \geq Q_d \geq 0,$$
$$\overline{S} \geq S \geq 0.$$

I approximate the value function using Chebyshev polynomials. Chebychev basis polynomials in combination with Chebychev interpolation nodes can yield extremely well- conditioned interpolation collocation equations that one can accurately and efficiently solve. For a discussion regarding Chebychev basis functions and nodes, I refer the reader to Judd (1992), Judd (1998) and Miranda and Fackler (2002). When approximating the value function using the Chebyshev polynomials, I discretize z and S into K (z_k for $k = (1, 2, \dots K)$) into n collocation nodes. I determine the basis function coefficients for each z and S. For n basis functions, there are going to be n basis coefficients, and given K different weather states, the computational problem is to solve for K × n coefficients. Let us denote these coefficients by $\beta = [\beta_1\ \beta_2\ \beta_3\ \dots\ \beta_K]'$,where, for example, $\beta_2 = [\beta_{1,2}\ \beta_{2,2}\ \dots\ \beta_{n,2}]'$.
For each state of the weather, z_k, and for each level of stored energy, S_i, the approximant is formed as follows:

$$V(S_i, z) \approx \tilde{V}(S_i, z) = \sum_{j=1}^{n} \beta_{j,z} \psi_j(S_i).$$

Given $V(S_i, z)$, I form the approximant to $V(S_i', z_k')$ as well. In doing this for S_i and z_k, I need to compute the level for the stored energy in the period ahead, S', and energy generation today Q_d given the intervals $\overline{S} \geq S \geq 0$ and $\overline{Q}_d \geq Q_d \geq 0$. Using these boundaries, I construct a grid for fossil fuel energy, $\{Q_{di,z_k,l}\}_{l=1}^{n}$, and energy storage, $\{S'_{i,z_k,l}\}_{l=1}^{n}$.

Given the approximants of the value function, I have $(K \times n)$ equations in $(K \times n)$ unknowns:

$$\sum_{j=1}^{n} \beta_{j,z} \psi_j(S_i) = \max_{\{Q_d, S'\}} \left\{ \frac{\left(Q_{di,z_k,l} + z\overline{Q}_c - S' + \phi S\right)^{1-\gamma}}{1-\gamma} - C_d(Q_d) + \delta \sum_{k=1}^{K} \sum_{l=1}^{n} \omega_k\, \beta_{j,z} \psi_j(S'_{i,z_k,l}) \right\}_{l=1}^{n}$$

where, in approximating the integral operation, I replaced the continuous random variable z_k with its discrete counterpart ω_k, the weight functions, using Gaussian quadrature scheme. The weight functions are defined over the interval K. (For a weight function defined on an interval K, $\int_K \omega(z) z dz \approx \sum_{k=1}^{K} \omega_k z_k$.) The expected value of the renewable energy generation can be numerically computed as follows:

$$\mathbb{E}\left[z\overline{Q}_c\right] = \int_K z\overline{Q}_c \omega(z) dz \approx \sum_{k=1}^{K} \omega_k z_k \overline{Q}_c$$

For $k = 1, 2, \dots K$, quadrature nodes z_k and the corresponding weights ω_k are selected such that 2K

moments are satisfied.

Above, I showed the approximant for $V(S_i', z_k')$ in its explicit form:

$$V(S_i', z_k') \approx \tilde{V}(S_i', z_k') = \sum_{j=1}^{n} \beta_{j,z_k} \psi_j\left(S_{i,z_k,l}'\right)$$
$$= \sum_{j=1}^{n} \beta_{j,z_k} \mathrm{T}_{j-1}\left[2\left(\frac{S_{i,z_k,l}' - \underline{S}}{\overline{S} - \underline{S}}\right) - 1\right]$$

for $l = \{1,2,\dots,n\}$, where $\psi_j\left(S_{i,z_k,l}'\right) = \mathrm{T}_{j-1}\left[2\left(\frac{S_{i,z_k,l}' - \underline{S}}{\overline{S} - \underline{S}}\right) - 1\right]$ are the Chebyshev polynomial basis functions. $\overline{S}$ and $\underline{S}(=0)$ denote the upper and lower bounds for energy storage, respectively.

Having explained how the polynomial interpolation can work, I now explain the procedure of how to calculate the basis function coefficients, $\beta = [\beta_1\ \beta_2 \dots\ \beta_K]$. First, I need to make a guess for the initial values of the basis functions' coefficients: $\beta^0 = [\beta_1^0\ \beta_2^0 \dots\ \beta_K^0]$. We then need to construct a grid of Chebyshev nodes, $\mathrm{u}_{n\times 1}$, and convert them into grid of stored energy, S. The mapping looks like the following:

$$\boldsymbol{u} \to \boldsymbol{S} \in \left[\overline{S}, \underline{S}\right], \boldsymbol{S} = \frac{\overline{S} + \underline{S}}{2}\boldsymbol{I} + \frac{\overline{S} + \underline{S}}{2}\boldsymbol{u}$$

where $\boldsymbol{I}$ is a vector of ones: $\boldsymbol{I}_{n\times 1}$.

For $k = \{1, 2, \dots, K\}$ and $i = \{1,2,\dots,n\}$, I construct a feasible grid of energy generation Q_d and S_i' using Chebyshev nodes:

$$\boldsymbol{u} \to \boldsymbol{Q}_d \in \left[\underline{Q}_d, \overline{Q}_d\right], \boldsymbol{Q}_{\boldsymbol{di,z_k}} = \frac{\overline{Q}_d - \underline{Q}_d}{2}\boldsymbol{I} + \frac{\overline{Q}_d - \underline{Q}_d}{2}\boldsymbol{u}$$
$$\boldsymbol{u} \to \boldsymbol{S}' \in \left[\overline{S}, \underline{S}\right], \boldsymbol{S}_{\boldsymbol{i,z_k}}' = \frac{\overline{S}}{2}\boldsymbol{I} + \frac{\overline{S}}{2}\boldsymbol{u}$$

where $\underline{S} = 0$.

For $\boldsymbol{S}'$, I have the Chebyshev Vandermonde matrix: $\boldsymbol{\Psi}(\boldsymbol{S})$. Then

$$\tilde{V}(\boldsymbol{S}, \boldsymbol{z}) = \frac{\left(\boldsymbol{Q}_{\boldsymbol{d,z}} + \boldsymbol{z}\overline{Q}_c - \boldsymbol{S}' + \phi\boldsymbol{S}\right)^{1-\gamma}}{1-\gamma} - C_d\left(\boldsymbol{Q}_{d,z}\right) + \delta \sum_{k=1}^{K} \omega_k \boldsymbol{\psi}(\boldsymbol{S}')\boldsymbol{\beta}_k^0.$$

Taking the maximal entries in $\tilde{\mathrm{V}}(\mathrm{S}, \mathrm{z})$, I can construct $\tilde{\mathrm{V}}(\beta^0)$, and update the coefficients according to Newton-Raphson method (see Judd,1998):

$$\beta' = \boldsymbol{\beta} - [\boldsymbol{\psi} - \tilde{V}^j(\boldsymbol{\beta})]^{-1}[\boldsymbol{\psi}\boldsymbol{\beta} - \tilde{V}(\boldsymbol{\beta})]$$

where $\tilde{\mathrm{V}}^{\mathrm{j}}(\beta)$ is the Jacobian of the approximant. One can then use the iterative update rule until the following difference gets smaller than a predetermined tolerance level, ε:

$$\boldsymbol{\beta}' - (\boldsymbol{\beta} - \left[\boldsymbol{\psi} - \tilde{V}^j(\boldsymbol{\beta})\right]^{-1}[\boldsymbol{\psi}\boldsymbol{\beta} - \tilde{V}(\boldsymbol{\beta})]) < \varepsilon$$

Long-run analysis

After solving for the collocation coefficients, β, one can estimate the evolution of the variables in the model. Using the grid, I constructed for the stored energy S, the solution to the model gives us

an implicit policy rule: $S' = g(S, z)$. (Given S_i and z_k, I know what $S'_{i,k}$ is.)

By satisfying the convergence criteria, I also solve for S'. I can use these values to estimate the policy (transition) rule, hence solve for the Chebyshev function coefficients, φ:

$$S' = \psi\varphi \rightarrow \varphi = (\psi'\psi)^{-1}\psi'S'$$

Using these coefficients, one can pick a random sequence for weather conditions z_t for $t = 1, 2, \ldots, T$. One can then generate another sequence for S_{t+1}:

$$S_{t+1} = \psi(S_t)\varphi$$

Suppose that I do this N times (for N large) by generating N pseudorandom sequences for z. (Pseudorandom sequences are sequences that display some properties satisfied by random variables, such as zero serial correlation and correct frequency of runs, although none satisfy all properties of an i.i.d random sequence (Judd, 1992).) Given the policy functions I calculated, $S'(S, z)$ and $Q_d(S, z)$, and the initial states S_0 and z_0, I can then generate a representative path from the N paths. Calculating the average value from the various pseudorandom sequences, one would get representative paths for the model variables in the long run. This procedure is called a Monte Carlo Simulation.

Numerical implementation

I solve dynamic programming equation (2) by using collocation method and update the collocation coefficients according to the Newton's method (see the subsection entitle Method description). The predetermined tolerance level for the convergence criterion is 1×10^{-7}. I construct a 40 Chebychev polynomial basis functions by forming 40 collocation nodes (4 nodes along *S* and 10 nodes along *S* dimension) and 40 basis function coefficients. The Beta distribution for the intermittent wind is approximated by Gauss-Legendre quadrature with 20 nodes.

The code is written in Matlab. In generating and evaluating the Chebychev polynomials, and doing the Monte Carlo simulations, I use CompEcon toolbox described in Miranda and Fackler (2002).

D. Sensitivity analysis: Round-trip efficiency parameter

The analysis in this section are based on an economy, in which $\overline{Q}_d = 100.8\text{GW}$, $\overline{Q}_c = 100.8\text{GW}$, $\underline{Q}_d = 8.4\text{GW}$, $\overline{S} = 16.8\text{GW}$, $\underline{S} = 0, \gamma = 2, \rho = 0.05, \phi = 0.99$, quadratic cost function, $C_d(Q_d) = c_q Q_d^2$, where $c_q = 1.0417 \text{ x } 10^{-5}$ UoN (see p.11).

From Figure 5 one can see that all scenarios discern the same pattern and display similar qualitative features; i.e., during the first few periods energy is accumulated and stays roughly on its long-run expected level. However, the lower the round-trip efficiency parameter is, the smaller is energy storage, i.e., lower levels of ϕ imply less enthusiastic storage policies. Accordingly, when $\phi \leq 0.4$ energy storage becomes suboptimal.

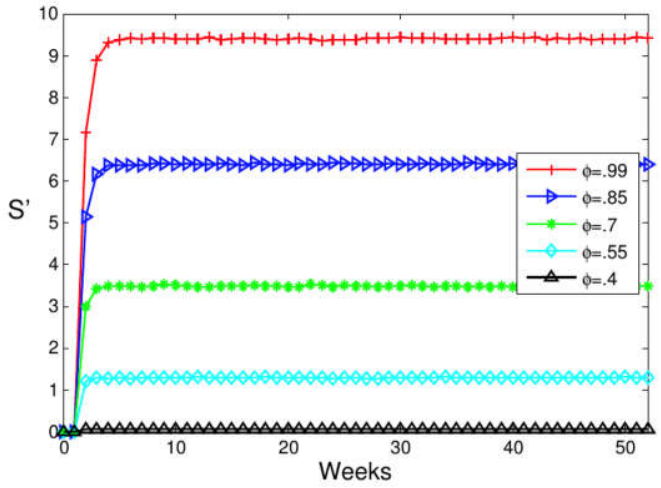

Figure 2: *Sensitivity analysis for the round-trip efficiency parameter, ϕ*

YILDIZ SOCIAL SCIENCE REVIEW

MODELLING THE EUROPEAN FOOTBALL DEMAND FOR THE 2014/2015 SEASON

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ÖZET

Spor ekonomisi literatüründe, seyirci sayısını etkileyen faktörleri tespit etmek son yıllarda, önemli bir ilgi alanı olmuştur. Son yıllarda hızla büyüyen spor endüstrisi, takımları firmalara, oyuncuları girdilere ve seyircileri müşterilere dönüştürmüştür bu sebeple eğer müşteri olmaz firmalar hayatta kalamaz. Çin'den Brezilya'ya dünyanın dört bir yanında, Avrupa'nın büyük liglerindeki maçlar naklen yayınlanmaktadır. Tribünleri doldurma konusunda İngiltere Premier Lig'i ve Alman Bundesliga son derece başarılıyken, Fransız ve İtalyan ligleri bunu başaramamaktadır. Bu çalışma Avrupa'nın 5 Büyük Lig'inde tribün doluluk oranlarını etkileyen faktörleri saptamayı denemektedir. Etkin faktörler saptandıktan sonra, tribünlerdeki seyirci sayısını arttırmak için de kullanılabilirler. Tribünlerin doluluğu, Avrupa futbolunun sürdürülebilirliği açısından son derece önemlidir. Taraftarlar, takımlarını seyretmek ve desteklemek için para ödemeye devam ettiği sürece endüstri var olmayı başaracaktır. Çalışmanın sonucunda, azalan önem sırasına göre, şu faktörlerin talep üzerinde etkin olduğu saptanmıştır: ortalama bilet fiyatının kişi başı yıllık gelire oranı, lisanslı futbolcu sayısının nüfus içerisindeki oranı, ligdeki rekabet seviyesi, ev sahibi takım tarafından toplanan puan, sezon başında lig atlamış olmak ve televizyonda naklen yayınlanan maç sayısı.

Anahtar Kelimeler: Futbol Seyircisi, Furbol Talebi, Bundesliga, Premier Lig, Seri A, La Liga

ABSTRACT

Identifying the influential factors on the demand for spectating sports has been a major area of interest for numerous scholars in recent years. The rapid growth of the sports industry in last decades has converted the clubs to firms, players to inputs and fans to customers; hence as in any sector in the absence of customers there is no point of operating the firms. Millions of people are watching the major European league games live, every week from China to Brazil. In Europe, English Premier League and German Bundesliga are the most successful in terms of attracting the crowds to the stands, whereas France and Italian leagues are failing to do so. This paper tries to identify the influential factors on the demand for football in the top five major European leagues- English, German, Spanish, French and Italian- utilizing the tools of econometrics. Once influential factors are identified they can be used to increase the attendance levels which would enable the sustainability of the football industry in Europe and that is the main motivation behind this paper. The industry will stand if and only if fans keep on paying to watch and support their teams. This study reveals that, listed in the order of descending importance, the ticket prices as ratio of average annual personal income, ratio of licensed football players in a country to its population, the level of competition in the league, the number of points gathered by home team, being promoted to the top division and the number of televised games every week are influential factors on the demand for football.

