DEMAND ESTIMATION, RELEVANT MARKET DEFINITION AND IDENTIFICATION OF MARKET POWER IN TURKISH BEVERAGE INDUSTRY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY
IN
ECONOMICS

FEBRUARY 2010

Approval of the Graduate School of Social Sciences

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Doctor of Philosophy.

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This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Doctor of Philosophy.

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ABSTRACT

DEMAND ESTIMATION, RELEVANT MARKET DEFINITION AND IDENTIFICATION OF MARKET POWER IN TURKISH BEVERAGE INDUSTRY

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February 2010, 299 pages

This dissertation aims to contribute to the field of economics of competition policy by analyzing the demand structure and the market power in the Turkish beverage industry and in the cola market in particular. First, a demand system for the beverage products has been estimated by using a multi-stage linearized Almost Ideal Demand System (AIDS). Using the own-price elasticity of cola in a SSNIP test (Small but Significant Non-Transitory Increase in Price), it is shown that cola market consists of a distinct relevant product market. Then, the demand elasticities of cola products at brand and package level have been estimated by the simple and nested logit models. Finally, the estimated demand elasticities of cola products have been used in measuring the degree of market power and predicting the effects of a hypothetical merger between Pepsi and Cola Turca by using a merger simulation technique. The results show that all cola suppliers have large price-cost margins for most of their products. Prices of the merging parties increase in average by 15 - 21% after the merger. The merger also causes the market price to increase by 16- 22% and consumer surplus to decrease by nearly 5% in average. Finally, depending on these results, the thesis recommends a stricter merger control criterion than dominance criterion for competition policy in Turkey.

Keywords: Almost Ideal Demand System, Nested Logit, Market Power, Merger Simulation, Relevant Market Definition

ÖZ

TÜRK İÇECEK SANAYİNDE TALEP TAHMİNİ,
İLGİLİ PAZAR TANIMI VE
PAZAR GÜCÜNÜN BELİRLENMESİ

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Doktora, İktisat Bölümü
Tez Yöneticisi : Prof. Dr. Erol Taymaz
Şubat 2010, 299 sayfa

Bu tezin amacı, Türkiye'deki içecek endüstrisinde –özel olarak da kolalı içecek piyasasında– talep yapısının ve pazar gücünün analizi yoluyla, rekabet politikasının iktisadi açıdan incelenmesi alanına katkıda bulunmaktır. İlk olarak, iki aşamalı bütçeleme çerçevesinde doğrusallaştırılmış İdeale Yakın Talep Sistemi (AIDS) kullanılarak, içecek ürünlerinin talep esneklikleri tahmin edilmektedir. Yapılan SSNIP testi (Küçük Ama Önemli ve Geçici Olmayan Fiyat Artışı testi) sonucunda, kola pazarının tek başına bir ilgili ürün pazarını oluşturduğu gösterilmektedir. Ardından, kolalı içecek ürünlerinin talep esneklikleri marka ve paket hacmi düzeyinde basit ve yuvalı logit modelleri yordamıyla tahmin edilmektedir. Tahmin edilen esneklikler, kola sağlayıcılarının çoğu üründe yüksek fiyat-maliyet marjlarına sahip olduklarını göstermektedir. Birleşme simülasyonu tekniği çerçevesinde yapılan bir analizle Pepsi ve Cola Turca arasındaki hipotetik bir birleşme sonrasında, ortalamada, birleşme taraflarının fiyatlarının %15-21, piyasa fiyatının %16-22 oranında artacağı, tüketici fazlasının da yaklaşık %5 oranında azalacağı tahmin edilmiştir. Son olarak, bu sonuçlara dayanılarak Türk rekabet politikası açısından, birleşme/devralma kontrollerinde hakim durum ölçütünden daha sıkı bir ölçütün benimsenmesi yönünde bir öneride bulunulmaktadır.

Anahtar Kelimeler: İdeale Yakın Talep Sistemi, Yuvalı Logit, Pazar Gücü, Birleşme Simülasyonu, İlgili Pazar Tanımı

To my wife Aylin and my son Anıl

ACKNOWLEDGEMENTS

I would like to thank Dr. Eyüp Özveren for encouraging me to pursue further study by starting the Ph.D program. I wish to express my gratitude to my supervisor Dr. Erol Taymaz for providing invaluable advice and input throughout the whole period of the dissertation. *Ipsos / KMG Turkey* was very generous and kind to provide me with their data. Mr. Cenk Ozan in *Ipsos/KMG Turkey* helped me a lot on the details of the data. I would also like to express my appreciation to the members of the thesis jury. This thesis is undoubtedly better for their efforts.

My special thanks go to Mr. Baha Karabudak who supported and stood by me until the very last day of the thesis. I would also like to thank the managers of the Turkish Competition Authority for supporting my academic studies.

I am grateful to all my teachers, especially to Dr. Haluk Erlat, Dr. Halis Akder, Dr. Alper Güzel, Dr. Erdal Özmen, Dr. Erkan Erdil, Dr. Murat Kırdar, Dr. Lapo Filistruchhi, Dr. Yves Richelle, Dr. Claude Monmarquette, Dr. Serdar Dalkır who taught me microeconomics, industrial organization and econometrics. It is impossible to forget my classmates Dr. Ozan Eruygur, Ayşegül Çorakçı Eruygur, Sırma Demir, Dr. Mümin Cilasun, Müge Ant, Taylan Bali, Georgios Petropoulos, Fatih Cemil Buğday for their collaboration in different periods of my graduate studies. I appreciate Aydın Çelen who set aside time to discuss the issues in merger simulation with me. Barış Ekdi showed a great effort in formatting the text. Without their contribution, this thesis could not have been submitted in time.

I am debtful to my parents and my brother Kerem for the support they gave me during all my education life. My beloved wife Aylin deserves special thanks for her patience and continuous support, review and constructive criticism of the thesis at all times. Finally, I must thank my son Anıl, from whom I stole the times that we could have spent in playing football.

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CHAPTER 1

INTRODUCTION

Turkey has adopted "The Act on Protection of Competition" (hereafter shortly, the Competition Act) in December 1994. Parallel with developments in EC Competition Law, the Turkish Competition Authority has been actively applying competition rules since March 1997.

Economics and competition law are basically related in four aspects. The first and the more fundamental one is that economic theory describes the rationale behind the need for a competition law. For example, it provides justification for law by showing why cartels are harmful and should be prohibited or why mergers should be controlled. Secondly, economics help practitioners and decision makers by predicting the possible effects of certain conduct either by theoretical or empirical tools. In this sense, the economic theory helps framing legal rules in detail. For example, economic theory shows conditions under which vertical restraints between a supplier and its distributors, such as exclusive territories, exclusive dealing or resale price maintenance, may enhance economic efficiency or facilitate collusion on the other hand. The third role of economics in the enforcement of competition law is its contribution to the decision making process in assessing an infringement of law or a proposed merger. Empirical economic research may be useful in measuring the degree of market power, in quantifying the change in market power before and after a merger or in measuring the welfare effects of an abusive conduct of a dominant firm. In addition, empirical techniques can be used in defining the "relevant market", which is a preliminary step in almost every competition law case. Finally, as the fourth point regarding the relation between economics and competition law, economics can be used in private litigation after a particular decision of competition authorities. Parties can claim compensation for the damages that they suffered because of an infringement of competition law. In forming their claim, they can use quantitative analyses that estimate the magnitude of the damage.

This dissertation is related to the third point mentioned above, that is to say, the contribution of the empirical economic research in decision making process. In more developed competition law regimes, the use of economic analysis in the enforcement of competition law and policy has been attached a high level of importance for the last two decades. Although the competition law has being actively enforced in Turkey for 12 years, the use of economic methods in the decisions of the Turkish Competition Authority has remained limited. In addition, the academic literature on the analysis of Turkish markets from the perspective of economics of competition has not been adequately developed yet.

The aim of this dissertation is to carry out empirical research that can have practical reflections on the enforcement of competition law and policy. For this purpose, the dissertation focuses on the estimation of elasticities of demand and on their use in defining the "relevant market", in measuring the degree of market power and in predicting the effects of a hypothetical merger in the Turkish beverage industry. Although the motivation behind the empirical studies in this dissertation is related to the role of the empirical economics in the enforcement of competition law, the large part of the dissertation is devoted to the details of the econometric studies for estimating demand elasticities.

The first empirical part of the dissertation aims to provide an application of the SSNIP test[1] for defining the "relevant product market" related to beverage products. In the enforcement of competition law, almost in every merger and abuse of dominance case, the first step of the analysis is to define a "relevant market". "Relevant market definition" is an important tool in the assessment of market power. More precisely, in order to talk about the existence of a "market power", first of all,

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SSNIP stands for "Small but Significant and Non-transitory Increase in Price" the existence and the boundaries of a particular “market” must be decided upon. Only after this decision, the issue of “power” will be assessed. The purpose of defining a “relevant market” is to identify actual competitors that are capable of constraining behavior of the firm(s) under investigation. The most immediate result of defining a relevant market is to calculate the market shares of its participants. Without defining a market, market shares can not be calculated. The “relevant market” basically has two dimensions; one is the product dimension and the second is the geographical dimension. The concept of “relevant market” within the context of competition law is different from the “market” defined simply as the “environment” where goods or services are sold and bought. Even the products (or geographical regions) that resemble each other on the basis of some characteristics may not necessarily be considered to be in the same market. Instead, the “relevant market” in competition law sense is defined on the set of products (or geographical regions) which exercise some competitive constraints on each other. Therefore, the logic behind the definition of the “relevant market” is based on the two types of substitution: demand substitution and supply substitution. The analysis of demand substitution focuses on determining the set of products which consumers deem substitutable for the relevant product under investigation. On the other hand, supply substitution is also analyzed in order to identify other suppliers which are able to switch their production to the product under examination without having to pay significant additional costs in the short term when faced with increases in relative prices. Then, the level of competitive pressure can be assessed if sufficient amount of additional production from other producers can be switched to the product that is analyzed.

In the literature of economics of competition law, it is generally agreed that the definition of the relevant market should be based on the characteristics of demand substitution. SSNIP test takes patterns of demand substitution into account in defining the relevant markets. The mechanics of the SSNIP test is as follows: It is assumed that the set of products under investigation is owned by a hypothetical monopolist. Then, the narrowest set of products on which the hypothetical monopolist can profitably increase its prices is searched. For this it is asked whether a "small but non-transitory increase in prices" (5% or 10%) can be profitable for the hypothetical monopolist. If the answer is "no", this means that there exists other products (or firms) that exercise significant competitive pressures on the products of the hypothetical monopolist. Hence, the products of the monopolist do not constitute a relevant market. Then, the test passes to the second stage and the closest substitute product (or region) for the monopolist's product (or region) is included in its portfolio and the question is asked once again. This procedure continues until the increase in prices becomes profitable for the monopolist who hypothetically owns all the products that are added in its portfolio at every stage of the test. In other words, the test stops and defines the narrowest set of products (or regions) as the relevant market on which the monopolist can profitably increase prices.

The choice of the beverage industry and the cola products in particular as the focus of the dissertation has been motivated by the debate between the leader cola supplier and the Turkish Competition Authority on the relevant market definition in case that is related to cola and other commercial beverages. The supplier argued that the relevant market is "all commercial beverages", whereas the Authority considered a narrower definition for the relevant market. A second motivation for the choice of the cola market as the subject of the thesis is related to the fact that the cola market has been characterized by oligopolistic market structure in which products are highly differentiated. The enforcement of competition law focuses on firm conducts in imperfectly competitive markets and the properties of the cola market have been considered as suitable for an economic analysis of the competition policy.

In practice, the relevant market definition is relatively easier where products in question are homogenous. However, when the analysis is on differentiated products, the task becomes more difficult in determining which products exercise competitive pressure on others. The SSNIP test requires information about own and cross price elasticities of demand of the products that are candidates to be in the relevant market. In the first empirical study of the dissertation, in order to calculate the elasticities of demand of beverage products in Turkey a linearized Almost Ideal Demand System (LAIDS) has been estimated. In this respect, this dissertation is the first academic attempt in applying the results of an econometric estimation of demand elasticities to the relevant market definition using the SSNIP test for the products in Turkish markets. In addition, at least to our knowledge, the demand elasticities of the beverage products in Turkey have not yet been estimated at the level of product classification that is specified in this dissertation. This study provides the elasticities of beverage products for the possible utilization of other researchers.

In previous studies in the demand literature, the AIDS model was generally estimated by using the Stone price index and accordingly the formulas of elasticities were calculated according to the Stone price index. In this dissertation, the LAIDS model has been estimated by using the Tornqvist price index. To our knowledge, the formulas of the elasticities depending on estimates of LAIDS with Tornqvist price index have not been reported in previous studies. In this respect, this dissertation makes a (although small) contribution to the demand literature by deriving and reporting the formula of the elasticities in LAIDS model estimated with Tornqvist price index.