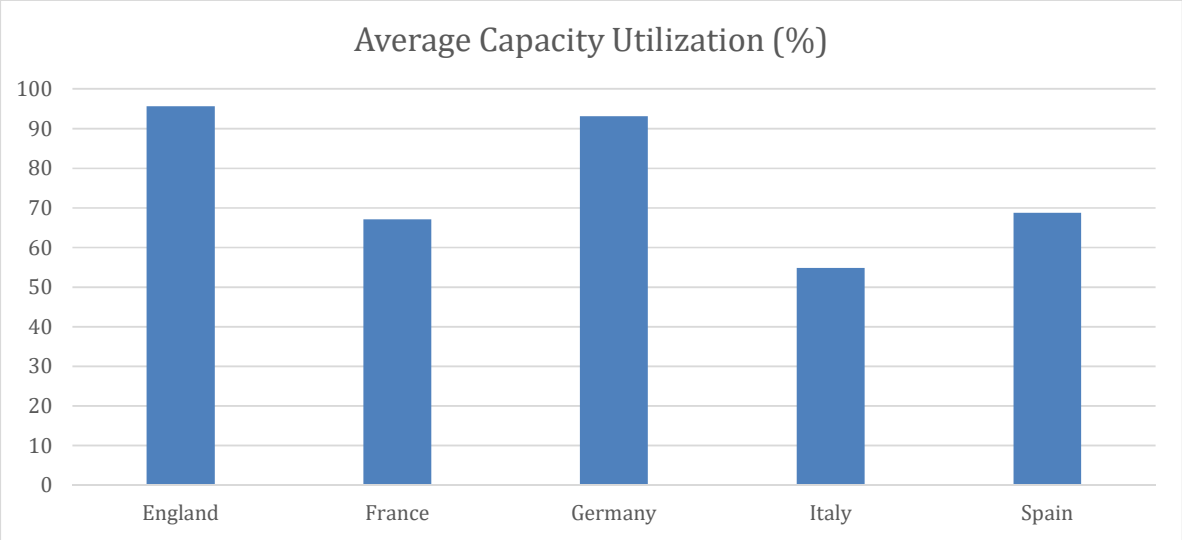
Keywords: Football Attendance, Demand for Football, German Bundesliga, Premier League, Ligue 1, La Liga, Serie A

1. INTRODUCTION

Conventional economic theories suggest that the demand for a good will decrease when its price increases, however when it comes to football the rationality assumption of consumers might not hold. Children are named after top scorers, special days get forgotten and events get rescheduled all because of football. Cristiano Ronaldo once said "without football my life is worth nothing" and he is not the only one feeling this way. Many people all around the world share the same emotions with him, however even this much love and passion is not enough to fill the stadiums sometimes. Why and how German and English teams manage to attract the crowds every week when French and Italians fail to do so?

Figure 1 provides the average attendance rates for the 2014/2015 season and it can be seen that English Premier League is the most successful one and Italy has the lowest average attendance levels among the five major leagues in Europe. This study aims to determine the influential factors on demand which would provide an explanation for the differentiation among the leagues in attendance levels.

Figure 1. Average Capacity Utilization



The fans not only enhance team performance by motivating players (Borland ve Macdonald 2003) and creating a home side advantage but also generate revenue for the team as also mentioned by Buraimo (2008). Even though match day revenues are no longer the most important sources of revenue for some clubs such as Real Madrid, Manchester United or Bayern Munich (Deliotte - Sports Business Group 2014), due to the broadcasting agreements and sponsorship deals, the survival of clubs with smaller reputation still depend largely on match day revenues and fans. On the other hand, the main reason behind the billion euro sponsorship and broadcasting deals is the millions of people which can be reached through football teams. If the interest in football is lost and the teams fail to attract the crowds to the stands, the billion euro deals will no longer be available even for the biggest clubs. In some lower reputation European leagues, such as Austrian Bundesliga, Swiss Super League or Greek Super League, policy makers have tried different league formats to increase uncertainty in outcome of the championship and increased attendance with some success (Pawlowski & Nalbantis, 2015).

This is why determining the factors for football demand is crucial for teams and policy makers in football. Once the factors are determined they can be used to increase the stadium attendance levels. A cross-sectional data analysis will be made for the 2014/2105 season for the 98 teams in the top 5 European Leagues (England, France, Germany, Italy and Spain) for investigating the factors which are influential on the demand for football. The 5 leagues will generate 5 blocks of observations and once the influential factors are distinguished, the cross-sectional league blocks will enable comparing and contrasting the leagues as well as the teams. The comparison among the leagues will enable the determination of country wise effective policies. These 5 leagues are leading the world football industry in terms of quality and value, determining the influential factors on attendance levels in these leagues would be beneficial for the world football since similar policies can be applied to other leagues as well.

Numerous studies have been made regarding factors affecting stadium attendance for different types of sports, from college football to rugby (Fizel & Bennett, 1989; Baimbridge, Cameron & Dawson, 1995). Filling stadiums is one of the main concerns for scholars, policy makers, club owners or whoever slightly interested in any kind of sport because they all know that the wheels won't turn without the fans in the stands. In the case of European football, (Barry 2015), Buraimo (2008) and Forrest & Simmons (2006) have all provided empirical evidence regarding the determinants of stadium attendance. These studies have common characteristics such as uncertainty in the result of the game, recent performance of the performing teams and physical conditions such as the time of the game, the location of venue etc. This study puts emphasis on internal determinants regarding the football game itself, such as the number of goals scored, points collected and transfers made rather than external factors such as the time of the game, the location of the venue or the conditions of the stadium.

The complexity of football demand makes the modelling process quite challenging. The factors related to football and related to conventional demand theories should be analyzed in detail for being able to construct a model. Every fan of every team from every country all have one common wish which is to see their team succeed. For some teams; success is winning continental titles whereas for some avoiding relegation is something to celebrate. Football will not exist without fans which make the clubs and policy makers obliged to attract the crowds to the stadiums.

2. Data Collection & The Models

Collecting credible data and designing appropriate models are crucial for generating reliable results. Data collection is relatively easier than designing the model if reliable sources of information can be found. While trying to identify the determinants of football demand different set of variables should be used to capture the effects of different factors (Garcia ve Rodriguez 2002). In this study socio-economic, such as population in team's hometown, income, ticket prices etc. and football related factors, such as goals, the importance of the game, competition in the league etc. are used. Once the factors are analyzed and the probable influential ones are identified, they will be tested in order to measure the significance of the factors on the demand for football in the 5 major leagues.

Data regarding football is quite easy to find thanks to the internet, however the high number of available resources for data collection create credibility issues. For increasing the liability of the data, two well-known and widely utilized websites are used as the main sources of data, which are: Transfermarkt.com and Worldfootball.net. Other than these 2 websites, the official pages of the clubs in the 5 major leagues and their football associations' pages were used along with the World Bank – Database for acquiring data regarding the economic and demographic indicators of countries.

Two models have been constructed for this study and they are going to be tested using OLS which has 98 observations with cross-sectional data. The first model (Model 1) is a simpler model treating

the demand for football as a regular commodity such as bread or water. Many probable influential factors regarding the football game are disregarded

Model 1 is quite similar to the one used by Késenne (2007) to model the demand for professional team sports. Késenne has used price, market size and winning percentage (as an indicator of uncertainty). The author's model is the demand function for a single team, whereas this study tries to construct the aggregate demand function for 98 teams. In this model price and market size (population of the club's hometown) and level of competition (CV) is used. Instead of using the winning percentage of each team, CVs of 5 leagues are used as proxies for uncertainty.

Model 1

$$PercentageFull = \beta_0 + \beta_1 P + \beta_2 CityPopulation + \beta_3 CV$$

$Y = PercentageFull$: Average attendance as per cent capacity for each club at home games.
$X_1 = P$: Average price for the season tickets for the 2014/2015 season.
$X_2 = CityPopulation$: The number of inhabitants in the football club's hometown. City population is used as proxy for the market size for the tickets.
$X_3 = CV$: Coefficient Variation: An indicator for the level of competition in the league which is the ratio of the standard deviation to the mean of the league table in terms of total points in the end of the 2014/2015 season $\left(\frac{\sigma}{\mu}\right)$ (Sloane, 1971)

Model 2 is a more complicated model when compared to Model 1. More independent variables are added to the model to capture the influence of a wide range of factors related to football.

Model 2

$$\begin{aligned} PercentageFull = \\ \beta_0 + \beta_1 ShareOfLicensedPlayers + \beta_2 RatioOfSpending + \beta_3 PointsHG + \beta_4 GoalsHG \\ + \beta_5 CV + \beta_6 P + \beta_7 ShareOfP\, \beta_8 TelevisedHG + \beta_9 CityPopulation \\ + \beta_{10} Promotion + \beta_{11} European \end{aligned}$$

$Y = PercentageFull$: Average attendance as per cent capacity for each club at-home games.
$X_1 = ShareOfLicensedPlayers$: Number of licensed football players in the country over the population of that country.
$X_2 = RatioOfSpending$: The transfer spending made by each club in the beginning of the 2014/2015 season divided by the team's total squad value.
X_3 & $X_4 = PointsHG$ & $GoalsHG$: The points collected and the sum of goals scored & conceded at home league games for each team.
$X_5 = CV$: Coefficient Variation. An indicator for the level of competition in the league which is the ratio of the standard deviation to the mean of the league table in terms of total points in the end of the 2014/2015 season $\left(\frac{\sigma}{\mu}\right)$ (Sloane, 1971)
$X_6 = P$: Average price for the season tickets for the 2014/2015 season.
$X_7 = logP$: The natural logarithm of the average price for season tickets for the 2014/2015 season.
$X_8 = ShareOfP$: The share of the average ticket price in GDP per capita.
$X_9 = TelevisedHG$: The number of televised home league games for the 2014/2015 season.
$X_{10} = CityPopulation$: The number of inhabitants in the football club's hometown. City population is used as proxy for the market size for the tickets.
X_{11} & $X_{12} = Promotion$ & $European$: Dummy variables indicating whether the team has promoted from the second division the previous season and whether the team is going to participate in one of

the European Tournaments (UEFA Europa League & UEFA Champions League) in the 2014/2015 season.

The dependent variable in the model is "average attendance as per cent capacity" for each club at home games ($PercentageFull$) rather than the number of spectators. The stadium capacities vary greatly from 6.000 (Eibar) to 99.786 (Barcelona) hence it would be unfair to measure a team's performance in filling its stadium based on the number of fans attending the games.

Some countries are just better at sports than the others, some win more Olympic medals, some win more football games, some win more basketball games and some others have more successful tennis players. Some sports are more popular in some countries where as some are not even played at all. Disregarding the physical differences, sportsmanship is a culture and countries who invest more in sports are generally more successful than others, except a few exceptions. To measure the popularity of football and the investment made in football in a country, considering the number of licensed players would be appropriate. To normalize the variances which would occur due to population differences from country to country, the percentage of licensed football players in population is used instead of the number of licensed football players ($ShareOfLicensedPlayers$).

Every fan likes to see new transfers in his/her team and the summer is one of the most thrilling parts of the season for the football fans. Fans enjoy watching expensive stars whereas a makeover in the team creates excitement, as more euros are spent fans are more eager to see their team play. To measure the influence of new transfers on the demand, an independent variable is added to model regarding the transfer spending. Instead of the amount of transfer spending, the ratio of total spending made to the team's value in the beginning of the season is used ($RatioOfSpending$). As in the case of stadium capacities, budgets and team values' differ from club to club. To compare the spending made by Real Madrid and SC Padderborn will not make sense, hence the ratio is used instead of the total sum of euros spent.

Fans want their team to win, that's the motivation in being a fan and if someone is a fan of a team it's because that person would want his/her team to win without any hesitation. In the case of football, the second best thing after a win is seeing goals, preferably scored by a fan's team, but since scoring is scarce in football compared to other sports, a goal is a rare moment in the game to enjoy football. To observe the influences of wins and goals on attendance, the points collected at home games ($PointsHG$) and goals scored and conceded ($GoalsHG$) are added to the model.

The debate over the influence of level of competition on the demand for football has been going on for a while. Some argue that as the uncertainty in the outcome of the game increases, the game would be more appealing so the demand would increase, whereas some others argue that there is not enough evidence to support such a claim (Peel ve Thomas 1988). To test the influence of the level of competition, the coefficient variation in the league table in the end of the 2014/2015 season (CV) is used in the model. The level of competition in the league will provide the seasonal uncertainty as defined by Szymanski (2003) and its influence on seasonal attendance levels will be tested.

To test the conventional economic theory, which states that the demand for a good will decrease as its price increases, the prices for the season tickets are added to the model together with the share of the season ticket price in GDP per capita. Since there are 5 different leagues from 5 different countries, the real cost of the tickets will differ from country to country due to the differences in the yearly earnings of the citizens.

The substitute good for attending a game would be to watch it on TV so the availability of the TV broadcast of football games might be influential on the demand. To test whether the availability

of the TV broadcast is influential on demand, the number of televised home games ($TelevisedHG$) is added to the model.

Finally two dummies are added to the model, to test whether if the team has just promoted to the league from the lower division ($Promotion$) and whether if the team is going to be participating in European competitions ($European$) that season. Newly promoted teams might have more eager fans since playing in the top division would be a new thrill for them. Participating in European competition is an indicator that the team performed well the previous season which might motivate the fans to go to the games.

3. Findings & Discussion

The regression of the models, which were discussed in detail in the Data Collection & The Models section, yield the following results when the data is regressed using OLS estimation.

Figure 2 – Model 1 Results

[1]*Dependent Variable: PercentageFull*	
Constant	102,85***
	(6,86)
CityPopulation	0,000002***
	(3,15)
P	-0,0071
	(-1,31)
CV	-83,59*
	(-1,82)
Adjusted R^2	0,1
Number of observations	98

The results for the first model are not promising, out of the 3 independent variables only $CityPopulation$ is statistically significant in 95% confidence which has a very low coefficient so it can be said that its influence on attendance is pretty low. The model is not successful in explaining the variation in attendance between the 98 teams in the top 5 football leagues of Europe for the 2014/2015 season even though the model is statistically significant. Both price of the tickets and the competition in the league are not statistically significant and has no influence.

Model 2, which has more independent variables added to the model to capture the influence of a wide range of factors related to football, is tested as two different models (Model 2A and Model 2B) which differ slightly.

The difference between Model 2A and Model 2B is the independent variables P and $logP$. Model 2A uses the season ticket prices as level where as Model 2B uses the natural logarithm of the prices. It's quite common to use the natural logarithm of price while modeling demand and furthermore since the dependent variable is in percentage terms it would be easier to interpret the effect of prices on demand when $logP$ is used instead of P.

[1] *: Significant at 90%, **: Significant at 95%, ***: Significant at 99%

Figure 3 – Model 2A Results

[2]*Dependent Variable: PercentageFull*	
Constant	2,9843
	(0,15)
CityPopulation	0,0000002
	(0,53)
ShareOfLicensedPlayers	481,6748***
	(6,49)
RatioOfSpending	-3,4020
	(-0,35)
PointsHG	13,5399***
	(3,81)
GoalsHG	2,2850
	(0,80)
CV	188,8367***
	(3,97)
P	0,0648***
	(2,65)
ShareOfP	-1812,867***
	(-2,90)
TelevisedHG	-1,9249***
	(-4,89)
Promotion	9,9241***
	(2,76)
Europe	1,9184
	(0,58)
Adjusted R^2	0,67
Number of observations	98

The findings suggest that the both models 2A and 2B are significant even in 99% confidence interval even though some of the independent variables are statistically insignificant. As can be seen from Figure 3 and Figure 4 some of the independent variables in these models, $CityPopulation, RatioOfSpending, GoalsHG$ and $European$ are statistically insignificant where as the rest of the dependent variables are statistically significant. The next two sections will discuss and interpret the influence and insignificance of the independent variables.

[2] *: Significant at 90%, **: Significant at 95%, ***: Significant at 99%.

Figure 4 - Model 2B Results

[3]*Dependent Variable: PercentageFull*	
Constant	-54,4094
	(-0,87)
CityPopulation	0,0000004
	(0,94)
ShareOfLicensedPlayers	519,0865***
	(6,49)
RatioOfSpending	-8,3467
	(-0,81)
PointsHG	13,3964***
	(3,65)
GoalsHG	1,7702
	(0,60)
CV	126,5552***
	(3,28)
logP	15,3892
	(1,60)
ShareOfP	-646,6623**
	(-2,08)
TelevisedHG	-2,2403***
	(-5,93)
Promotion	9,4495**
	(2,52)
Europe	2,4506
	(0,73)
Adjusted R^2	0,66
Number of observations	98

3.1. No more hometown loyalty? Why the fans don't care about spending, goals and European cups?

Caring about a team is like caring a person, the fan cares about the well being of his/her team and tries to keep up with the changes effecting the team. People tend to support local and regional teams since it creates a sense of belonging and becoming proud of one's town and region as in the case of supporting national teams (Dixon, 2001). Perhaps it was the case a few decades ago or perhaps it's the case for lower division teams who play in front of a few hundred fans, but today's football is much more global than it was a few decades ago. Every year European giants travel across the world in summer for friendly fixtures, from China to USA. The friendly fixtures are not about getting ready for the next season any more but to promote the team in the large markets such as China and the US, where the football market is not saturated yet. The globalization of football, like any other commodity, is altering the demand patterns. The foreign capital which had started flowing into

[3] *: Significant at 90%, **: Significant at 95%, ***: Significant at 99%.