The result of the SSNIP test shows that cola products constitute a distinct "relevant product market". The second empirical study of the dissertation is built on this result It focuses on the estimation of the elasticities of demand of cola products at brand and package level. Cola producers differentiate their products by taste, calorie content and package type. Product differentiation is one of the factors that enable firms to exercise market power. The elasticities that will be estimated at brand and package level will serve to calculate the degree of market power of each product separately. However, estimating the demand for differentiated products can be problematic especially when the number of differentiated products is large. In the sample used in the dissertation there are 93 different cola products. Estimating the demand for such a large number of products is practically infeasible in an AIDS-like model in which the number of parameters to be estimated will be nearly one thousand. This is known as the dimension problem in demand literature. Even if multi-stage budgeting is used the dimension problem may not be fully overcome. The discrete-choice models, especially logit-class models, are more suitable for estimating the demand when the number of product is large. In these models only one price coefficient is specified. By including a reasonable number of other explanatory variables in the model, the demand for large number of differentiated products can be estimated by discrete-choice models without encountering the problem of dimension.

However, estimation of logit models has some disadvantages if the model involves endogenous regressors. The endogeneity of regressors is a common problem in demand studies since prices are expected to be correlated with demand shocks. The logit-class models do not allow using the instrumental variables in a linear way. Berry (1994) presents a new method which permits the use of linear estimation techniques with instrumental variables in logit models. In addition, this method is also suitable for the use of aggregate data which is in general more available than micro data.

On the other hand, these models impose some restrictions on cross-price elasticities. The simple logit model assumes that the cross-price elasticities of all other products being equal with respect to price of a particular product. This restriction is relaxed in the nested logit model by assuming an a priori segmentation among products. In this dissertation, diet and normal cola products have been assumed to be in different nests. With this segmentation cross-price elasticities of products in different groups are allowed to differ from those in the same group. On the other hand, the cross-price elasticities of products within the same group are equal with respect to prices of a particular product that is in the same nest. The estimations have been done for five different shop types separately.

The main part of the data set that will be used in the econometric work in the dissertation is a part of Household Consumption Panel Database which is collected by *Ipsos/KMG Turkey*, which is a private marketing research company. This data is at household level and consists of information on the expenditures on fast-moving consumer goods of households participated in the panel. It covers the period between January 2000 and May 2006. The coverage of data extends each year and by 2006 it includes information on more than 6000 households living in 34 cities of Turkey. Data contains information on the price, quantity, brand, package and type of the product that has been purchased by participants. There is also information on the shop types in which the relevant product has been sold. In addition, the data includes information on the demographics of participants such as age, socio-economic status, household size and location. Although the original data is at household level, it has been aggregated over consumers to be used in the econometric models estimated in the dissertation. The aggregation was necessary to overcome the problem of unobserved prices for some observation points. Data on input costs supplied by TURKSTAT have also been used as instrumental variables.

In the final empirical section of this dissertation, the degree of market power of cola products is measured. In addition, the welfare effects of a hypothetical merger between the second and third largest suppliers of cola (Pepsi and Cola Turca), whose total market share sums up to 30-35%, will be predicted by a merger simulation technique. Economic theory has shown that the concept of market power is closely related to elasticities of demand of a particular market or of a firm. Therefore, in measuring the degree of market power and in predicting welfare effects of the hypothetical merger, the demand parameters and the elasticities that are estimated at brand and package level in the second empirical section of the will be used. In order to measure the degree of market power, the concept of price-cost margin will be taken into account in this dissertation. In addition, multi-product suppliers will be assumed to compete in prices in a Bertrand-type oligopoly with differentiated products. The same assumption will be kept for the calculations in simulating the hypothetical merger between Pepsi and Cola Turca.

Turkey's current merger control policy depends on the traditional approach of assessing dominance. In a traditional merger control policy, which only takes into account the criterion of "dominance", a merger similar to that is analyzed in this dissertation cannot be said to "create or strengthen a dominant position", at least from a single-dominance perspective. However, in contemporary merger control regimes in the U.S. and EU, the unilateral effects of mergers on prices market and on welfare in the market need also to be assessed. In this respect, in near future, merger simulations are expected to be an important part of the enforcement of competition law in Turkey, especially if Turkey continues to apply its competition policy in parallel to the developments in the EU and U.S.

The dissertation is organized as follows: The next chapter is a literature survey which focuses on the econometric models that have been developed for estimating demand parameters and on studies that relates econometric results to their use in the enforcement of competition law. In the third chapter, the data used in the econometric estimations will be presented and summarized. The chapters four, five and six are for the empirical studies summarized above. Finally, in the seventh chapter a general conclusion will be attempted.

CHAPTER 2

LITERATURE SURVEY ON THE USE OF DEMAND MODELS IN ECONOMICS OF COMPETITION LAW

2.1. Introduction

Ackerberg et al. (2007) presents a large survey on techniques used in estimating demand structures. Demand studies are generally divided into two broad classes. The first group of studies focuses on estimation of the demand systems that are based on "product space". More clearly, these models assume that the representative agent's utility is defined on the product *per se*, but not on the characteristics of the product. Models assuming the Constant Elasticity of Substitution (CES) utility function and/or more flexible demand function (i.e. Almost Ideal Demand System introduced by Deaton and Muellbauer (1980)) belong to this first group. On the other hand, the second group of demand studies includes discrete-choice models (i.e. the multinomial *simple logit*, *nested logit* and random coefficients logit models) or distance-metric models, in which products are considered as bundles of characteristics. These models are shortly called as "characteristics space models".

Ackerberg et al. (2007:4180-4181) states that there are two problems of positing consumer preferences directly on products instead of on the characteristics of products. First, one has to estimate the demand system with too many parameters. The number of parameters to be estimated is more than the square of the number of product in the model. This is known as the dimensionality problem. The second problem is that the demand system based on "product space" does not allow analyzing demand for new goods prior to their introduction. In "characteristics space" models, products are assumed to be bundles of characteristics. Consumer preferences are defined on those characteristics. Each consumer chooses the bundle that gives him the maximum utility. Consumers are allowed to have different preferences for product characteristics. In these models, the number of parameters that determine the aggregate demand structure does not depend on the number of products, but on the number of product characteristics and the joint distribution of preferences over these characteristics. Therefore, the problem of dimensionality is solved in these models. The impact of the introduction of new goods can also be measured in these models by specifying a new good as a different bundle of characteristics than the bundles that currently exist (Ackerberg, 2007 4181). On the other hand, the different models belonging to the group of "characteristics space" models have advantages and disadvantages with respect to each other.

Below some econometric models that can be used to estimate demand parameters according to the classification given above are presented.

2.2. Product Space Models

2.2.1. Linear Demand System

The most basic functional form is that of the *linear demand system*. Quantities are regressed on prices. It makes computations relatively easier; however as reported in (Hosken et al. 2002, 13) linear demand systems can predict negative predicted quantities.

2.2.2. Constant Elasticity Demand System

Another functional form is the *log-linear demand function*. The advantage of this function is the fact that the parameters estimated give directly the elasticities and there is no need for an additional computation. This function is also known as the constant elasticity function. This means that the elasticities estimated with this model are assumed not to change with price and quantity level. This is not a valid assumption in most cases. (Hosken et al. 2002, 13).