European football is changing the structure of the clubs as well as the fans. Every year thousands of foreigners attend the games of clubs such as Barcelona, Real Madrid and Manchester United. The fans in the stands are no longer only from the neighbourhood since there are other people who are willing to pay much more and travel much further to see their favourite team playing. After all these being said, the statistical insignificance of the $CityPopulation$ is not surprising. There is no evidence to say that the population of the city which a club is founded at is influential on the demand for its game tickets.

The empirical evidence suggests that there is no influence of the transfer spending made in the beginning of the season on the number of attendees. Fans are usually excited to read about transfer gossips and new signings appear to create a thrill however there is no empirical evidence to state that signing new players attract crowds do the stadiums. Clubs tend to transfer more players after an unsuccessful season hence a club spends more if the previous season was a failure. The probable negative effect created by the last season's low performance might neutralize the thrill created by the new signings and perhaps this is the reason why transfer spending does not have positive influence on that year's attendance, even though it may be considered as an investment to success in the next season to be followed by better attendance. Borussia Dortmund has one of the highest capacity utilization percentages in Europe. The German club has managed to achieve one of the most remarkable financial recoveries in European football thanks to their high attendance levels. In the 2004/2005 season Borussia Dortmund did not spend any money on transfers yet they have managed the achieve the highest attendance in the German league.

One of the dummy variables in the model, $European$, is also statistically insignificant. The $European$ dummy is included as an indicator related to the influence of whether the team is going to participate in the European competitions in the season or not, which is actually a measure of success of the previous season. One would expect that after a successful season fans would be more willing to attending games however there is no statistical evidence to support that claim.

Both the $RatioOfSpending$ and the $European$ can be interpreted as parameters for measuring previous season's success however they are not influential on attendance. Football consumers are either absent minded or they do not value the past season's success or failure since there is no influence of the previous season's success on attendance measured in terms of transfer spending and European cup participation. A rational expectation would be that if a team was successful the previous year their fans would attend more games the following year or vice versa however there is no statistical evidence to justify this expectation.

Goals are the second best thing after a win for the fans and since goals are scarce in football, teams who play more openly, who score and concede a lot of goals would be more fun to watch which might result in higher attendance. As logical as this claim seems, there is no statistically evidence to back this. The independent variable $GoalsHG$ measure the average number of total goals scored in home games however it's not statistically significant, hence no influence on attendance can be observed.

Some of the tested dependent variables in the model are statistically insignificant even though the rational behind them were promising in the sense that they would be influential on attendance.

3.2.To be or not to be in the stands – What makes fans attend the games?

The miraculous success Iceland team has achieved in Euro2016 has been admired by everyone even though Cristiano Ronaldo accused them of playing defensively and claimed that they could not achieve anything with this mentality. According to Big Count, Iceland has just more than 32.000 football players (FIFA 2007) which is about 10% of their population which is higher than in Germany, the highest among the top five leagues at 7%. German Bundesliga has the 2nd highest attendance average after the English Premier League among the five countries and perhaps the most successful in football in national level, when both men's and women's teams are taken into consideration.

The wide spread regular practice of sports among the individuals in a society is an indicator regarding the interest to sports. It would be logical to expect that the demand for sports would be

higher if there are more people who are interested in sports. The number of players in a country is a good proxy for measuring the number of people interested in football, even though playing football is not a necessity for attending games. $ShareOfLicensedPlayers$ is statistically significant and it has the highest positive coefficient in the model hence it can be said that it is the most influential independent variable in the model. It can be said that as the number of people playing football as a share of the population increases the attendance rate increases. Developing a nationwide interest to football is important to increase stadium attendance levels however there is always an economic dimension to it.

In Model 2A P and $ShareOfP$ are both statistically significant hence they are influential on the attendance rate, however their coefficients have different signs. P has a positive coefficient which states that attendance increases as the price of the season tickets increases which is quite unusual. In this sense season tickets for football in Europe act as "Veblen goods" or "conspicuous goods", there are few possible explanations for the failure the law of demand. First, the increasing demand by the outsiders and foreigners causes the tickets to be overpriced especially for the clubs which has worldwide supporters. As mentioned earlier there might be people willing to pay more than the locals who live in the neighborhood, hence clubs charge more for the tickets because they can simply do so. The second explanation would be that since buying tickets is a way of helping the finances of one's favorite club, fans don't care about the prices as much as they should. Owning a season ticket is something to brag about to show how devoted a person is to his/her favorite club and for many fans its worth to pay high prices. Finally another explanation would be that since there are 5 different leagues which belong to 5 different countries with different economic conditions, the effect of prices is biased. The cost of living differs from country to country hence the relative worth of season tickets differs from country to country.

Model 2B uses $logP$ instead of P and the rest of the model is the same with Model 2A. The results of Model 2B and 2A are very similar, other than the little variation in the coefficients of the significant variables. The only main difference between the models is that the independent variable $logP$ which was substituted with P is insignificant in Model 2B. The questionable result of Model 2A was that the coefficient of P was positive indicating that price is positively correlated with demand which is against the law of demand. When $logP$ is used instead of P the results of the model coincide with the theory of demand.

To offset the bias caused by the difference in cost of living from country to country, the independent variable $ShareOfP$ is added to the model. $ShareOfP$ has a negative coefficient and it has the highest coefficient in absolute terms. The most influential variable in the model is $ShareOfP$ since it has the highest coefficient. The demand for attending the games is adversely affected as the price of the season ticket in terms of its share in GDP per capita.

Coefficient variation has been introduced to the literature by Sloane (1971) as a parameter related to level of competition and it has been widely used ever since. Numerous studies have been conducted regarding the importance of competition in a championship. Uneven contest is a threat for the interest of the fans (Neale, 1964) meaning that if the same teams wins every single week it might adversely affect the attendance levels. The debate regarding the influence of uncertainty in the result of a game on attendance levels has been going on, but there is lack of empirical evidence to state that uncertainty is influential on attendance. Some argue that fans will not attend games if they expect their team to win by five goals every time hence competition is important, whereas some argue there is no evidence to state that (Késenne 2007). The model provides empirical results to suggest that competition is indeed strongly influential on attendance rates. CV is statistically significant, it has the second highest coefficient after $ShareOfLicensedPlayers$ and it is the third most influential variable in the model so as the competition in the league increases more people attend to games.

$PointsHG$ is the number of points collected at home games as mentioned earlier and as can be seen from Figure 3 and Figure 4 it has positive influence on attendance. The statistical significance of the variable suggests that fans are more likely to attend games if they expect their team to win the game or at least not to lose. Even though goals are not influential on fans' decision to attend games, the points collected by their team at home games is. The fact that $PointsHG$ is positively correlated

with attendance rate creates a perception that successful teams have more fans which is true in almost all cases. The giants in every league have higher attendance levels when compared to the less successful teams in the league.

$Promotion$ is one of the two dummy variables in the model and it is statistically significant. Teams who have just promoted to the top league might have fans who are more eager to attending games hence the dummy has positive influence on attendance. Its quite logical to expect that playing in the top division is thrill for the fans which motivates them to attending games. Even though the dummy is statistically significant and it has a positive coefficient, there are two exceptions amongst 14 teams examined to test the influence created by the promotion.

Figure 5 provides the attendance percentages for the promoted teams in the 2014/2015 season.

Figure 5. Attendance Percentage

Team	*2013/2014*	*2014/2015*	*Change*
Leicester City	77,36%	98,08%	20,73%
Burnley	64,10%	89,39%	25,29%
Queens Park Rangers	90,09%	98,94%	8,85%
Deportivo La Coruña	63,78%	61,48%	-2,30%
Eibar	50,28%	79,67%	29,38%
Cordoba	47,49%	73,90%	26,40%
SM Caen	51,34%	79,85%	28,51%
Metz	52,12%	68,37%	16,25%
RC Lens	81,14%	45,01%	-36,13%
Sassuolo	46,00%	65,16%	19,15%
Empoli	23,27%	54,93%	31,66%
Cesena	44,70%	67,80%	23,10%
1. FC Köln	92,47%	96,66%	4,19%
SC Padderborn 07	71,88%	99,06%	27,18%

Out of the 14 promoted teams in the beginning of the 2014/2015 season 12 of them have higher attendance compared to previous season when these teams have competed in the second divisions of their countries. Deportivo La Coruña and RC Lens are the only two teams which have lower attendance compared to the previous season. The decrease in Deportivo La Coruña's attendance is about 2% which might be explained by factors which are not related to football such as the general economic conditions in Spain or issues regarding the La Coruña. However the decrease in RC Lens's attendance is extremely high, 36% decrease is the highest change among the 14 teams. Although it's a concerning issue for the RC Lens team, there were some special outside factors which caused this result. Unfortunate for the team and fans, due to the renovations in their home ground which was being prepared for Euro 2016, RC Lens fans had to travel 124km to see their team playing. Instead of their local ground Stade Bollaert-Delelis they played their games in Stade de la Licorne during the 2014/2015 season (Football Radar 2015).

Watching a football game on TV and attending the game in a stadium may be considered as substitutes for each other for a fan who wants to see his/her team playing. If the substitute for a good is available, it would be rational to expect a negative influence on the demand. $TelevisedHG$ is the number of home games which had live broadcast, in the 2014/2015 season, for each team. Due to the increasing value of broadcasting rights, broadcasters provide the live broadcasts for every game. The only expectation is the English Premier League where only a number of games are televised every week. Outside of UK, one can watch any Premier League game he/she desires, however in UK all

games are not available live on TV. $TelevisedHG$ is statistically significant and it has a negative coefficient, as the number of televised games increase less people attend the games. Forrest, Simmons and Szymanski (2004), Forrest & Simmons (2006) and Allen & Roy (2008) have all provided empirical evidence regarding the adverse effects of TV broadcasts in the English and Scottish Premier Leagues however when compared to the other major European leagues the adverse effects are less. The fact that not all games are televised in the English Premier League is beneficial for the attendance levels. Perhaps this is one of the underlying reasons for the Premier League to be the league with highest attendance levels, even though English clubs have the 2nd most expensive tickets among the five leagues.

It should be mentioned that the influence of $ShareOfP$, $ShareOfLicensedPlayers$ and CV is much higher than the other significant variables. These three independent variables has, at least ten times, higher coefficients than the others. Even though $PointsH, Promotion$ and $TelevisedHG$ are influential on the demand for football in the major European leagues their effects are relatively smaller.

4. Conclusion

Even though the German and English leagues have high levels of attendance, the fans have been protesting the clubs due to the high ticket prices, on the other hand when it comes to French, Spanish and Italian leagues, clubs are struggling to fill the stadiums. Attendance is an important issue for the policy makers and fans are irreplaceable for football. Football without fans will lose its popularity in no time, this is why the governing bodies of football try to increase the interest on tournaments by changing its formats or increasing the number of competing teams.

The models used in this study provides the possible influence of different factors on ticket demand for the top five leagues in Europe. These five leagues are the locomotive of European and perhaps world football, the failure or the success in these league in attracting crowds to the stands will affect the leagues all around the world. The determination of influential factors would enable the policy makers to take action for increasing attendance.

As a result of this study influence level of several factors were determined which might be expected to have an influence on the demand for football. Factors such as number of licensed football players in the country, points gained on home games, cost of tickets, home game broadcasting, promotion to a higher league ($ShareOfLicensedPlayers$, $PointsHG$, CV, P, $ShareOfP$, $Promotion$ and $TelevisedHG$) are identified as statistically significant factors that are influential on the demand and the degree of their influence are quantified. It is concluded that football demand is affected by both economic factors and factors related to the game itself. On the other hand, several variables which would be expected to have influence on demand are found to be insignificant, such as: home town population, transfer spending, goal scored in home games and participation in European tournaments ($CityPopulation$, $RatioOfSpending$, $GoalsHG$ and $European$) even though they are considered to rest on some conceptual grounds. As logical as the conceptual grounds seem, apparently they are not sufficient to explain the consumer behavior in case of football. In the order of descending importance, the ticket prices as a share of average annual personal income, ratio of licensed football players in a country to its population, the level of competition in the league, the number of points gathered at home games, being promoted to the top division and the number of televised games every week are influential factors on the demand for football.

This study used the data for 2014/2015 season, a total of 98 observations, which might not be a sufficient period of time to observe the influence of some variables. The underlying reason behind the fact that some variables were insignificant might be due to limitations regarding short duration of the observational data. Regressing the same model using panel data for several seasons might yield different results, which might be an inspiration for future studies. What this study aimed was to develop a model to demand for football in European major leagues and it was accomplished.

For most of the fans, attending a football game is not just a leisure activity but it's a responsibility to be fulfilled against your most beloved. Football is more than just a game, football is

life itself where sometimes miracles happens and teams like Leicester City or Iceland and Wales national teams make people believe that good things can still happen in life. People change the cities they live in, they change the houses they stay at, they even change their wives and husbands but one can never simply change his/her team.

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YILDIZ SOCIAL SCIENCE REVIEW

AN ANALYSIS OF TURKISH-TUNISIAN RELATIONS IN LIGHT OF ARAB SPRING

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ÖZET

Tunus'taki ayaklanmalar, Arap ülkeleri için yeni bir dönem başlattı. Yasemin Devrimi gerçekleştikten sonra bile ülkede gösteriler ve protestolar devam etti. Otokrasiden demokrasiye geçiş, İslam ve demokrasinin uyumluluğu ile ilgili tartışmaları beraberinde getirdi. Sonuç olarak, Arap Baharı'nın başından itibaren, büyük ölçüde Müslüman nüfusa sahip olan Türkiye Cumhuriyeti, ayaklanmaların yaşandığı bölgedeki Tunus ve diğer ülkeler için bir rol model olarak gösterildi. Bu bağlamda, bu çalışma şu sorulara odaklanmıştır; Tunus'un takip etmek için bir modele ihtiyacı var mı? Tunuslular Türkiye hakkında ne düşünüyor? Türkiye-Tunus ilişkisinin geçmişi ve bugünü nedir? Avrupa Komisyonu tarafından finanse edilen Marie Currie Araştırma Projesi'nin bir parçası olan bu çalışma, yukarıda belirtilen sorular çerçevesinde Tunus'un durumunu ortaya koymaktadır.

ABSTRACT

Uprisings in Tunisia started a new are in the region of Arab countries. Manifestations and protests took place in the country even after the Jasmine Revolution had happened. Transition to democracy from autocracy brought discussions regarding the compatibility of Islam and democracy. Consequently, from the beginning of Arab Spring, Republic of Turkey with majorly Muslim population was pointed out as a role model for Tunisia and other countries in the region where uprisings took place. In this context, the following questions became the main subjects of this study; does Tunisia need a model to follow? What do Tunisians think about Turkey? What is the background and actuality of Turkish-Tunisian relationship? This study, which is a part of Marie Currie Research Project funded by European Commission, shows the Tunisian reflection regarding the aforementioned questions

Keywords: Tunisia, Turkey, Arab Spring, Jasmine Revolution

1. Introduction

Since early 2011, the World started to witness a change that took place in Arab countries, first in Tunisia, then Egypt, Libya and many other. People from the countries listed above became the actors of protests; manifestations and sit-ins. Consequently, populations of Arab countries raised similar concerns and demands for freedom, democracy, end of corruption and nepotism. Street protests are nothing new, for instance, teachers gather because of low salaries, or workers rally against the decrease on their rights and work conditions. However, the uprisings in the Arab countries were totally different than before. Their 'anger' and 'grudge' was not directed to *sole* problem of their country. They targeted the whole system as problem and they marked their rulers as the source of the problem. Consequently, one of the most striking common features of the outcry from Arab countries was that it was raised by ordinary people who constitute the core of their societies. They were not politicians; they were not any certain groups like teacher or workers, they were the "people" without any distinction who occupied streets and stayed there all day long. They have demonstrated to the outside world that people possess the power.