2.2.3. CES Demand System

An alternative to these models is the constant elasticity of the substitution model. In this model, a constant parameter that measures the substitution across products is estimated. Nevo (1997, 10) says that the dimensionality problem is solved in this model by imposing symmetry between different products. In this way, the estimation would involve a single parameter, regardless of the number of products, and could be achieved using non-linear estimation methods. However, Nevo adds that the symmetry condition would imply that the cross-elasticities are restricted to be equal, regardless how "close" the products are in some attribute space.

2.2.4. Flexible Linear Systems

The common property of these models is that they have flexible functional forms that contain sufficient parameters to be regarded as an adequate approximation to the "true" underlying utility or cost functions. They are all linear and can be estimated within a system of equations. They also allow imposing and testing the restrictions of the microeconomic theory such as adding-up, homogeneity, and symmetry. Erdil (2003) presents a large survey on these types of models such as the Rotterdam model, the Almost Ideal Demand System and the CBS model.

The most popular one among these models is the AIDS model developed by Deaton and Muellbauer (1980). Since the AIDS model has been estimated by many researchers for different reasons, only a subset of those whose results have been interpreted for competition policy will be summarized here.

AIDS is a suitable model to be estimated in a multi-stage budgeting framework. The advantage of multi-stage budgeting is that it reduces the dimensionality problem. Segmentation of the market reduces the number of parameters proportionally to the inverse of the number of segments (Nevo, 1998, 3). Therefore, with either a small number of brands or a large number of reasonable segments elasticities can be estimated using the AIDS model.

Hausman, Leonard and Zona (1994) used a linearized AIDS model for estimating the demand for beer brands in U.S. market. They used a three-stage budget segmentation in which the first stage is for the general beer demand, the second stage is for the demand for three different segments of beer and finally the third stage for individual beer brands in each segment. Segments have been classified as light beers, premium beers and popular beers. After estimating own and cross-price elasticities at brand level, they run simulation in order to measure the effects of possible mergers among beer brands. When predicting the price effects they have also taken into account the offsetting impact of the efficiency gains of mergers under alternative scenarios. One important suggestion brought in this article is on the use of prices in other cities as instrumental variables. This suggestion has been used later in many other researches in demand estimation literature.

In a similar research, Hausman and Leonard (1996) estimated the demand elasticities for bath tissues in the U.S. market with two-stage budgeting. Using the elasticities obtained from a linearized AIDS model, they simulated the likely effects of mergers on prices. Comparing their result to those of another research done by Werden and Froeb (1994) using the logit model with the same data set, they found that predictions of the price increases in these two models are different because of the differences of the magnitudes of cross-price elasticities in the AIDS and logit model. In Hausman and Leonard (2002), authors estimated the effects of the entry of a new brand in the bath tissue market on the prices and welfare in that market using demand elasticities again obtained from the AIDS model and Bertrand-Nash modeling for tissue brands.

Although these papers are very important examples that show how the demand elasticities can be used in merger analysis, the definition of the relevant market have not been questioned in these papers. They considered that beers or bath tissue products constitute distinct relevant product markets; however, they could have implemented a test for relevant market after estimating the demand elasticity for the product category in the first stage of the segmentation they used. In addition, in Hausman and Leonard (2002), after having the demand parameters, authors used a simplified version of the formula of the elasticities. In the formula they used, they assumed that the share of each product in the Stone price index is constant over time. In this dissertation, the relevant product market for cola products has been tested before estimating elasticities of cola brands. In addition, after estimating a linearized AIDS model, the demand elasticities of beverage products have been calculated by taking into account the variation of the share of the products in the Tornqvist price index. This consideration results in a more complicated formula for elasticities.

As to the application of the AIDS model to the soft drink industry, two previous studies below are worth mentioning. They both relate the demand elasticities to the concept of market power in the soft-drink industry in the U.S.

Cotterill et al. (1996) estimate a linearized AIDS model using the Stone price index and assuming two-stage budget segmentation for soft-drink brands. Coke, Pepsi, RC, and Dr Pepper are placed in the Cola segment. Brands such as Sprite, Seven up and Mt Dew are put in the Clear segment. At a higher level, they estimate elasticities between four segments of non-diet soft drinks (Cola, Clear, Private label, Others). Then, they use the brand level elasticities to construct some indices of market power, such as Rothschild Index, Cotterill index and Chamberlin quotient. Cotterill et al. show that the observed market power can be decomposed into its unilateral and coordinated components. Comparing these indexes they reach the conclusion that market power is mostly due to product differentiation, not collusion.

Dhar et al. (2005) estimate demand for brands such as Coca-Cola, Sprite, Pepsi and Mountain Dew in the U.S. market. They estimate a system with 3 demand equations and 4 first-order conditions for supply functions, using Full Information Maximum Likelihood method under normality assumption. By restricting supply side functions appropriately, they estimate and test three different strategic behaviors such as collusive behavior between Coke and Pepsi, the Bertrand model and the conjectural variation (CV) model. They reject the Bertrand type strategic behavior among all of the firms. Their results show that Coke and Pepsi do not behave collusively. Therefore, they suggest using CV model as the strategic behavior in estimating demand parameters. Then, by using demand estimates obtained from the three models above, they compute Lerner index for all brands, as a measure of market power.

Dalkır and Kalkan (2004) apply "Proportionality-Calibrated AIDS" (PCAIDS) model to actual and hypothetical merger cases in fertilizer industry in Turkey to predict the unilateral price increase effects of these transactions. Although the PCAIDS model requires limited number of information such as market shares, market demand elasticity and own-price elasticity of only one firm, it does not estimate the demand parameters but calibrate them. Therefore, the model depends on the elasticities that are estimated in other researches. It can be used easily in simulating the effects of mergers, however it imposes restrictions on the cross-price elasticities.

2.3. Characteristics Space Models

The "characteristics space models" mainly covers two different approaches of demand estimation. Those in the first group are based on the discrete-choice models, especially on the multinomial logit models developed by McFadden (1974). These models have been adapted to the demand estimation of differentiated products by Berry (1994). The second group consists of "metric-distance" models which are developed by Pinkse, Slade and Brett (2002).

2.3.1. Multinomial Logit Models

The basic advantage of these models over linear flexible systems is that they allow estimating the demand for large number of products, and hence solve the dimensionality problem in demand estimation. This is especially important when one wants to estimate demand for differentiated products as the number of products in the market grows with any small differentiation in the characteristics of products. Again for the same reason, multinomial logit models have been more frequently used than probit models since the estimation with the latter becomes more complicated as the number of product increases. Therefore, most of the studies in demand estimation using discrete-choice model have used logit-type models.