The protests immediately put Arab countries under the spotlight in international politics. Every mass media channel started to broadcast what were happening in the squares of Tunisia first, then Egypt. They even sent their reporters to have live broadcasts from the region. Consequently, these uprisings were indicated and labeled as the beginning of a new era in World politics majorly by western mass media. Following the protests in Arab countries, we saw people who occupied the streets in some European countries like Italy, Spain, etc. The "Arab Spring" represented the success of collective actions; most importantly, that actions without violence could change certain political systems. With the Arab uprisings, Muslim societies understood that they were at the core of their states; they were the sovereign ones, not their rulers.

The famous uprisings were initiated as protest movements against the system itself in general and against the rulers in particular, but then it gradually converted into "revolutionary movements" seeking to change the status quo. After long years living under repression and political manipulation, the people of Tunisia wanted to take charge, and demanded a change in their political system. In the beginning of the protests, their hatred and anger were visible. However, their real demands started to be understood after the scale of protests increased. What Tunisian people asked was a genuine democracy. Within the conditions of manifestations and protests, people had an opportunity to discuss their political thoughts that were not possible before. They started to question the real meaning of terms that belong majorly to the Western part of World, like 'democracy', 'people', 'freedom', 'vote' and so on. Alongside with peaceful protests and manifestations, this questioning made people more aware of what was the problem in their country. They have also shattered the widespread perception in the West regarding the irreconcilability between democracy and Islam.

Tunisian people's demand for democracy triggered another discussion about the future of the countries, where manifestations had happened. However, the initial declaration form West was highlighting the dangers for the authoritarian rulers to be merely replaced by radical Islam. It is to say that right in the beginning of the protests, Tunisian people deemed to accept a simple change of the ruler. This has ultimately increased the already existing trends for 'Islamophobia'. However, it is important to say that from the very beginning, Tunisians sought for genuine democracy for the future of their country. In addition to the fear of radical Islam, scholars and politicians from Western part of the World started the discussion about how Islam can be compatible with democracy and tried to point out certain countries as examples or role models for the Arab countries where the revolutionary movements took place. In the mind of some Western intellectuals, the religion of Islam could be an obstacle on the way to achieve a genuine democracy for Arab countries.

Some of Arab countries that experienced the uprisings already had elections for the office of the President and/or the Parliament. However, these elections were only viable on paper and always conducted under the absolute control of the rulers. At this point, it is possible to say all those years people of Arab countries were disillusioned about the election system, the reality of having rigged elections without any real effect on the political system. In a functioning democracy where elections

are the indispensable part of the political system, the people is at the center of the system and also the people provides legitimacy to the system. When the system loses its legitimacy and credibility in the eyes of the electorates, people start to demand more than cosmetic modifications. Briefly, having elections is not proof of any kind of democracy. If people lost their credence in the system, then the change is unstoppable. On the topic of democracy, the main question for the Arab countries was and still is that how Islam can be compatible with democracy?

While the arguments against compatibility of Islam and democracy often circle around, there are some arguments in the Muslim world favoring the concept of democracy and arguing the inherent democracy embedded in Islam. They believe that it is possible to have an "Islamic democracy." According to them, it is not possible to adapt the complete western democracy with western values and limits, but a kind of democracy which contains certain important elements of Islam alongside with necessities of democracy can be formed and be applied in Muslim societies. Even recently, when the Arab Spring was happening and re-shaping the region, this discussion was on the agenda of eastern thinkers.

As with the eastern thinkers, many scholars from the west also argue that Islam and democracy cannot be compatible. Even after the uprisings in Arab countries, some argue that another autocrat will simply take the power of governance. As under autocratic regimes, strong and viable opposition groups could not be formed, only the Islamist became the most powerful opposition in many Arab nations. Basically, Islamists are the groups that embrace a political view of Islam and reject secular forms of government. In other word, they reject any western value in the game of democracy. However, the big picture of Tunisian political life, which was shaped rapidly after the revolution and the escape of Ben Ali from the country, did not give any sign that the country was rolled towards radical Islam. For instance, significant number of women were elected in Tunisia; even the parties that are considered as Islamist did not make their propaganda around Shari'ah or head-scarf. They often tried to convince their people and Western observers that they would not interfere in the lifestyle of people or people's freedom.

From the first day of protests and manifestations scholars from East and West are talking about the future of the region in general, about Tunisia in particular as it was where whole *revolutionary* street protests started. As Arab countries have majorly Muslim populations, while discussing their future, most of the scholars make frequent references to Turkey as a *role model*. This is one of the reasons that this article focuses around the Turkish-Tunisian relations. The place of Turkey in the discussion of having democracy in majorly Muslim society is pivotal. With its majorly Muslim society, the Republic of Turkey has a functioning democracy within laic state structure and this characteristic places Turkey at the center of debates about the future of the region. Consequently, the Turkish experience of having a democracy in majorly Muslim society became a case study for the debate about compatibility of Islam and democracy. Proponents of this compatibility indicate the success and viability of the Turkish case. When we take a glance at the Middle East-North Africa region, it would not be possible to talk about another democracy except the Republic of Turkey, which functions and puts people's will at the core of the system. But for Turkey, it is quite common to say that it is a "bridge" between the east and the west, which holds regular elections, and puts people as sovereign of the territory of Turkey.

Within the perspective of these discussions, recent popular question is: can Turkey be a role model for Arab States in which transformations to democracy are happening right now? There is no certain answer for that question.

This article has been written as a result of mobility time that I spent in Tunis for the project 'SpringArab'. During the time of mobility, the host university; Université de Tunis, provided necessary tools and documents in order to facilitate the research. With provided necessary documents from Université de Tunis to access libraries, National Library of Tunisia and National Archive of Tunisia were visited several times in order to search for related written sources about history of Tunisia, Arab Spring and Revolution in Tunisia. For the research project I used oral history as a primary method for methodology as a result of being in the region. Multiple conversations have been conducted with local people of city of Tunis, the capital of Tunisia. Manifestations, demonstrations

and sit-ins also have been observed by first hand. Hence, majority of the information for this article have been gathered personally.

2. Historical Roots of Turkish-Tunisian Relations

For a Turkish citizen, Tunisia is a country that has similar food and cultural elements. Even some of food in Tunisian cuisine has Turkish names. Possibly, Tunisia is among a few countries that Turkish citizen can order Turkish coffee by its name on a café shop. Hence, there is an undeniable proximity between Tunisian and Turkish culture. On the relations of Turkey and Tunisia, it would not be wrong to argue that two dimensions, history and actuality, are the reasons behind this proximity between Turkish and Tunisian societies.

On the perception of history, people of Anatolia and people of Tunisia had lived under the same flag for a significant period of time. Under the Ottoman Empire's rule, different types of people lived as *subjects* of the Ottoman Sultan, who had the absolute authority over the Ottoman Empire's territories. Even though there is no direct territorial connection between Anatolia, also known as Asia Minor, and Tunisia, the effect of Ottoman Dynasty was prominent then. The Ottoman Era of Tunisia started back in 1574. Ottomans conquered the territories of Tunisia and started to apply their way of governance in the country. Under the rule of the Ottoman Empire, Ottoman Turkish became the language of the governance as the records and reports had been written in that language. While Ottoman Turkish was the language of the ruling circle in Tunisia, Arabic was in use among the population of Tunisia. It is also possible that many words, which have Turkish roots, are still in use in daily life. Consequently, it is possible to say that, Ottoman Empire's effect on culture of the country is visible even today. While Tunisia was the part of the Ottoman Empire, the country was ruled by Tunisian families within certain autonomy. Ruling elites of Tunisia were often appointed by the Ottoman Empire and called with titles like '*bey'* and *'pasha (pacha)',* which was the title for the chieftain. Traditionally, bey served under pasha in the provinces of the Ottoman Empire. Even today it is possible to see the usage of 'pasha' in the names of streets of modern Tunisia. Accordingly, Tunisia was one of the several 'beyliks' or 'eyalet' (there are no exact translation of beylik/eyelet to English, however it is possible to translate it as principality, province) of the Ottoman Empire. Until the beginning of 1800s, no major problems occurred under the Ottoman rule and by the hands of pashas. As stated earlier, local rulers had certain autonomy under the Ottoman rule, and to protect that autonomy they even applied more European governance methods. However, by 1830, France conquered Algeria and the effect of politics of France started to be seen in Tunisia. In late 1800s, the Hayrettin Bey of Tunisia tried to implement series of reforms in order to stabilize the country; however, his efforts did not give any positive outcome and France gained control of the Tunisia by 1881. Right after, France became *protector* of Tunisia.

Tunisia lived under French protectorate until 1956. Starting with the independence, Neo-Destour (New Constitutional Liberal Party) governed country first under the rule of Habib Burguiba, then Zine El Abidine Ben Ali, until the Jasmine Revolution took place in the country in 2011. During the mobility time in Tunisia, I had chance to talk with Tunisians regarding the history of both countries. As Habib Bourguiba was known with the changes that he accomplished in Tunisia, many Tunisians made connections with Mustafa Kemal Atatürk directly when they heard that I am from Turkey. Interestingly, Tunisian people know more than expected about the founder of the Republic of Turkey, Mustafa Kemal Atatürk. After the Independence War of Turkey, under the leadership of Mustafa Kemal Atatürk, the National Assembly of Turkey abolished the Ottoman Sultanate and by 1923 declared the new born state of Turkey as Republic of Turkey. Hence, as many Tunisians already know the history of the Republic of Turkey, they pointed out the similarities between the process of establishments of both Tunisian and Turkish republics. Tunisians often stated that on all his reforms and changes Habib Bourguiba inspired by the history of modern Turkey in general, and the leadership of Mustafa Kemal Atatürk. They even said that they consider Habib Bourguiba as Mustafa Kemal Atatürk of Tunisia. While Tunisians made several connections between Mustafa Kemal Atatürk and Habib Bourguiba, in his book '*Sauver la Tunisie*' Lotfi Maktouf indicates that methods of Habib

Bourguiba and Mustafa Kemal Atatürk were slightly different from each other. According to him, while Mustafa Kemal Atatürk gave his fight against the Sultanate of Ottoman Empire, and tried to implement westernized reforms in the name of modernity, Habib Bourguiba respected the historical elements of Tunisia and tried to create harmony within the different fractions of Tunisian society.[1] According to article of Eric Pace that published on New York Times, after achieving power in Tunisia, Habib Bourguiba was asked about the new political system in Tunisia, and he answered "The system? What system! I am the system!"[2]

3. Jasmine Revolution and Actuality of Turkish-Tunisian Relations

According to Tunisians, the country had problems during Habib Bourguiba period; however, they stated that Ben Ali period was worse than Habib Bourguiba period. Ben Ali applied more security measures than Habib Bourguiba. Under Ben Ali's regime, unemployment kept increasing; however, state became the main job-providing sector. According to Tunisians, middle class had savings during the relatively successful economy under Habib Bourguiba, so that they kept spending their money during the years under Ben Ali regime. A lot of privatization took place, but majorly Ben Ali and his family gained the control of everything. Day by day, Tunisians started to question the economic conditions in the country. They started to talk about corruptions immediately when I mentioned Ben Ali. Many Tunisians stated that Ben Ali and his family *stole* the resources of Tunisia in their favor. Ben Ali's second wife Leila Trabelsi and his son-in-laws started to control nearly every business branch in the country. Tunisian often called them as whole as 'Trabelsies'. In late 2010 infamous WikiLeaks cable came to surface about the corruption in Tunisia in general, but more importantly about Ben Ali and 'Trabelsies'. Robert Godec, then Unites States of America's ambassador to Tunisia wrote followings about Trabelsies;

> *"The problem is clear, Tunisia has been ruled by the same president for 22 years. He has no successor. And, while President Ben Ali deserves credit for continuing many of the progressive policies of President Bourguiba, he and his regime have lost touch with the Tunisian people. They tolerate no advice or criticism, whether domestic or international. Increasingly, they rely on the police for control and focus on preserving power. Corruption in the inner circle is growing. Even average Tunisians are now keenly aware of it, and the chorus of complaints is rising. Tunisians intensely dislike, even hate, first lady Leila Trabelsi and her family. In private, regime opponents mock her; even those close to the government express dismay at her reported behavior. Meanwhile, anger is growing at Tunisia's high unemployment and regional inequities. As a consequence, the risks to the regime's long-term stability are increasing. We have too much at stake. We have an interest in preventing al-Qaida in the Islamic Maghreb and other extremist groups from establishing a foothold. We have an interest in keeping the Tunisian military professional and neutral. We also have an interest in fostering greater political openness and respect for human rights. The opulence with which El Materi and Nesrine live and their behavior make clear why they and other members of Ben Ali's family are disliked and even hated by some Tunisians. The excesses of the Ben Ali family are growing."*[3]

The Trabelsies had sort of monopoly in some sectors. For instance, the only private radio situation back then was owned by the family. By latest part of the aforementioned statement of ambassador Robert Godec talked about the ultra-luxury life of Nesrine, daughter of Ben Ali, and Mohamed Sakher El Materi, Ben Ali's son-in-law. The WikiLeaks came out in 2010; however, the ambassador's report was written in 2009. By the time that WikiLeaks cable was read and heard by Tunisian people, they already knew all of this, but with confirmation from a foreign country officer just made it an international scandal. Under the regime of Ben Ali, his family and close friends had *successful* business deals. Tunisians stated that no one without strong connections to the Ben Ali

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[1] Maktouf, Lotfi, Tunus'u Kurtarmak, İstanbul, Modus Kitap, 2013, p. 35.

[2] Pace, Eric. Habib Bourguiba, Independence Champion and President of Tunisia, Dies at 96, New York Times, 07 April 2000, <http://www.nytimes.com/2000/04/07/world/habib-bourguiba-independence-champion-and-president-of-tunisia-dies-at-96.html>

[3] Black, Ian. "WikiLeaks cables: Tunisia blocks site reporting 'hatred' of first lady", The Guardian, 7 December 2010, <http://www.theguardian.com/world/2010/dec/07/wikileaks-tunisia-first-lady>.

family ever had part of countries' huge privatization steps. In his book, Lutfi Maktouf states that foreign companies, which had intention to enter the Tunisian market, could not do so without giving bribes to the Ben Ali's family.[4] As already known right after the uprisings in Tunisia, Ben Ali and his family members fled away from the country. Even though exact amount is a mystery, there are rumors that they took more than 50 million American Dollar with them. If we accept that number as accurate number, which is a small one, the level of corruption is more or less calculable.

Apart from corruptions and unemployment problem; political rights, civil liberties, and the quality of public services were bad and bureaucracy had too much space in the body of governance and nearly had unlimited power. Furthermore, corruption was very high that people of these countries accepted corruption as a *normal* thing of their everyday life. Nearly every Tunisian that I was in contact stated that it was only possible to get things done with bribery. As the corruption became a part of their life, Tunisians started to talk about it in their inner circles, as it was impossible to show any opposition against any problem. They stated that the government officials saw themselves as 'untouchables' and often created problems without any given reason. The government organs were so powerful that nothing could move without their permission. Eventually, the only way to overcome any certain problem is to give bribes, which means to feed the already corrupted system unwillingly. If the citizens went to court for any problems with their government, they would hit a brick of wall and would not have any certain results. Moreover, the judicial laws on these countries were unclear and often lead to unexplained detentions of person without indicating time limit.

Under aforementioned conditions, the first uprising, which was the beginning of a series of uprisings that changed the region, broke out in Tunisia in late December 2010. According to Tunisians that I talked, after the international economic crises of 2008, the unemployment rate increased dramatically, poverty and corruption became number one problem in the society. On December 17, 2010, a twenty-six years old street vendor, Mohammed Bouazizi set himself on fire in the city of Sidi Bouzid as a result of depression and violence by state officials. According to Tunisians, earlier on December 17 police seized his fruit and vegetable cart and humiliated him publicly. He tried to complain about police's attitude by going to the local municipality. However, no body listened to him and consequently he set him self-fire in order to get the attention of state officials. Right after his act, the protests started and by December 27, the manifestations arrived to Tunis, the capital of Tunisia. The first reaction of Ben Ali was to try to pacify the protestors. Tunisians stated that he promised new jobs on the state structure, early election and even to keep age limit for the presidency. By doing so, Ben Ali indicated that he would not become a lifetime president. Basically, all these promises and moves came from Ben Ali with intention to gain more time to control the situation. Ben Ali visited Mohamed Bouazizi at hospital in order to show his good will. Later in January 5, Mohammed Bouazizi died[5].

In following days, manifestations and protests spread over nearly every city in Tunisia. More and more people gathered to show their anger against the Ben Ali regime. According to people participated the protests; there were no sole group of people on the streets. Workers, students, laic minded people, Islamists were on the streets next to each other. As the atmosphere gave them the opportunity to say their demands out loud, people enjoyed this newly learnt freedom of expression. They stated that from the beginning of the first protests, many slogans were used; many changed depending on the daily development and discourses of state officials. However, the famous one, 'Dégage' ('Get out' in French), was repeated by thousands of people in every protest until Ben Ali fled away from the country. As Tunisia is a country with Arab population, it was surprising to hear that people actually shouted in French, not in Arabic. The same slogan was in use back in summer of 2013. During my mobility time, I personally went to multiple protests, which were against Ennahda government this time, and slogan 'dégage' was shouted by the people and flayers were handed over to the participants in the manifestation area.

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[4] Maktouf, op. cit., p.52.

[5] "Tunisia suicide protestor Mohammed Boauzizi dies", BCC, 5 January 2011, <http://www.bbc.co.uk/news/world-africa-12120228>.

During the manifestations, protesters vented their rage on poverty and especially on corruption. These two were the main problems, which were the reasons behind other problems also. As manifestations continued, Ben Ali wanted to use military forces against the people in order to suppress the protestors, however; army officials refused to act and attack against protestors. Consequently, on 14 January 2011, Ben Ali fled away from Tunisia with his family members. As the rulers of Arab countries generally see the country as their *property,* nobody had imagined the flee of Ben Ali. This was the first time and a ruler of Arab country ran away from his country. After the flee of Ben Ali, who ruled the country for 23 years, Neo Destour Party's office in central Tunis was abandoned. Tunisians stated that like Party's other establishments, this building gone under to control of new state and probably it would be sold to in near future.

With the flee of Ben Ali, a new start took place in the history of Tunisia. Tunisian people started to enjoy for the first time freedom of speech, forming political parties and non-governmental organizations. The country was prepared for the first election, after long years of single-party regime control by single man. After the flee of Ben Ali, Tunisians accepted the 14 January 2011 as an historical day of their history. Consequently, the name of the main square in Avenue Habib Bourgubia was changed to 'Place 14 Janvier 2011'. Starting with 2012, Tunisians celebrate 14 January as the anniversary of *their* revolution. While the uprisings are already known as Arab Spring as whole, Tunisian Revolution has its own name: Jasmine Revolution. As the Jasmine flower is famous in Tunisia, the uprisings took its name from this flower.

When I asked Tunisians what they think about Turkey's position regarding the Jasmine Revolution, nearly all of them stated that then Prime Minister Recep Tayyip Erdoğan showed his support from the day one of the uprisings. For that reason, Tunisians were appreciated, as they consider Turkish Prime Minister as powerful leader in the region.

On 23 October 2011, Tunisian went before the ballot box in order to form the constituent assembly, which would write a new constitution and secure the future of country. As a lot of political parties were established during post-Ben Ali era, majority of them participated in the elections for constituent assembly. However, only 51.7% of the total number of potential voter executed their right to vote[6]. It is possible to say that the percentage of participation is quite low, however; we must remember that Tunisians' lack of experience with real and free democracy. After living under nearly 55 years of oppression, their hesitance to go ballot box should be considered as normal. As a result of the elections of constituent assembly, Ennahda (it means Renaissance, awakening) won 89 seats in the 217-member parliament by 41% of valid votes[7]. Ennahda's victory surprised many people both inside and outside of Tunisia. According to Tunisians, some protests took place right after the declaration of election results, however; these protests did not last long at that time.

Under the Ennahda party, a new era started on Tunisian politics. However, the assassinations of two opposition leaders under the rule of Ennahda government, brought protests back to the streets. First, Chokri Belaïd, the leader of left leaning Democratic Patriots' Movement was assassinated on 6 February 2013 in front of his house[8]. Then opposition leader, Mohamed Brahmi was killed by gunshots after five months[9]. Many Tunisians accused Salafis on these assassinations. Additionally, they believed that Ennahda supported the Salafis, maybe not publicly but secretly.

During the field research, I had the chance to observe some of the manifestations and sit-ins in person. Bardo square was the main area for manifestations against Ennahda government. As stated earlier, after the Jasmine Revolution, the Salafi movements started to be more visible within society,

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6 "Final Results of Tunisian Elections Announced", Tunisialive, 14 November 2011, <http://www.tunisia-live.net/2011/11/14/tunisian-election-final-results-tables/>.

7 "Tunisia's Islamist Ennahda party wins historic poll", BBC, 27 October 2011, <http://www.bbc.co.uk/news/world-africa-15487647>.

8 "Chokri Belaid, 1964-2013: Fierce opponent of Tunisia's Islamists", Ahramonline, 6 February 2013, <http://english.ahram.org.eg/NewsContent/2/8/64204/World/Region/Chokri-Belaid,--Fierce-opponent-of-Tunisias-Islami.aspx>

9 "Tunisian politician Mohamed Brahmi assassinated", BBC, 25 July 2013, <http://www.bbc.com/news/world-africa-23452979>.

and secular Tunisians always thought that Ennahda government supported the movement. Tunisians stated that Salafis often accept the black flag as their flag instead of Tunisian flag. During the beginning of March 2012, Salafis occupied one of the buildings of Manouba University and they tore down the Tunisian flag and raised Salafi flag[10]. Tunisians interpreted this act as Salafi's refusal of Tunisian identity. Consequently, as a result of identity clash between Salafis and secular Tunisians, the Tunisian flag became one of the symbols of manifestations. During the summer 2013, sit-ins were still going on in front of the Parliament of Tunisia. Many manifestations took place in the square of Bardo, as stated earlier. As the manifestations primarily against the Ennahda government, protestors carried out pictures of two assassinated politicians. As a reaction to rise of black Salafi flag, Tunisians who participated to manifestations choose the Tunisian flag as main symbol of expression. It was possible to see Tunisian flag in the billboards in roadside during the summer of 2013.

As stated earlier, Tunisians was eager to speak and share their thoughts, however; they feared to declare their names and professions to me. When I asked their permission to speak with them, first they asked multiple questions to understand my intention and my purpose. After answering their questions and declaring that I am from Turkey, they became less concerned. According to them, this fear was the result of Ennahda policies. While they admitted that after the Jasmine Revolution, they have relatively more freedom of speech, but they still do not feel safe enough to say what is on their mind, especially to a foreigner. They stated that when Ennahda refused to give up the power of governance, Tunisian society started to worry again about their future. Many of them accused Ennahda with having a *secret* agenda, even working on creation of purely Islamic state. While Ennahda stuck to the power more and more, Tunisians found the solution by hitting the streets again.

The young protestors stated that when the revolution started, youth took the first line during the uprisings. For the first time they said, they felt like being part of something, and achieving their short-term goals. However, nearly two and half years after the revolution, they did not have any idea for their future. Many of them stated that, they were looking for a way to immigrate another country. They expressed that with the revolution they achieved *something*, but day after day they started to lose their *hope* in the quest of democracy. They believed that they *won* against Ben Ali regime, however; Ennahda's insistence to stay in power gave them disappointment. Ultimately, Tunisian youth was already aware that no one, no party should not stay in power forever.

Another important subject on my discussions with Tunisians was the economy. Many of them stated that country's bad economic situation was the reason why Mohamed Bouazizi set himself on fire. After the revolution, nothing changed, they said. However, a middle-aged man, who refused to say his profession, said: "I am part of these people. I am here with them. My reasons are different maybe, but we all want something: a better country with better governance! Yes, the economy was very bad before, and yes it is still not good. But it is better than before I believe. The thing about economy is that the poor of Tunisia thought that with the revolution they would have money without a job! They expect that state should pay them for nothing! There is no country like this! So do not believe when they say economy is bad as before. It is bad, but better than before!" It is quite interesting to listen all these diverse opinions among the society. Often if I can I let people to speak between each other, and I only observed. However; after a while, they switch to the Arabic instead of English, so that I needed to interfere and ask another question. In Turkey, for researchers, taxi drivers are useful sources to understand the general situation. As taxi drivers generally talk with a lot of people in a single day, it is possible to have a summary of the agenda from them with the right question. Consequently, I asked the economic situation to multiple drivers while I was using taxis. One of them stated that he was gaining more before, because the economy was better under the Ben Ali regime, despite the lack of freedom. Hence, he stated, "We are free, but we are poor also. We pay the price of freedom by giving up money". It is possible to say that Tunisians have diverse opinions about the actual situation in the country. There are the *happy* ones with the Ennahda government and

[10] "Salafis tear down Tunisian flag: Ennahda blames University dean", Middle East Online, 08 March 2012, <http://www.middle-east-online.com/english/?id=51101>.

the long-time taking transition, however; there are the *angry* ones who fear that the country will be stuck in the loop between the revolution and a functioning democracy.

4. Actuality of Turkish-Tunisian Relations

On the topic of Tunisian-Turkish relationship, it is possible to talk about increasing Turkish interest in Tunisia. However, it should be noted that until the Justice and Development Party governments, Turkish Foreign Policy did not pay that much attention to Middle-East North-Africa region. Turkish foreign policy was generally western oriented until then Minister of Foreign Affairs Ahmet Davutoğlu applied a significant change to the foreign policy. He often stated that while Turkey is keeping Western oriented foreign policy; it should also pay more attention to the old-Ottoman territories. Hence, the new foreign policy concept started to be named as Neo-Ottomanizm in western intellectuals and scholars' world. Nevertheless, under the Justice and Development Party, the State of Turkey developed its relations with Tunisia. From the first day of revolution, Turkish officials showed their support to the transition in Tunisia. The Turkish Government and especially then Prime Minister Recep Tayyip Erdoğan were very popular in Tunisia. Back in September 2011, then Prime Minister Recep Tayyip Erdoğan paid a visit to the countries like Egypt and Tunisia, where the streets were occupied by people and revolutionary movements took place. Hundreds of Tunisians were at the airport in order to welcome him. Many of them carried both Tunisian and Turkish flags and waved banners with slogans in Arabic[11]. As Tunisian and Turkish people had historical relations, Tunisian people showed their admiration to Prime Minister Recep Tayyip Erdoğan in particular, and to Turkey in general. This example clearly indicates the popularity of Prime Minister Erdoğan in the region, at least in Tunisia.

In March 2012, then Turkish President Abdullah Gül visited Tunisia. He was the first president who visited the country after revolution. After his visit, then President Gül wrote on Twitter that Turkish-Tunisians relations have 400 years of background; he was referring to Ottoman Empire period of Tunisia. In the beginning of June 2013, then Turkish Prime Minister Recep Tayyip Erdoğan visited Tunisia with more than hundred businessmen with him. Multiple agreements were signed between Tunisia and Turkey. Consequently, in addition to already existing proximity between societies, countries created a partnership, which contains increased co-operation between governments and businessmen.

At the end of the May and beginning of June 2013, the government of Turkey faced protests in major cities, especially in Istanbul. As then Turkish Prime Minister Recep Tayyip Erdoğan visited Tunisia in June 2013 and my mobility time started in July 2013, talking with Tunisian people about Turkey and Turkish-Tunisian relationship was very interesting as the country recently hosted Turkish Prime Minister and Tunisian people paid more attention to the ongoing protests in Turkey. Accordingly, the interviews and conversations with local people became dual interviews, as they asked many questions about protests. Additionally, Turkish State News Agecny (Anadolu Ajansı) opened its office in Tunisia in July 2013[12]. This is an evidence of Turkish government's interest in Tunisia.

On the topic of Tunisian-Turkish relationship, they see Turkey at the level where a country with majorly Muslim population should be. According to them, Turkey is a pivotal country among the countries, which have Muslim societies. They often refer Turkey as a 'success story'. As Turkish Government stood next to Tunisian people and supported the ideas of Tunisian Revolution, they expressed their sincere gratitude when they heard that I am a Turkish citizen. It is possible to say that Tunisian people consider Turkey as 'sister country' and feel close to it as both societies are Muslims. Even though Turkey has its own problems, Tunisian people see Turkish Government as a friend.

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11 "Erdoğan Tunus'ta sloganlarla karşılandı", Aljazeera Turk, 20 September 2011, <http://www.aljazeera.com.tr/haber/erdogan-tunusta-sloganlarla-karsilandi>

12 "Anadolu Ajansı Tunus Bürosu Törenle Açıldı", Medyagündem, 01 July 2013, <http://www.medyagundem.com/anadolu-ajansi-tunus-burosu-torenle-acildi/>.

5. Conclusion

It was really surprising to see that so many young Tunisians had the knowledge of Turkish language. They were interested to learn more about Turkish language and culture. Even, some of them often asked questions regarding the scholarships opportunities of Turkey. It is possible to say that young Tunisians are looking a way to be able to live and work in Turkey. When I asked them why Turkey, they stated that, Turkey is a country that has everything. As Muslims they believe that they can work and live in Turkey without compromising anything both from their religious and national identity.

After giving the reflection of Tunisian people regarding to Turkish-Tunisian relations, if I go back to the question of 'Can Turkey be a model for Tunisia', it is possible to say that Tunisians are not looking any model to follow. Additionally, I believe that it is not possible to have a "copy-paste" democracy for any country. Even if we can 'copy' certain legal provisions or institutions of certain country, they will probably be rejected by other society when you 'paste' them over. As applying a copy-paste democracy cannot be considered as an option, the theory that suggests Turkey as a role model for Arab countries collapses. Nonetheless, Turkey still can provide insights for the Arab people and the newly elected/formed governments of these countries by telling them about her own transformational history. Thus, Turkey can serve as a source of inspiration for these countries with its success story. Its strong democratic credentials, increased economic relations with the Middle East, more people-to-people contacts, and cooperation between civil society organizations, and cooperation between national assemblies, may also provide efficient channels for these countries to understand the Turkish Experience.

To conclude, neither Tunisia nor other countries were affected by Arab uprisings need any role model in their journey to have democracy. Tunisia and other Arab countries should create their own systems, while studying historical background and components of the Turkish experience. Ultimately, it is possible to say that Turkey is capable of being a source of inspiration rather than a role model for Arab countries.

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YILDIZ SOCIAL SCIENCE REVIEW

TÜKETİCİLERİN FİYAT TAKTİKLERİNİN İKNA KABİLİYETİ İLE İLGİLİ BİLİNÇ DÜZEYİ ÖLÇEĞİNİN TÜRKÇEYE UYARLANMASI

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ÖZET

Bu çalışmanın amacı Hardesty, Bearden ve Carlson (2007) tarafından geliştirilen Tüketicilerin Fiyat Taktiklerinin İkna Kabiliyeti ile İlgili Bilinç Düzeyi (Pricing Tactic Persuasion Knowledge – PTPK) ölçeğinin Türkçeye uyarlanmasıdır. Ölçümlemede önce ifadeler Türkçe'ye çevrilmiştir, sonra uzman akademisyenlerden görüş alınmış, düzeltme yapılmıştır. Sonra, bu, 30 kişilik pazarlama alanında yüksek lisans ve doktora yapan öğrencilerden oluşan bir örnekte (ifadelerin ve soruların anlaşılırlığını görmek, problemli noktaları saptamak amacıyla) test edilmiştir. Buradan elde edilen veriler ışığında gereken düzeltmeler yapıldıktan sonra ölçek nihai haline getirilmiş, daha sonra ise 206 kişiden oluşan bir örnekte test edilmiştir. Ölçek geliştirme çalışmalarının metodolojisine uygun olarak Türkçe'ye uyarlanan maddelerin Kapsam Geçerlilik Oranı (KGO) bulunmuş, düşük değerli maddeler ölçekten çıkarılmış, orijinal versiyonunda 17 madde olan ölçeğin Türkçe'ye uyarlanmış versiyonunda 11 madde kalmıştır. Ölçeğin geneline ilişkin Ölçek Kapsam Geçerlilik İndeksi ise α=0,05 düzeyinde 0,6 olarak bulunmuştur. Çalışmanın özgün değeri göz önünde bulundurulursa, bu çalışmanın hem akademik literatüre hem de uygulamacılara faydalı olacağı düşünülmektedir.