On the other hand, the endogeneity of prices necessitates the use of instrumental variables and due to the non-linear structure of the logit-type models the instruments need to be introduced in non-linear way which is not possible in much software. This problem has been solved by the contribution of Berry (1994) who developed a method called "inversion of market share function" which allows logit-type models to be estimated by the use of instrumental variables for endogenous regressors in a linear fashion. In addition, this model allows using aggregate data which is easier to obtain for applied researchers.

However, the logit model requires the satisfaction of "independence of irrelevant alternatives" to hold. This causes the *simple logit* to impose some restrictions on the substitution patterns of consumers. The *nested logit* model relaxes the strong assumptions of the logit model, and it allows interactions between product and consumer characteristics. Products are grouped into g different groups according to their characteristics. Given an increase in the price of *j* that belongs to the group *g*, more consumers are expected to shift to alternatives in the same group rather than to those in other groups (Nevo, 2001: 316). The utility of products in the same group is assumed to be correlated. The *nested logit* yields more reliable estimates compared to the logit model. Although the *nested logit* allows for more flexible substitution patterns relative to the logit models, it necessitates a priori division of products into groups and this segmentation should depend on reasonable arguments.

Ivaldi and Verboven (2004) estimated the elasticities of demand for truck brands using a *nested logit* model for analyzing the effects of a merger between Volvo and Scania which are the two Nordic truck producers. Ivaldi and Verboven classify the trucks into two groups as rigid truck and tractor trucks. They also estimate supply functions in which marginal cost is the function of the product characteristics. After obtaining elasticities of demand for truck brands, they evaluate the effects of alternative mergers and conclude that pan-European merger would have less anticompetitive effects than the merger of regional mergers.

Argentesi and Filistrucchi (2007) present an interesting application of the *nested logit* model to the media markets. Media markets are known as having two-sided demand characteristics. The first side is about the demand of readers (or viewers). The second side of the demand for newspapers consists of the demand of advertisers. Argentesi and Filistrucchi estimated the demand parameters of the demand for Italian newspapers on the both side and used the estimates in evaluating the market power in this market.

The *nested logit* model has also been used by the economists of the European Commission in analyzing a recent vertical merger case in the market for portable digital navigation devices (De Coninck et al., 2008). One of the merging parties (TomTom) is one of two largest producers of the navigation devices in the world. The other party is the supplier of digital maps that are used as an input in these devices. In theory, the vertical mergers are theoretically expected to create efficiencies; however, there is also a possibility of foreclosure of competitors in downstream market (device producers in this case). The European Commission, using a *nested logit* model for the demand for these devices, has estimated the demand elasticities and has assessed whether the merged firm would have an incentive to foreclose the competitors in downstream market. In doing this assessment, the loss of revenue that would occur in case of a potential exclusionary conduct of the merged firm in downstream market (i.e. raising rivals' costs by charging too high prices for digital maps) has been compared by the gains in revenue that would be obtained by monopolizing the device market. It has been concluded that the cross-price elasticities of demand for devices of the merged firm are significantly low and the potential gains of the merged entity in downstream market would be very limited in case of price increase in the rivals' products due to a potential input foreclosure.

Although the *nested logit* model provides different cross-price elasticities for inside and outside group, the cross-price elasticities of the products within the same nest continue to be equal. The restrictions that the *simple logit* and the *nested logit* model impose on the substitution patterns are fully relaxed in the "random coefficients multinomial logit model". It allows more flexible substitution patterns. In this model, every individual *i* is allowed to have different tastes for each of the product characteristics *k*. (Berry, 1994:246). As a result, the own-price elasticities of products are calculated according to the different price sensitivities of different individuals (Nevo, 2001:316). In the full random coefficients model, the randomness of the consumers' taste parameters depends on the product characteristics. Individuals with the same tastes shift to similar products. The composite error term in the utility function is not assumed to be independent of the product characteristics. This results in the fact that the cross-price substitution is driven by product characteristics (Nevo, 2001:316). However, the estimation of this model is very complicated. In their seminal paper, Berry, Levinsohn and Pakes (1995) present an estimation of the random coefficients multinomial logit model for cars which are highly differentiated. Nevo (2001) applied the random coefficients model to the ready-to-eat industry and provided some guidance for computation (Nevo, 1998). In addition, Nevo used the results of this model in computing the price-cost margins as indicators of the market power of brands in the ready-to-eat cereal market.

One of the basic assumptions of the discrete-choice models is that consumers buy only one unit of the product that they prefer among other alternatives. This behavior may not be always valid for every market. Especially, in soft drink markets consumers may buy more than one unit at a time. Nevo (2000, 401) solves this problem by assuming that even if a consumer may buy more than one unit in a shopping visit, he consumes one unit of the relevant product while consuming it.

Dubé (2005) develops a model where consumers are allowed to purchase multiple items of soft drinks in the U.S. market. This type of models are called "multiple-discreteness model" following Hendel (1999). Dubé uses disaggregated household-level data to capture the assortment type of consumer behavior. In his model different package sizes of a brand are treated as different products. He also considers diet, regular, caffeinated and non-caffeinated drinks as distinct products. The brands that he includes in the model are Pepsi, Coke, Dr Pepper, Mountain Dew, Sprite and Seven-up. There are three types of package sizes. He estimates own and cross elasticities of 26 products using the Method of Simulated Moments. Then, he calculates markups and marginal costs. He uses the estimated demand parameters to simulate hypothetical mergers. Dubé finds that consumers seem to respond to price changes by switching to another product of the same size.

These findings of Dubé constitute a basis in analyzing the estimates from the *nested logit* model used in estimating the demand for cola products in this dissertation. Cola products in the Turkish market have been modeled by placing diet and normal cola products in different nests. In addition, when calculating the price-cost margins of the cola products, those having the same pack size have been modeled separately in a Bertrand game with multi-product firms.

2.3.2. Distance-metric (DM) approach

This approach takes into account that brands of a differentiated product can compete along many dimensions and focuses on a small subset of those dimensions in estimation. In DM approach, it is assumed that individuals have a systematic taste for diversity and thus might want to consume more than one brand. Individuals are allowed to purchase variable amounts of each brand. The DM model is based on a normalized-quadratic, indirect-utility function which is in Gorman polar form and can therefore be aggregated to obtain brand-level demands. In particular, aggregation does not depend on the distribution of unobserved consumer heterogeneity or of income. Although the aggregation is obtained easily by assuming the Gorman polar form, all consumers are assumed to have the same marginal utility of income. The intercept, the own and cross slope coefficients of the model depend on the distance between a metric of characteristics of alternative products. Slade (2004) estimates a DM model for beer brands in U.K. by using the alcohol content as one of the distance measure of product characteristics. Others were dummies that indicate whether the brands belong to the same product type and whether they are brewed by the same firm. The substitutability between brands depends on distance measures. This allows one to test hypotheses such as, ‘brands that have similar alcohol contents are closer substitutes’.