Anahtar Kelimler: *Pazarlama Araştırmaları, Ölçek Uyarlama, ,Fiyatlandırma, Fiyatlandırma Taktikleri*

ABSTRACT

The aim of the study is to adapt to Turkish the Pricing Tactic Persuasion Knowledge (PTPK) scale developed by Hardesty, Bearden and Carlson (2007). The items of the scale have been translated into Turkish, then, opinions were obtained from expert academicians and corrected. Then this scale was tested (determining the clarity of the expressions and the questions and to determine the problematic points) in a sample of graduate and doctoral students in the marketing field of 30 people. Corrections were made to the data obtained from this and the scale was finalized, and then tested in a sample of 206 individuals. In accordance with the methodology of the scale development studies, the Content Validity Ratio (CVR) of the items adapted to Turkish was found, then low-value items were removed from the scale, 11 items were left in the version adapted to Turkish, which there were 17 items in the original version of the scale. The overall Scale Content Validity Index (S-CVI) of the scale was found to be 0.6 at α = 0.05. The original value of the study is thought to be beneficial to both the academic literature and the practitioners.

Keywords: *Marketing Research, Scale Adaptation, Pricing, Pricing Tactics*

1. GİRİŞ

Fiyat müşterilerin satın alma kararlarına etki eden faktörlerden biridir (Monroe, 1973; Alba, Mela, Shimp ve Urbany, 1999; Thomas, & Morwitz, 2004). Perakendecilikte müşteri sadakatini arttırmak için kullanılan fiyatlama taktikleri önemli bir araştırma konusudur (Levy, Grewal, Kopalle, & Hess, 2004). Bu noktada en önemli konulardan biri, tüketicilerin firmalar tarafından sunulan düşük fiyatlardan haberdar olup olmamasıdır. Tüketicilerin fiyatlandırma taktiklerinin ikna kabiliyeti ile ilgili bilinç fiyatlandırma stratejilerinin belirlenmesinde önemli rol oynamaktadır.

Tüketicilerin fiyata dair bilgisi fiyatlandırma stratejilerinde önemli bir rol oynamaktadır. Çünkü bu bilgi fiyatların tüketiciler tarafından nasıl algılanıp değerlendirildiği ve onların satın alma kararlarını ne derece etkilediği ile ilgilidir. (Binkley & Bejnarowicz, 2003; Dolan, 1995; Mesak & Clelland, 1979; Monroe, 1973; Shapiro, 1968; Turley & Cabaniss, 1995; Vanhuele & Dre`ze, 2002). Bununla birlikte, tüketicilerin fiyatlandırma taktiklerinin ikna kabiliyeti ile ilgili bilinç düzeyini ölçmeğe imkan veren ölçüm araçları çok değildir. Konu ile ilgili kapsamlı bir ölçüm aracı 2007 yılında Hardesty, Bearden ve Carlson tarafından geliştirilmiştir. Bu çalışmada Hardesty ve arkadaşları tarafından geliştirilen bu ölçeğin Türkçeye uyarlanması amaçlanmaktadır. Bu doğrultuda ölçek önce Türkçe'ye çevrilmiş daha sonra ise çevrildiği dilde uyarlanmasın test edilmesi için geçerlilik ve güvenilirlik analizleri yapılmıştır. Türkçe pazarlama literatüründe konu ile ilgili ölçüm araçlarının olmadığını göz önünde bulundurduğumuzda çalışmanın hem akademisyenlere hem de uygulamacılara önemli faydalar sağlayacağını öne sürebiliriz.

2. TEORİK ÇERÇEVE

2.1. Pazarlamada Fiyatlandırma ve Fiyatlandırma Taktikleri

Pazarlamada fiyatlandırma stratejisi ürün veya hizmet için optimum fiyatın belirlenmesi ile ilgilidir. Bu nedenle fiyatlandırma stratejisi, pazarlama karmasının en kritik bileşenlerinden biri olmaktadır. Çünkü fiyatlandırma stratejisi hem tüketiciye hem de işletmelere uygun şekilde tasarlanmalıdır (Kotler, Keller, Ancarani, & Costabile, 2014; Kotler, & Armstrong, 2010; Bowersox, & Cooper, 1992).

Fiyatlandırma stratejisi, fiyatlandırmaya dair bir hedefin gerçekleştirilmesine yönelik bir araçtır. Fiyatlandırma stratejileri maliyete dayalı, rekabete dayalı ve müşteriye dayalı olarak üç türlü stratejiden oluşmaktadır. Her bir fiyatlandırma stratejisinin kendine özgü ve ortak belirleyicileri vardır (Noble & Gruca, 1999). Bundan başka fiyatlandırma stratejilerin her birinin kendine has bir takım taktikleri vardır.

2.2. Tüketicilerin Fiyat Bilinci

Fiyat bilinci (price awareness / price knowledge) alıcıların fiyatları göz önünde tutma kabiliyeti anlamına gelmektedir. Önceki çalışmalarda, fiyat bilinci ağırlıklı olarak üç şekilde işlerlik kazanmıştır (Monroe ve Lee, 1999):

- Alıcıların satın aldıkları ürünlere ödenen tam fiyatları söyleyebilmesi (satın alma noktası çalışmaları);
- Alıcıların fiyatlarına göre alternatif maddeleri sıralaması;
- Alıcıların belirli bir ürünün fiyatını tanıma becerisi.

Tüketiciler satın alma sırasında bir ürünün fiyatına karar verirken, fiyat bilgisini nadiren dikkate almaktadırlar. Oysaki fiyatlandırma stratejileri oluşturulurken tüketici fiyat bilgilerine de odaklanılması gerekmektedir (Kenning, Evanschitzky, Vogel & Ahlert, 2007). Bir tüketicinin bir ürüne düşük fiyat verebilmesi için bu ürünün "normal fiyat"ı hakkında en azından bir fikri olmalıdır. Normal fiyat konsepti, tüketicilerin teklifin bir pazarlık olup olmadığı ile ilgili bir fikre sahip olmaları

için gerekmektedir. Normal fiyat, fiyat promosyonu veya sezon sonu satışı olmadığında bir moda mağazasında bir ürünün genellikle maliyeti olan fiyattır (Baumgartner, 2003).

Tüketicilerin fiyat bilinci, tüketici ve ürün kategorisinin özellikleri ilgili olabilen birçok faktörden etkilenmektedir (Estelami, 1998). Tüketicilerin demografik yapısı fiyat bilgisini etkileyebilmektedir. Bir ürünün farklı tüketiciler için farklı bir önemi vardır ve dolayısıyla her bir ürün kendi tüketicisi tarafından önem arz etmektedir. Aynı zamanda, bir tüketici kendi alışveriş sepetinde olmayan ürünlerin fiyatlarına karşı kayıtsız olacaktır. Fiyat bilgisi hem tüketicilerin satın alma kararını hem de kar marjını etkilediğinden dolayı pazarlamada çok önemli bir konudur. Ayrıca, tüketicinin bir ürüne dair fiyat bilgisi perakende satış başarısı ile ilgili psikolojik bir yapıyı da ifade etmektedir (Kenning, Evanschitzky, Vogel & Ahlert, 2007). Tüketicilerin fiyat bilinci referans fiyat verme konusu ile de ilgilidir. Tüketicilerin satın aldıkları ürün için doğru bir referans fiyat fikrine sahip olabilmeleri için yeterli fiyat bilgisine sahip olmadığı konusunda yapılmış çalışmalar bulunmaktadır (Zeithaml, 1988; Dickson & Sawyer, 1990; Aalto-Setälä & Raijas, 2003). Bütün bunlar ise tüketicilerin satın alma sürecinde fiyat bilincinin önemini vurgulamaktadır.

2.3. Orijinal Tüketicilerin Fiyat Taktiklerinin İkna Kabiliyeti ile İlgili Bilinç Düzeyi Ölçeği

Tüketicilerin Fiyat Taktiklerinin İkna Kabiliyeti ile İlgili Bilinç Düzeyi ölçeği Hardesty, Bearden ve Carlson (2007) tarafından geliştirilmiştir. Hardesty, Bearden ve Carlson (2007) yapmış oldukları bu çalışmada, ilgili akademik ve ticari literatürü gözden geçirerek fiyatlandırma taktiklerini ifade eden 26 maddelik bir havuz oluşturmuşlardır. Daha sonra doktora öğrencilerinin ve saha profesyonellerinin olduğu bir grupta bu ifadeler test edilmiştir. Test sonrası iki madde silinmiş ve bir madde eklenmiştir. Çalışma sonucunda ölçeğin 17 maddeden oluşan nihai versiyonu elde edilmiştir. Ölçeğin orijinal şeklinde, öncelikle fiyatlandırma ile ilgili 17 adet her biri farklı fiyatlandırma taktiklerini anlatan (veya tanımlayan) ifadeler geliştirilmiş; bu çerçevede her bir fiyatlandırma taktiğinin tanımı, ona dair bir örnek ve pazarlamacılar tarafından bu taktiğin nasıl ikna edici şekilde kullanıldığı açıklanmıştır.. Katılımcılardan bunlara "Doğru", "Yanlış" ve "Bilmiyorum" seçeneklerinden biri ile yanıt vermesi istenmiştir. (EK 2). Hardesty ve arkadaşları tarafından geliştirilen bu ölçeğin güvenilirlik test sonucu 0.72 olarak bulunmuştur (2007).

3. ARAŞTIRMANIN METODOLOJİSİ

3.1. Araştırmanın Yöntemi

Genellikle, ölçüm araçları ve onların farklı ülkelerde (kültürlerde) kullanılması ile ilgili yapılmış çalışmaları incelediğimizde, bu türlü ölçeklerin kullanılmasında üç farklı yol izlendiği görülmektedir:

- Geliştirilmiş bir ölçüm aracı tüm ülkelerde (kültürlerde) değiştirilmeden ve yerli duruma uyarlanmadan kullanılmaktadır. Örneğin, Davis (1989) tarafından Teknoloji Kabul Modeli ile ilgili olarak algılanan yararlılık ve algılanan kullanım kolaylığını ölçmek için geliştirilen ölçek farklı kültürlerde kullanılabilmektedir.

- Geliştirilmiş ölçüm araçları farklı ülkelerde (kültürlerde) kullanılmaları için yerli örneklemlerde yeniden yapılandırılmakta ve uyarlanmaktadır. Örneğin, Benet-Martı´nez ve John (1998) tarafından geliştirilen Beş Faktör Kişilik Envanteri Sümer ve Sümer (2005) tarafından Türkçe'ye uyarlanmıştır.

- Geliştirilmiş ölçüm araçlarını farklı ülkelerde (kültürlerde) kullanılmak yerine, bu ülke (kültür) için tamamıyla yeni bir ölçüm aracı geliştirilmektedir. Örneğin, Aksoy ve Özsomer (2007) tarafından marka kişiliği ile ilgili Türkiye'de yeni bir ölçek geliştirilmiştir.

Bu çalışmada, önceden farklı kültürde geliştirilmiş bir ölçeğin Türkçeye uyarlanması gerçekleştirildiğinden dolayı ikinci sınıflandırmaya girmekte olup yerli örneklemlerde yeniden yapılandırılmakla uyarlanma tercih edilmiştir.

Bu çalışmanın ölçek uyarlama ile ilgili çalışmaların (Hambleton & Bollwark, 1991; Savaşır, 1994; Şahin, 1994, Beaton, Bombardier, Guillemin & Ferraz, 2000) öngördüğü çerçevede hareket edilerek, ölçeğin Türkçe'ye uyarlanması sürecinde özetle aşağıdaki aşamalar izlenmiştir.

Ölçeğin Türkçe'ye uyarlanması sürecinde ilk aşamada orijinal ölçeği geliştiren yazarlardan e-posta yoluyla izin alınmaya çalışılmıştır. Ancak sorumlu yazarın (Jay P. Carlson) kendisine ulaşılamadığı için makalenin ilk yazarına (David M. Hardesty) e-posta yoluyla ulaşılmış ve izin alınmıştır. Sonraki aşamada ölçeğin ifadeleri Türkçe'ye çevrilmiştir. Türkçe'ye çevrilmiş ifadeler ile ilgili olarak uzman akademisyenlerden görüş alınmış ve gerekli düzeltmeler yapılmıştır. Ölçeğin düzeltmeler yapıldıktan sonraki versiyonunda ifadelerin anlaşılırlığını kontrol etmek ve problemli noktaları saptamak amacıyla pazarlama alanında yüksek lisans ve doktora yapan öğrenciler üzerinde bir ön test yapılmıştır. Bu ön testten gelen bildirimler çerçevesinde ifadeler tekrar düzeltilmiş ve daha sonra 206 kişiden oluşan bir örnek üzerinde tekrar test edilmiştir. Bu örnekten toplanan veriler üzerinden ölçeğin geçerlilik ve güvenilirlik testleri yapılmış nihayet ölçeğin Türkçe'ye uyarlanmış nihai şekli elde edilmiştir.

Orijinal ölçekte yer alan ifadelerdeki fiyatlar ABD Doları ile ifade edildiği için; Türkçe'ye uyarlanması sürecinde Türk Lirası (TL) ile ifade edilebilmesi amacıyla kur dönüşümü yapılmıştır. Bunun için verinin toplanmaya başlandığı tarih olan 15.05.2017 Pazartesi günü saat 15:30'daki Türkiye Cumhuriyeti Merkez Bankasınca belirlenen gösterge niteliğindeki kurlar (ortalama 1 USD = 3.5 TL olarak) esas alınmıştır[1]. Ayrıca, orijinal ölçekteki fiyatlandırma taktiklerini açıklayan örnekler Türkçe'ye uyarlama sürecinde tüketiciler tarafından anlaşılırlığı göz önünde bulundurularak, yerli uygulamadan benzer örneklerle değiştirilmiştir.

3.2. Çeviri Çalışması

Ölçek uyarlama çalışmalarında en önemli noktalardan biri ölçeğin çeviri süreci (Beaton, Bombardier, Guillemin, & Ferraz, 2000) olup çevrildiği dilde uygun dil ve ifadelerin kullanılmasıdır (Savaşır, 1994). Bu çalışmada da öncelikle orijinal ölçekte olan ifadeler pazarlama alanında yüksek lisans ve doktora eğitimi yapan ve İngilizce bilen kişiler tarafından Türkçe'ye çevrilmiştir. Ölçek pazarlama alanında tüketicilerin fiyat taktiklerine dair bilinç düzeyi ile ilgili olduğundan dolayı bazı kelime ve ifadelerin daha teknik kalabileceği düşünülmüş ve bu alanda bilgi düzeyinin daha yüksek olacağı düşünülerek böyle bir yol izlenmiştir. Ayrıca fiyatlandırma taktikleri ile ilgili yapılacak çevirilerin sadece dilbilim çerçevesinde kelime karşılığının değil, Türkçe pazarlama literatüründe kullanıldığı şekli ve anlamsal karşılığını yansıtması amaçlanmıştır.

Ölçek ifadeleri Türkçe'ye çevrildikten sonra uzman akademisyenlerden görüş alınmış ve ölçeğin bazı ifadelerinde düzeltmeler yapılmış ve daha sonra çevirinin denetimi gerçekleştirilmiştir.

Ölçek uyarlama çalışmalarında çevirinin denetlenmesi için farklı yöntemler bulunmaktadır. Bu yöntemler niceliksel ve niteliksel yöntemlerdir (Savaşır, 1994). Niteliksel araştırmalarda ölçek uyarlama çalışmalarında ifadelerin oluşturulması süreci ile ilgili farklı yöntemlerden söz edebiliriz. Bunlar; Geri Çevirme Yöntemi ve Tek Çevirme Yöntemi (Hambleton, & Bollwark, 1991). Geri çevirme yönteminde ölçek orijinal (kaynak) dilden, kullanılacak (hedef) dile çevrilir. Sonra çeviri her iki dili de çok iyi bilen çevirmenler tarafından kaynak dile yeniden çevrilir. Sonra ise bu geri-çeviri orijinal ölçekle karşılaştırılarak tutarsızlıklar incelenir ve değişiklik ve düzeltmeler yapılır. Fakat bu yöntemin bazı kısıtları vardır. Bunlardan en önemlisi testin uygulanacağı araştırma kitlesini temsil eden bir örnekte yapılmamasıdır. Örneğin, bu yöntemde testin Türkçe formunun bir Türk örneklemde denenme zorunluluğu olmayıp uzmanlar bu konuda karar verdiği için örneği temsil eden bireylerle karşılaşılabilecek sorunların ortaya çıkması olanaksız olmaktadır (Savaşır, 1994). Bu nedenle bu araştırmada, Türkçe'ye çevrilen ifadelerin denetimi niteliksel yöntemlerin Tek Çevirme Yöntemi'ne göre yapılmıştır. Tek çevirme yöntemi kaynak dilden hedef dile çeviriyi her iki dili iyi bilen ilgili alandaki terminolojiye aşina kişiler tarafından yapılmaktadır. Tek Yönde Çeviri Yönteminin de farklı

[1] http://www.tcmb.gov.tr/kurlar/201705/15052017.xml

çeşitleri vardır (Savaşır, 1994). Bunlardan en sık kullanılanları "çeviri sonrası sorgulama" ve "çevirinin başka çevirmenlerce değerlendirilmesi" yöntemleridir. Çeviri sonrası sorgulama yöntemi, hedef grubun yorumlarının kaynak gruba benzer olup olmadığını tespit etmeye yönelik olup; deneklere maddelerin anlaşılır olup olmadığı sorulur ve kendi alternatif yorumlarını yazmalarına olanak sağlanır (Savaşır, 1994). Bu çalışmada, çeviri sonrası sorgulama yöntemi kullanılmıştır.

3.3. Araştırmanın Örneklemi

Türkçe'ye çevrilmiş ifadelerle ilgili uzman akademisyenlerin görüşlerine esasen yapılan düzeltmelerden sonra ölçek, 30 kişilik pazarlama alanında yüksek lisans ve doktora yapan öğrencilerden oluşan başka bir örnekte test edilmiştir. Bu örnekte yer alan katılımcılar İstanbul Üniversitesi'nde ve Marmara Üniversitesi'nde Pazarlama Anabilim Dalında tezli yüksek lisans ve doktora yapan öğrenciler arasından gerçekleştirilmiştir. Türkiye'de devlet üniversitelerinde işletme doktora programı sadece 4 üniversitede "pazarlama" adıyla verilmektedir. Bu üniversiteler Anadolu Üniversitesi, Boğaziçi Üniversitesi, İstanbul Üniversitesi ve Marmara Üniversitesi'dir (Bora Semiz, 2016). İstanbul'da yerleşkesi ve kontenjan sayısı dikkate alındığı takdirde İstanbul Üniversitesi ve Marmara Üniversitesi ilgili örneklem için uygun görülmüştür. Katılımcılar, 2016-2017 akademik yılı içerisinde halen bu üniversitelerde Pazarlama Anabilim dalında tezli yüksek lisans ve doktora düzeyinde eğitim alan kişilerden oluşmuştur. Burada amaç geliştirilen test ifadelerinin ve soruların anlaşılırlığını görmek, problemli noktaları saptamak ve gerekli düzeltmeleri yapmaktır.

Tablo 1. Türkçe'ye Uyarlanmış Ölçeğin Kapsam Geçerlilik Oranının Belirlenmesi için Uygulanan Ankete Katılan Katılımcıların Sosyo-Demografik Özellikleri

Sosyo-Demografik Özellikler	N (206)	Yüzde (%)
Cinsiyet		
Erkek	94	45,6
Kadın	112	54,4
Medeni Durum		
Evli	40	19,4
Bekâr	163	79,1
Diğer	3	1,5
Yaş		
18-27	149	72,3
28-37	45	21,9
38-47	12	5,8
Eğitim Düzeyi		
Ortaokul Mezunu	1	0,5
Lise Mezunu	60	29,1
Üniversite Mezunu	89	43,2
Lisansüstü Mezunu	56	27,2
Meslek		
Öğrenci	105	51
Ev Kadını	3	1,5
Özel Sektör	34	16,5
Kamu Sektörü	46	22,3
Diğer	18	8,7
Bireysel Gelir Seviyesi (Türk Lirası ile)		
1000 ve altı	75	36,4
1001 – 2000	51	24,8
2001 – 3000	20	9,7
3001 – 4000	28	13,6
4001 – 5000	15	7,3
5001 ve üzeri	17	8,3

Daha sonra ise buradan elde edilen veriler ışığında gereken düzeltmeler yapılmış ve ölçek nihai haline getirilmiştir. Ölçeğin geçerlilik ve güvenilirlik analizlerini yapmak için verilerin toplanılması internet üzerinden gerçekleştirilmiştir. Anketin linki genel katılıma açık şekilde sosyal medyada paylaşılmış ve toplam 206 Türk tüketicinin katılımı ile veri toplanmıştır.

Araştırmaya katılanların %45.6'sı erkek, %54.4'ü ise kadın olup; %19.4'ü evli, %79.1'i ise bekâr bireylerden oluşmaktadır. Katılımcıların %72.3'ü 18-27 yaş aralığında, %21.9'u 28-37 yaş aralığında ve 5.8'i ise 38-47 yaş aralığındadır. %29.1'i lise mezunu, %43.2'i üniversite mezunu ve %27.2'i ise lisansüstü mezunu olan katılımcıların %51'i öğrenci, %1.5'i ev kadını, %16.5'i özel sektör çalışanı, %22.3'ü kamu sektörü çalışanından oluşmaktadır. Araştırmaya katılanların %36.4'ü 1000 TL ve altı, %24.8'i 1001-2000 TL, %9.7'si 2001-3000 TL, %13.6'sı 3001-4000 TL, %7.3'ü 4001-5000 TL ve %8.3'ü ise 5001 TL ve üzeri gelir aralığında olan bireylerden oluşmaktadır. Araştırmanın bu kısmı ile ilgili katılımcıların sosyo-demografik özelliklerine dair bilgiler Tablo 1'de verilmiştir.

4. VERİLERİN ANALİZİ VE BULGULAR

Davranış bilimlerinde, niceliksel araştırma modelleri için gerekli olan ölçme işlemi genellikle bir psikolojik yapıyı ölçmeye yönelmekte ve alan uzmanları tarafından geliştirilen ölçeklerle gerçekleştirmektedir (Yurdugül, 2005). Bu ölçeklerin oluşturulma aşamasındaki yönelim daha çok kuramdan uygulamaya yöneliktir. Ölçek maddelerinin psikometrik özelliklerini belirlemek için pilot çalışmanın mümkün olmadığı durumlarda ise ölçmeye konu olan özelliğe göre uzman görüşlerine başvurulur. Uzman görüşleri üzerine yapılan çalışmalar özünde nitel çalışmalardır. Uzman görüşlerine dayalı nitel çalışmaları istatistiksel nicel çalışmalara dönüştürmek amacıyla **kapsam geçerlik oranları (Content Validity Ratio – CVR) ve kapsam geçerlik indeksleri (Content Validity Index – CVI)** kullanılan hesaplama yöntemlerindendir (Lawshe, 1975; Yurdugül, 2005).

Ölçülmek istenilen özellik ile ölçek maddeleri arasındaki bağıntı, ölçme aracının geçerliğine ilişkindir. Ölçek maddesinin ölçülmesi amaçlanan özelliği kapsama, ölçme (kapsam geçerliği) ya da ölçekteki ifadenin, maddenin ilgili yapıyı tanımlama (yapı geçerliği) gücünü belirlemek amacıyla ön testlere ihtiyaç vardır (Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003).

Bu çalışmada da amaçlanan, Hardesty, Bearden ve Carlson (2007) tarafından geliştirilen tüketicilerin fiyat taktiklerinin ikna kabiliyeti ile ilgili bilinç düzeyini ölçen (Pricing Tactic Persuasion Knowledge – PTPK) ölçeğini Türkçe'ye uyarlamak olduğundan; orijinal ölçekteki ifadeler uzmanlar yardımıyla Türkçe'ye çevrildikten sonra bunun testi 206 kişilik bir örnek üzerinde gerçekleştirilmiştir. Ve ölçeğin geçerliliğini test etmek için Kapsam Geçerlilik Oranı (KGO) yönteminden yararlanılmıştır. Lawshe (1975) tarafından geliştirilen kapsam geçerlilik oranları hesaplanırken uzmanlardan ölçekte yer alan her bir madde (veya ifade) için "ifade hedefleneni ölçüyor", "ifade yapı ile ilişkili ancak gereksiz" ya da "ifade hedefleneni ölçmüyor" şeklinde görüşlerini belirtmeleri istenir. Daha sonra Kapsam Geçerlik Oranı (KGO), her bir maddeye (veya ifadeye) ilişkin "ifade doğru, ölçüyor" görüşünü belirten katılımcı sayısının, maddeye ilişkin görüş belirten toplam katılımcı sayısının yarısına oranlanıp bu oranının 1 eksiği ile elde edilmektedir (Yurdugül, 2005). Kapsam Geçerlilik Oranının hesaplanmasını aşağıdaki gibi formüle edebiliriz:

$$KGO = \frac{N_G}{N/_2} - 1$$

Burada;

KGO – Kapsam Geçerlilik Oranı;

NG – maddeye ilişkin "Doğru" diyen katılımcı sayısı,

N – maddeye ilişkin görüş belirten toplam katılımcı sayısını göstermektedir.

Lawshe (1975: 568) uzman sayısına göre ölçeğe alınabilecek maddelerin sahip olması gereken en az kapsam geçerlilik değerlerini belirtmiştir (Tablo 2).

Lawshe'ye (1975) göre uzman sayısının 40 ve üzeri olduğu durumlarda KGO için minimum değerin 0.29 olması yeterlidir. Bu bağlamda, Tablo 3'den de görüldüğü üzere ölçek maddelerinin 11 âdetinin KGO değeri literatürde belirtilen değerlerle uyumludur. Ölçeğin diğer 6 adet maddesinin KGO değerleri literatürde belirtilen minimum değerlerin altında olduğu görülmektedir. Dolayısıyla ölçek maddelerinin KGO değeri belirlendikten sonra literatürde belirtilen minimum değerlerin

(Lawshe, 1975) altında olan maddeler ölçekten çıkarılmış ve KGO değerleri literatürdeki değerlerle uyumlu olan maddeler ölçekte kalmıştır.

Tablo 2. Uzman Sayısına Göre Ölçeğe Alınacak Maddelerin Sahip olması Gereken Minimum KGO Değerleri

Uzman Sayısı	Minimum Değer	Uzman Sayısı	Minimum Değer
5	0.99	13	0.54
6	0.99	14	0.51
7	0.99	15	0.49
8	0.78	20	0.42
9	0.75	25	0.37
10	0.62	30	0.33
11	0.59	35	0.31
12	0.56	40+	0.29

Kaynak: Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*, 28(4), 563-575.

Çalışmada ön teste katılan 206 birey ölçeğin tüm maddelerini (17 madde) yanıtlamıştır. Ölçekte yer alan 17 maddenin her biri bir örnek yardımıyla da desteklenerek, firmaların kullandığı bir fiyatlandırma taktiğini açıklayacak şekilde ifade edilmiştir. Cevaplayıcılardan bu örneğin ve ifadenin anlatılmak isteneni anlatıp anlatmadığı, örneğin ilgili maddeyi açıklayıp açılamadığını yönündeki görüşlerini belirtmeleri istenmiştir. Buna göre de yanıtlayıcılar ölçeğin her bir maddesine ilişkin tanımı (ifadeyi) ve örneği okuduktan sonra ilgili madde için "Doğru, ifade ediyor, açıklıyor" veya "Yanlış ifade etmiyor, açıklamıyor)" seçeneğini işaretlemiştirler. Araştırmada ölçeğin her bir maddesine ilişkin toplam katılımcıların sayısı, "doğru açıklıyor" yanıtını verenlerin sayısı, oranı ve KGO değerleri ile ilgili detaylar Tablo 3'de verilmiştir.

Tablo 3. Türkçe'ye Uyarlanmış Ölçek Maddelerinin Kapsam Geçerlilik Oranları

No	Fiyatlandırma Taktiğinin Adı	Katılımcı Sayısı	Doğru Yanıtını Verenlerin Sayısı	Doğru Yanıtını Verenlerin Oranı (%)	Kapsam Geçerlilik Oranı (KGO) Değeri
1	Tutsak Fiyatlandırma	206	181	87,9	0,76
2	Müşteri Değerli Fiyatlandırma	206	170	82,5	0,65
3	Her Gün Düşük Fiyatlandırma	206	73	35,4	-0,29
4	İmaj Fiyatlandırması	206	165	80,1	0,60
5	Fatura Harici Referans Fiyatlandırması	206	71	34,5	-0,31
6	Zararına Fiyatlandırma	206	159	72,2	0,54
7	Tavsiye Edilen Üretici Fiyatı	206	157	76,2	0,52
8	Pazarlıksız Fiyatlandırma	206	62	30,1	-0,40
9	Faiz Olmayan Fiyatlandırma	206	61	29,6	-0,41
10	Bölünmüş Fiyatlandırma	206	85	41,3	-0,17
11	Pazara Sokulma Amaçlı Fiyatlandırma	206	180	87,4	0,75
12	Günde 1 TL Veya Günde XXX TL	206	98	47,6	-0,05
13	Fiyat Paketleme	206	158	76,7	0,53
14	Yüksek Fiyatı Vurgulama	206	154	74,8	0,50
15	Pazarın Kaymağını Alma Fiyatlandırması	206	177	85,9	0,72
16	Rastgele İndirim	206	145	70,4	0,41
17	Esnek Fiyatlandırma	206	170	82,5	0,65

Ölçek maddeleri arasından minimum KGO değerlerini sağlayamayan ve dolayısıyla ölçeğin Türkçe versiyonunda çıkarılması uygun görülen altı fiyatlandırma taktiği şunlardır; her gün düşük fiyatlandırma; fatura harici referans fiyatlandırması; pazarlıksız fiyatlandırma; faiz olmayan fiyatlandırma; bölünmüş fiyatlandırma ve günde 1 TL veya günde XXX TL fiyatlandırma. Elenen bu altı madde ile ilgili tanımlayıcı açıklama orijinal ölçekte de "Yanlış" olarak belirtilmektedir (Bakınız EK 2). Yani ölçekte adı konulan ve bir fiyatlandırma taktiğinin ne olduğu ile ilgili yapılan açıklamanın "Yanlış" olduğu belirtilmekte ve cevaplayıcılardan buna katılıp katılmadıkları, açıklamanın doğru mu yanlış mı olduğu sorulmaktadır. Dolayısıyla, katılımcıların çoğu bu ifadelere yanıt olarak "Yanlış" cevabını verselerdi, bu maddeler de elenmeyecekti. Ancak sonuçta sadece tüm bu tip "yanlış" cevaplı ifadelerin KGO değerlerinin düşük çıkması burada düşündürücüdür.