Slade (2004) used the demand elasticities obtained from her DM model in calculating the price-cost margins assuming that multi-product firms play a Bertrand game with differentiated products. Then, she compared these margins with the observed margin that are found by real price and cost data. The difference between the observed margins and those computed after the Bertrand equilibrium showed the part of the coordinated actions of beer producers on the market power exercised in brewery market. She concluded that the market power observed in U.K. brewery can be attributed entirely to unilateral effects and there is no evidence for coordinated effects.

2.4. Conclusion

There are many empirical studies related to the estimation of elasticities of demand for various products in the Turkish market. A survey of them will be presented at the beginning of the Chapter 4. However, the demand elasticities for products or product groups that are analyzed in this dissertation have not been estimated in previous studies. In addition, it is observed that in previous demand studies related to Turkish markets, the level of product classification is not as detailed as specified in this thesis. The reason of this may be the difficulty of having access to data at firm, brand or pack size level or the scope and the purpose of the relevant research itself. In this respect, it can be argued that the elasticities in this dissertation can be seen as the results of a new and original study.

There are also some studies that focused on the econometric estimation of price-cost margins in Turkish manufacturing (Kalkan, 2000; Ceritoğlu, 2004). However, these estimates did not depend on the estimation of demand elasticities. They were estimated using industry level data such as value-added, aggregate material and input costs. The industry classification of the sectors analyzed in these studies is at two-digit level. For this reason, their results cannot be interpreted in assessing the market power in a particular "relevant market", which is naturally much narrower.

In conclusion, by the help of the quality of data that is used in this dissertation, the estimates of the demand elasticities are more specific and more suitable to be used in the analysis of competition policy. As to the models that are used in this dissertation (the linearized AIDS and the *nested logit* models), it can be said that they are among models that are frequently used in the current academic research. It is also known that the *nested logit* model has been used by the economists of the European Commission in analyzing two recent merger cases (De Coninck et. al., 2008).

CHAPTER 3

DATA

The original data set that has been used in the econometric estimations in this dissertation has been kindly provided by *Ipsos / KGM Turkey* which is a private marketing research company in Istanbul.

The data is named Household Consumption Panel Database (HCPD) and is collected by *Ipsos /KGM Turkey* by recording the details of expenditures of households on fast-moving consumer goods. It is at household level and only includes expenditures in "shops" and does not contain information on goods consumed in places, such as restaurants, hotels etc.

It covers the period between January 2000 and May 2006. The coverage of data extends each year and by 2006 it includes information on more than 6000 households living in 34 cities of Turkey. The company has started to collect this data in 1997. The data that is used in this dissertation covers the period between January 01, 2000 and May 31, 2006. Until the end of 2001, HCPD was based on the 12 biggest cities of Turkey including their city centers and districts having populations over 25.000 persons. Then, the coverage of the data has been increased. By 2002, HCPD had covered a sample of 4796 households in 23 cities. This new sample included rural districts with less than 25,000 population and households belonging to social economic group "E". The sampling design has been organized by taking into account the distributions of household size, socio-economic status, age, education level, profession, population of cities and of sub-divisions of cities such as urban, suburban and rural areas.

The numbers of cities, of households and of the transactions reported in the whole sample are shown in the table below.

Table 3.1. The number of cities, of households and of transactions by years

Years	2000	2001	2002	2003	2004	2005	2006
Number of cities	12	12	23	27	27	28	34
Number of households	4,030	3,608	4,796	4,979	5,853	5,700	6,243
Number of transactions	1,968,783	1,925,768	2,257,276	2,268,377	2,434,742	2,829,275	1,259,793

Author's own calculations using Ipsos/KGM data.

In HCPD, households report the date of the shopping trip, the store chosen, the brand name and the package of the product bought, the quantity purchased and the price paid. The data also includes information on some of the product characteristics. The demographics of the households such as age, household size, socio-economic status are also covered in the data.

The names of the stores are generally explicitly reported. In addition, the data allows grouping the shops into broad categories of supply channel such as "chain stores", "non-chain shops", "discounter shops", "medium markets-groceries" "wholesalers", "kiosks" and "pen bazaars". Some shops are stated by their private name such as "*Carrefour", "Real", "Migros", "Tansaş"* etc. On the other hand, small business groceries or medium markets are grouped under the group name "medium markets-groceries" instead of being recorded with their own names. There is also category *"others"* for other shops. Nearly 35-40% of the transactions have been done in small groceries (bakkal) and medium shops.

Households are grouped into four social-economic statuses (SES) such as AB, C1, C2 and DE. The distribution of households by these groups and years are given in the table below.

Table 3.2. Distribution of households by social-economic status

SES GROUPS YEARS	AB	C1	C2	DE	Total
2000	0.23	0.30	0.30	0.17	**1.00**
2001	0.26	0.31	0.27	0.16	**1.00**
2002	0.25	0.32	0.24	0.19	**1.00**
2003	0.25	0.31	0.21	0.22	**1.00**
2004	0.22	0.30	0.21	0.27	**1.00**
2005	0.20	0.27	0.21	0.32	**1.00**
2006	0.19	0.27	0.20	0.34	**1.00**

Author's own calculations using Ipsos/KGM data.

The share of AB group is between 0.19 and 0.26 during the whole period. The share of DE group has increased in the two last year to 0.30 and 0.32 whereas it was around 0.20 in previous years. C2 group has decreased from 0.30 to 0.20 between 2000 and 2006.

The table below shows the distribution of households by their size.

Table 3.3. Distribution of the household-size by years

HH Size Years	1-2	3-4	5+	Total
2000	0.12	0.55	0.33	1.00
2001	0.10	0.59	0.32	1.00
2002	0.08	0.56	0.35	1.00
2003	0.08	0.57	0.35	1.00
2004	0.09	0.56	0.35	1.00
2005	0.10	0.56	0.34	1.00
2006	0.10	0.57	0.33	1.00

Author's own calculations using Ipsos/KGM data.

Households with one or two persons constitute 10% of the sample in average. 57% of the households in the sample have three or four persons in the family. The remaining 34% of the sample are larger households having five or more persons.

In the table below, the distribution of the households by cities for every year is presented.