Tablo 4. Türkçe'ye Uyarlanmış Ölçek Maddelerinin Kapsam Geçerlilik Oranlarına Göre Nihai Versiyonu

No	Fiyatlandırma Taktiğinin Adı	Katılımcı Sayısı	Doğru Yanıtı Verenlerin Sayısı	Doğru Yanıtı Verenlerin Oranı (%)	Kapsam Geçerlilik Oranı (KGO) Değeri
1	Tutsak Fiyatlandırma	206	181	87,9	0,76
2	Müşteri Değerli Fiyatlandırma	206	170	82,5	0,65
3	İmaj Fiyatlandırması	206	165	80,1	0,60
4	Zararına Fiyatlandırma	206	159	72,2	0,54
5	Tavsiye Edilen Üretici Fiyatı	206	157	76,2	0,52
6	Pazara Sokulma Amaçlı Fiyatlandırma	206	180	87,4	0,75
7	Fiyat Paketleme	206	158	76,7	0,53
8	Yüksek Fiyatı Vurgulama	206	154	74,8	0,50
9	Pazarın Kaymağını Alma Fiyatlandırması	206	177	85,9	0,72
10	Rastgele İndirim	206	145	70,4	0,41
11	Esnek Fiyatlandırma	206	170	82,5	0,65

Buradan hareketle, özellikle "Yanlış" cevabı olan tüm maddelerin ölçekten elenmesi iki nedenle ilişkilendirilebilir. Birincisi, katılımcılar bu maddelerde sunulan fiyatlandırma taktiğinin tanımının aynı maddelerdeki ilgili örneklerle açıklanabileceğini düşünmüşlerdir ki aslında böyle değildir. İkincisi ise, katılımcılar aslında soruyu tam olarak anlamamışlar ama bunu kapatmak (veya üzerinde çok düşünmemek) amacıyla da daha çok "Doğru"yu işaretlemek eğiliminde olduklarından dolayı bu maddeler elenmiştir. Bunu özellikle Türkiye'de yapılan araştırmalarda 5'li, 7'li Likert ölçeği kullanılması durumunda merkeze toplanma eğilimi ve ya kabullenme eğilimi gibi düşünebiliriz. Kabullenme eğilimi, katılımcıların sorunun içeriğine bakmadan olumlu seçeneği işaretleme eğilimidir (Turan, Şimşek ve Aslan, 2015). Bu çok seçenekli ölçeklerde özellikle görülen bir sorundur.

Araştırmanın sonucunda orijinal ölçekte 17 olan madde sayısı Türkçe uyarlaması sonucunda 11'e inmiştir (Tablo 4). Burada Türkçe'ye uyarlanan ölçeğin her bir maddesi için Kapsam Geçerlilik Oranı (KGO) verilmiştir.

Türkçe'ye uyarlanan ölçeğin geneline ilişkin Ölçek Kapsam Geçerlilik İndeksi ise (KGİ), α=0,05 düzeyinde anlamlı olan ve nihai forma alınacak maddelerin toplam KGO ortalamaları üzerinden elde edilir (Yurdugül, 2005:2; Geçkil ve Tikici, 2015: 58). Buna göre ölçeğin geneline ilişkin Ölçek Kapsam Geçerlilik İndeksi (KGİ) ise 0,6 olarak bulunmuştur. Ölçeğin tümüne ilişkin Kapsam Geçerlilik İndeksi de Tablo 2'de belirtilen değerler ile karşılaştırılmış olup (Yurdugül, 2005), uzman sayısının 40 ve üzeri olduğu durumlarda minimum değerin 0.29 olduğu dikkate alınarak ölçeğin toplamına ilişkin KGİ'nin (0.6) kabul edilebilir düzeyde olduğu bulunmuştur.

5. SONUÇ VE ÖNERİLER

Bu çalışmada Hardesty, Bearden ve Carlson (2007) tarafından geliştirilen tüketicilerin fiyat taktiklerinin ikna kabiliyeti ile ilgili bilinç düzeyini ölçen (Pricing Tactic Persuasion Knowledge – PTPK) ölçeğin Türkçe'ye uyarlanması yapılmıştır. Bu doğrultuda orijinal ölçekte yer alan maddeler Türkçe'ye çevrilmiş, uzman görüşlerine sunulmuş ve elde edilen verilerden hareketle ölçeğin her bir maddesine ilişkin Kapsam Geçerlilik Oranı bulunmuştur. Araştırmadan elde edilen bulgular sonucunda ölçeğin geneline ilişkin Kapsam Geçerlilik İndeksi (Ö-KGİ) ise α=0,05 düzeyinde 0,6 olarak bulunmuştur. Bu doğrultuda Hardesty, Bearden ve Carlson (2007) tarafından geliştirilen tüketicilerin fiyat taktiklerinin ikna kabiliyeti ile ilgili bilinç düzeyini ölçen (Pricing Tactic Persuasion Knowledge – PTPK) ölçeğin Türkçe'ye uyarlanmış son hali elde edilmiştir (Ek 1).

Çalışmanın gerçekleştirilmesi kapsamında bazı kısıtlarla karşılaşılmıştır. Bunlar arasında tüketicilerin ikna kabiliyeti ile ilgili bilinç düzeyini ölçmeye yönelik çalışmaların fazla olmaması, bu türlü çalışmalara Türkçe literatürde rastlanmaması ve çalışmanın istatistiksel analizlerinin yapılmasında karşılaşılan kısıtları sayabiliriz. Tüm bunlarla rağmen araştırma ölçek uyarlama çalışmalarının (Savaşır, 1994; Beaton, Bombardier, Guillemin, & Ferraz, 2000; Yurdugül, 2005) öngördüğü çerçevede yapılmış ve genel kapsam geçerlilik indeksi 0.6 olan Türkçe versiyonu geliştirilmiştir. Bu çalışmanın Türkçe pazarlama literatüründe bir boşluğu doldurması açısından katkısının önemli olduğu söylenebilir. Çünkü pazarlama alanında fiyatlandırma taktikleri ve tüketicileri ikna kabiliyeti ile ilgili bilinç düzeyini ölçmeye yönelik bir ölçek bulunmamaktaydı. Yapılacak çalışmalarda Türkçe'ye uyarlanan bu ölçeğin kullanılabilmesi mümkün olabilecektir.

Gelecekte yapılacak çalışmalarda, bu ölçek kullanılabilir ve farklı değişkenlerle birlikte test edilebilir. Aynı zamanda, "yanlış" cevaplı ifadelere yönelik bir araştırma yapılabilir, veya bu ifadeler olumluya çevrilerek test edilebilir. Ayrıca ölçek maddeleri ile ilgili kalitatif çalışmalar da yapılabilir.

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EK 1. Tüketicilerin Fiyat Taktiklerinin İkna Kabiliyeti ile İlgili Bilinç Düzeyi Ölçeğinin Türkçeye Uyarlanmış Nihai Şekli

Tüketicilerin Fiyat Taktiklerinin İkna Kabiliyeti ile İlgili Bilinç Düzeyi Ölçeği

1. *Tutsak Fiyatlandırma*; "Çok fonksiyonlu, kolay kullanımlık, tıraş bıçağının tanesi 10.5 TL ve içinde sekiz adet yedek tıraş bıçağı olan paketi ise 35 TL'dir". Sonuç olarak, tüketiciler ürünü kullanmaya devam etmek istiyorlarsa, yüksek fiyatı göze alarak yedek bıçakları satın almaları gerekecektir. Tutsak fiyatlandırma, pazarlamacılar tarafından bu durumun yarattığı avantajlardan yararlanmak için kullanılmaktadır. DOĞRU
2. *Müşteri Değerli Fiyatlandırma;* "Bir fastfood restoran zincirinin menüsünde hamburgerin fiyatı 2.77 TL'dir". Müşteri değerli fiyatlandırma, pazarlamacılar tarafından mağazalarda düşük fiyat arayan tüketicileri çekmek için kullanılmaktadır. DOĞRU
3. *İmaj Fiyatlandırması;* "(X Markalı) bir şarap markası 350 TL'ye satılmaktadır. Aynı şarap, şu anda bir şişe için 'Z markası' adı ile 70 TL'den satılmaktadır". Bazı tüketiciler daha yüksek fiyatlı ürünlerin daha yüksek kaliteye sahip olduğunu düşünüyor ve daha düşük fiyata aynı ürünün daha düşük fiyatlı bir çeşidini arzuluyorlar. İmaj fiyatlandırması, pazarlamacılar tarafından bir ürünün daha yüksek fiyatlı bir çeşidinin bu tüketicilere sunulması için kullanılmaktadır. DOĞRU
4. *Zararına Fiyatlandırma;* "On ikili 'Dünya Klasikleri' kitap seti 39.50 TL'dir". Zararına fiyatlandırma, pazarlamacılar tarafından yalnız düşük fiyatlı ürünleri değil, ayrıca mağazadaki diğer normal fiyatlı ürünleri satın alan tüketicileri de çekmek için kullanılmaktadır. DOĞRU
5. *Tavsiye Edilen Üretici Fiyatı;* "19 inç yeni bir (uzaktan kumandalı) televizyon için üreticinin önerdiği fiyat 4250 TL, satış fiyatı ise 3500 TL'dir". Tavsiye edilen üretici fiyatı pazarlamacılar tarafından tüketicilerin satış fiyatlarını cazip olarak görmelerini sağlama çabalarıdır. DOĞRU
6. *Pazara Sokulma Amaçlı Fiyatlandırma;* "Dörtlü yeni bir pil markası – 7 TL'dir". Pazara sokulma amaçlı fiyatlandırma pazarlamacılar tarafından, fiyatların düşük ayarlanarak tüketicilerin bu ürünü denemelerine teşvik etmek için kullanılmaktadır. DOĞRU
7. *Fiyat Paketleme;* "1.1GHz işlemciye ve 128 MB belleğe sahip bilgisayar ve lazer yazıcı 3850 TL'dir." Fiyat paketleme pazarlamacılar tarafından, ürünlerin ayrı ayrı fiyatlandırılmasından elde edilebilecek olana kıyasla geliri artırmak için kullanılmaktadır. DOĞRU
8. *Yüksek Fiyatı Vurgulama;* "Yeni bir çift koşu ayakkabısı–490.00 TL'dir". Yüksek fiyatı vurgulama pazarlamacılar tarafından, tüketicilerin fiyata dayalı ürün veya hizmetler için kaliteli karar verebilmeleri amacıyla kullanılmaktadır (örneğin, yüksek fiyat = yüksek kalite, düşük fiyat = düşük kalite). DOĞRU
9. *Pazarın Kaymağını Alma Fiyatlandırması;* "Son çıkan yeni bir ürün—Myphone sky-9 6500 TL'dir". Pazarın kaymağını alma fiyatlandırması pazarlamacılar tarafından, yeni çıkan bir ürün için yüksek fiyat ödemeyi göze alan tüketicilere hitap etmede kullanılmaktadır. DOĞRU
10. *Rastgele İndirim;* "Dört haftalık dönem boyunca herhangi bir marka portakal suyunun fiyatı şu şekildeydi: 1.Hafta 8.75 TL, 2.Hafta 8.75 TL, 3.Hafta 5.25 TL, 4.Hafta 8.75 TL". Rastgele

indirim, dikkatli bir şekilde fiyatları kontrol eden ve etmeyen tüketicilere satış yapmak için kullanılmaktadır. DOĞRU

11. *Esnek Fiyatlandırma;* "Aslında X, Y ve Z ürünlerinde %50'ye varan indirim vardır. Ancak firma sadece '%50'ye varan indirimi vurgulayarak tüm ürünlerde %50 indirim olduğu algısı yaratmaktadır". Esnek fiyat kararları pazarlamacılar tarafından, yanlışlıkla, ürünlerin çoğunun veya tümünün belirlenen tutarda indirimde olduğunu zanneden tüketicilerin avantajlarından yararlanmak için kullanılmaktadır (örneğin, %50 indirim). DOĞRU

EK 2. Tüketicilerin Fiyat Taktiklerinin İkna Kabiliyeti ile İlgili Bilinç Düzeyi Ölçeğinin İngilizce Orijinal Şekli

Pricing Tactic Persuasion Knowledge

1. *Captive pricing*—"$3.00 for a non-disposable, easy-grip razor, and $10.00 for a package of eight replacement razor blades." *Captive pricing* is used by marketers in order to take advantage of the fact that, eventually, consumers will need to purchase the high-priced replacement components if they want to continue using the product. TRUE
2. *Customer value pricing*—"$0.79 for a hamburger on the value menu at a fast-food restaurant chain." *Customer value pricing* is used by marketers to attract consumers who seek low prices to the marketer's store. TRUE
3. *Everyday-low-pricing*—"Always low prices at store XYZ." *Everyday-low-pricing* is used by marketers so that they will be perceived as having really low prices on some items and higher prices on others. FALSE
4. *Image pricing*—"$100.00 for a brand of wine ('Brand X'). The same wine is currently sold for $20.00 a bottle under the name 'Brand Z'." *Image pricing* is used by marketers in order to have a higher-priced version of a product available for consumers who view higher-priced goods as having higher quality, and a lower-priced version of the same product available for consumers who strongly desire lower prices. TRUE
5. *Invoice external reference prices*—"2002 automobile–$500 over invoice." *Invoice external reference prices* are used by marketers to persuade consumers to seek out complete price information for a product. FALSE
6. *Loss leader pricing*—"Box of a dozen 'Grade A' eggs for $0.80." *Loss leader pricing* is used by marketers to get consumers to not only purchase the low-priced item but also other regularly priced items within the store. TRUE
7. *MSRP's (Manufacturer's Suggested Retail Prices)*—"A new 19 in. color television (with remote control): MSRP $300, Sale Price $200" *MSRP's* are used by marketers in efforts to cause consumers to perceive that the sale price looks attractive. TRUE
8. *No haggle pricing*—"All automobiles for sale at the lowest price possible–no haggling!" *No haggle pricing* is used by marketers in order to convince buyers that negotiations will be fair. FALSE
9. *No interest pricing offers*—"Buy a dining room set today and pay no interest for twelve months." *No interest pricing offers* are used by marketers to persuade consumers that the price has been reduced. FALSE
10. *Partitioned pricing*—"$30.00 for a button-up, 100 percent cotton long-sleeve shirt, plus $5.00 shipping and handling." *Partitioned pricing* is used by marketers to persuade consumers that the marketer is offering an attractive shipping and handling rate. FALSE
11. *Penetration pricing*—"A four-pack of a new brand of batteries–$2.00." *Penetration pricing* is used by marketers so that, by setting prices low, consumers will be encouraged to try the product. TRUE

12. *Pennies-a-day or XXX-per-day*—"Just $1.00 per issue for a 1-year subscription to sports magazine XYZ." *Pennies-a-day or XXX-per-day* is used by marketers to provide price information in the most understandable format to consumers. FALSE
13. *Price bundling*—"Computer having a 1.1 GHz processor and 128MB memory *and* laser jet printer for $1100." *Price bundling* is used by marketers in order to increase revenue over what would have been obtained had the products been priced separately. TRUE
14. *Price signaling*—"A new pair of running shoes–$140.00." *Price signaling* is used by marketers since consumers may make quality judgments for products or services based on price (i.e., high price = high quality, low price = low quality). TRUE
15. *Price skimming*—"Brand new product—videophone $500." *Price skimming* is used by marketers to appeal to consumers who are willing to pay a high price for a new product. TRUE
16. *Random discounting*—"A brand of orange juice's (64 oz. or 1/2 gallon) price over a four-week time period was as follows: Week 1 $2.50, Week 2 $2.50, Week 3 $1.50, Week 4 $2.50." *Random discounting* is used to obtain sales from both consumers who carefully search for low prices and consumers who do not check prices carefully. TRUE
17. *Tensile price claims*—"Products X, Y, and Z: Up to 50 percent off." *Tensile price claims* are used by marketers in order to take advantage of consumers who may inadvertently perceive most or all products to be discounted by the stated amount (i.e., 50 percent off). TRUE

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