Table 3.4. Distribution of households by cities and years

NO	YEARS / CITIES	2000 (14)	2001 (14)	2002 (23)	2003 (27)	2004 (27)	2005 (28)	2006 (34)
1	**ADANA**	0.05	0.06	0.05	0.05	0.04	0.04	0.03
2	**ANKARA**	0.14	0.13	0.09	0.09	0.08	0.07	0.07
3	**ANTALYA**	0.03	0.03	0.04	0.03	0.03	0.04	0.03
4	**BALIKESIR**	-	-	-	0.01	0.02	0.02	0.02
5	**BOLU**	-	-	-	-	-	-	0.01
6	**BURSA**	0.06	0.06	0.05	0.05	0.05	0.05	0.04
7	**CANKIRI**	-	-	0.02	0.02	0.02	0.02	0.02
8	**CORUM**	-	-	-	-	-	-	0.00
9	**DENIZLI**	-	-	-	0.00	0.01	0.02	0.02
10	**DIYARBAKIR**	-	-	0.02	0.03	0.04	0.04	0.03
11	**ERZURUM**	0.02	0.02	0.02	0.03	0.04	0.04	0.03
12	**ESKISEHIR**	-	-	-	0.02	0.02	0.02	0.01
13	**GAZIANTEP**	0.03	0.05	0.04	0.04	0.04	0.04	0.03
14	**HATAY**	-	-	-	-	-	-	0.01
15	**ISTANBUL**	0.40	0.40	0.32	0.27	0.23	0.22	0.24
16	**IZMIR**	0.13	0.12	0.09	0.07	0.06	0.07	0.06
17	**KAYSERI**	0.02	0.02	0.02	0.02	0.02	0.04	0.03
18	**KOCAELI**	0.03	0.03	0.02	0.02	0.02	0.03	0.02
19	**KONYA**	0.05	0.05	0.04	0.05	0.04	0.03	0.03
20	**KUTAHYA**	-	-	-	-	-	0.00	0.01
21	**MALATYA**	-	-	0.02	0.02	0.02	0.02	0.02
22	**MARDIN**	-	-	-	-	-	-	0.01
23	**MERSIN**	-	-	0.02	0.02	0.04	0.04	0.03
24	**MUGLA**	-	-	0.02	0.02	0.02	0.02	0.02
25	**NIGDE**	-	-	-	-	-	-	0.01
26	**ORDU**	-	-	0.03	0.02	0.04	0.04	0.03
27	**OSMANIYE**	0.02	0.02	0.02	0.02	0.02	0.02	0.02
28	**SAMSUN**	0.02	0.02	0.02	0.01	0.02	0.02	0.02
29	**TEKIRDAG**	-	-	0.02	0.02	0.02	0.02	0.02
30	**TRABZON**	-	-	-	0.01	0.03	0.02	0.01
31	**USAK**	-	-	0.02	0.02	0.02	0.02	0.02
32	**VAN**	-	-	-	-	-	-	0.01
33	**YALOVA**	0.00	0.01	0.01	0.01	0.02	0.02	0.02
34	**ZONGULDAK**	-	-	0.01	0.01	0.01	0.01	0.01
		-	-	-	-	-	-	-
	Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Author's own calculations using Ipsos/KGM data.

Households from Istanbul constitute 40% of the all households in the sample in 2000 and 2001. Their share decreases gradually in the following years and reach to 24% in

2006. Ankara and İzmir are in the second and the third rank although their shares fall to around 7% and 6% in 2006.

Table 3.5. Joint distribution of expenditures and SES groups in 2005

2005 Expenditure Groups	Shares by SES Groups AB	C1	C2	DE	SUM	Shares by Products AB	C1	C2	DE	SUM
OPEN FOOD PRODUCTS	0.27	0.28	0.20	0.26	1.00	0.18	0.18	0.18	0.19	0.18
MEAT PRODUCTS	0.27	0.28	0.20	0.25	1.00	0.09	0.09	0.09	0.09	0.09
FOOD PRODUCTS	0.22	0.26	0.21	0.31	1.00	0.13	0.15	0.17	0.19	0.16
BEVERAGES	0.32	0.28	0.18	0.21	1.00	0.15	0.13	0.11	0.10	0.12
CONFECTIONARY	0.27	0.27	0.21	0.25	1.00	0.09	0.09	0.09	0.09	0.09
MILK PRODUCTS	0.27	0.29	0.20	0.24	1.00	0.16	0.16	0.16	0.15	0.16
OIL	0.23	0.28	0.21	0.28	1.00	0.05	0.06	0.06	0.07	0.06
PAPER PRODUCTS	0.28	0.29	0.21	0.22	1.00	0.04	0.03	0.03	0.03	0.03
HAIR PRODUCTS	0.28	0.29	0.20	0.22	1.00	0.02	0.02	0.02	0.01	0.02
BODY PRODUCTS	0.29	0.29	0.20	0.22	1.00	0.03	0.03	0.03	0.03	0.03
DETERGENTS (LAUNDRY-DISHWASHING)	0.23	0.28	0.21	0.27	1.00	0.04	0.04	0.05	0.05	0.04
OTHER CLEANING	0.30	0.29	0.20	0.21	1.00	0.02	0.01	0.01	0.01	0.01
OTHER	0.35	0.28	0.18	0.19	1.00	0.00	0.00	0.00	0.00	0.00
TOTAL						1.00	1.00	1.00	1.00	1.00

Author's own calculations using Ipsos/KGM data.

The table above shows the distribution of expenditures by SES groups and the expenditure share of product groups in the budgets of different SES groups. Households of DE and C2 groups spend less in beverages than households of AB and C1. The sum of the expenditures done by AB and C1 households make up more than 60% of the all expenditures in beverages. The part of DE households in beverage expenditures rises from 13% to 21% between 2000 and 2006 (not shown in this table). The share of the beverages in the budgets for all fast-moving consumer goods lies between 10% and 15% for different SES groups.

Table 3.6. Expenditure shares of products in the beverage industry (percentage))

Sector / Year	2000	2001	2002	2003	2004	2005	2006
ALCOHOLIC BEVERAGES (NON-BEERS)	0.068	0.077	0.078	0.096	0.089	0.100	0.110
BEERS	0.059	0.060	0.062	0.067	0.067	0.070	0.057
BOTTLED WATERS	0.115	0.119	0.110	0.115	0.116	0.162	0.173
BUTTERMILK	0.005	0.005	0.005	0.005	0.006	0.006	0.007
ENERGY & SPORT DRINKS	0.000	0.001	0.001	0.001	0.002	0.001	0.001
FRUIT JUICES	0.084	0.087	0.081	0.071	0.067	0.066	0.079
GRANULATED DRINKS	0.029	0.030	0.029	0.025	0.020	0.012	0.005
ICED TEAS	0.001	0.001	0.002	0.001	0.001	0.001	0.001
INSTANT COCOA DRINKS	0.011	0.010	0.012	0.015	0.016	0.014	0.014
INSTANT COFFEES AND CREAMS	0.052	0.044	0.042	0.037	0.039	0.044	0.056
MALT DRINKS	-	-	-	-	0.000	0.000	0.000
MINERAL WATER	0.040	0.030	0.025	0.024	0.028	0.026	0.024
SOFT DRINKS	**0.300**	**0.299**	**0.300**	**0.285**	**0.290**	**0.265**	**0.225**
TEAS	0.208	0.217	0.236	0.240	0.245	0.219	0.236
TURKISH COFFEES	0.027	0.021	0.019	0.017	0.014	0.014	0.014
TOTAL	**1**	**1**	**1**	**1**	**1**	**1**	**1**

Author's own calculations using Ipsos/KGM and TURKSTAT data.

In Table 3.6, it is shown that the expenditure share of soft drinks is between 22% and 30% among all beverage types including alcoholic beverages as well.

Table 3.7. Expenditure shares of beverages for each SES groups (2000-2006)

BEVERAGES	AB	C1	C2	DE
ALCOHOLIC BEVERAGES	0.139	0.090	0.059	0.047
BEERS	0.071	0.067	0.060	0.056
BOTTLED WATERS	0.174	0.140	0.113	0.082
BUTTERMILK	0.007	0.006	0.005	0.004
ENERGY & SPORT DRINKS	0.001	0.001	0.001	0.000
FRUIT JUICES	0.078	0.069	0.075	0.069
GRANULATED DRINKS	0.014	0.019	0.022	0.024
ICED TEAS	0.002	0.001	0.001	0.000
INSTANT COCOA DRINKS	0.014	0.014	0.014	0.013
INSTANT COFFEES AND CREAMS	0.042	0.044	0.049	0.041
MALT DRINKS	0.000	0.000	0.000	0.000
MINERAL WATER	0.031	0.029	0.024	0.018
SOFT DRINKS	**0.244**	**0.280**	**0.303**	**0.301**
TEAS	0.165	0.223	0.260	0.329
TURKISH COFFEES	0.017	0.017	0.016	0.015
TOTAL	**1**	**1**	**1**	**1**

Author's own calculations using Ipsos/KGM data.

From the table above, it is understood that richer households spend a lower share of their budget for soft drinks than poorer households. On the contrary, the share of the alcoholic beverages is larger for AB group than it is for other groups.

The expenditures on beverages can be analyzed in a more detailed way by calculating some statistics at "shopping basket" level. A shopping basket is comprised of the items purchased by the same family in the same day. By 2005, the average of the deflated shopping basket expenditures is 7.04 TL (nearly 5 U.S. Dollars). In average, there are 1.09 different types of beverage in a basket. (Types are given in the table below, i.e. *soft drinks, tea, beer* are different types). The table below shows some statistics for each beverage type for their position in shopping baskets.

Table 3.8. Beverages in Shopping Baskets (2005)

Basket Analysis / Beverages	**Soft Drinks**	**Fruit Juices**	**Bottled Water**	**Mineral Water**
Ratio of baskets containing the beverage	0.106	0.036	0.060	0.016
Exp. share of the bev. in a basket (mean)	0.058	0.013	0.051	0.005
Exp. share of the bev. in a basket (std. dev)	0.206	0.095	0.215	0.062
Avg. unit of the bev. in a basket	1.36	2.34	1.31	5.38

Author's own calculations using Ipsos/KGM data.

According to the table below, soft drinks and fruit juices have been bought in 10% and 6% of all the shopping baskets, respectively. The ratio of the other beverage types is lower. The expenditures for soft-drinks account for 5.8% of the total basket expenditures in average. Only 1.36 units of soft drinks are bought in a basket in average. The average number of units of mineral water is 5.38. According to the table below, in average, 92.38% of the baskets include only one type of beverage (given that any type has been purchased).

Table 3.9. Distribution of the number of the different beverage types (2005)

Number of different beverage types in shopping baskets	%
1	92.38
2	6.82
3	0.70
4	0.09
5	0.01

Author's own calculations using Ipsos/KGM data.

The table below presents the frequency of purchasing beverages in multiple units in shopping baskets.

Table 3.10. Multiple units of beverage in a shopping basket, 2000-2006.

2000-2006	Soft Drinks	Fruit Juices	Bottled Water	Mineral Water
Unit	**%**	**%**	**%**	**%**
1	79.4	50.3	70.3	18.0
2	14.4	25.5	8.3	11.5
3	2.5	6.7	1.1	3.9
4	1.9	6.2	0.7	6.8
5	0.5	3.5	0.5	2.8
6	0.6	2.3	0.2	45.9
6+	0.7	5.5	18.9	11.1
Total	1	1	1	1

Author's own calculations using Ipsos/KGM data.

It is observed that mineral waters are bought 6 units in 45% of the shopping baskets that include this beverage. This may be a result of the fact that mineral waters are usually marketed in packs of 6 units. Soft drinks are generally bought in a single unit. This is the case in 79.4 % of the baskets that include soft drinks. The frequency which fruit juices are bought as single units is relatively low (50%) compared to soft drinks. Conversely, the ratio of buying 2 units of fruit juices is high (25% of the baskets) with respect to soft drinks (14% of the baskets).

According to the results of the last two analyses, it will not be unrealistic to assume that soft-drink products, especially cola, are bought as single units in order to satisfy the assumption behind the discrete-choice models (the simple and the *nested logit* models) that will be specified for estimating the demand for cola products in Chapter 5.

CHAPTER 4

ESTIMATION OF THE ELASTICITIES OF DEMAND AND DEFINITION OF THE RELEVANT PRODUCT MARKET IN THE TURKISH BEVERAGE INDUSTRY

4.1. Introduction

In this chapter a demand system for beverage products in Turkish market is estimated using the Almost Ideal Demand System that has been developed by Deaton and Muellbauer (1980) in a multi-stage budgeting framework.

The motivation for this research was originated from two different statements of the Turkish Competition Authority (TCA) on the definition of the relevant product market concerning the beverage industry. The first one came out after a decision, in 2004, in which the claims of predatory pricing strategies by *Coca Cola Dağıtım ve Satış A.Ş.*[2] in "clear carbonated soft drink market" was investigated (TCA, 2004). After having implemented a series of Granger causality tests on prices of cola products and alternative beverages, the TCA decided that the relevant product market is "the market for carbonated soft drinks" and the company is dominant on this market. Three years later, in another decision concerning the withdrawal of the exemption of the exclusive dealing agreements between Coca Cola A.Ş. and its distributors, the TCA has conducted a "shock analysis" in order to define the relevant product market (TCA, 2007). In the "shock analysis", the advertising expenditures of Coca Cola A.Ş. have been analyzed after the entry of *Cola Turca* in market as a new competitor. It was found that the advertising expenditures of Coca Cola in cola segment increased significantly higher than those in other segments of the carbonated soft drinks. At the end, the TCA stated that the results of the shock analysis may constitute a substantial evidence for defining the relevant market as "the market for

[2] Coca Cola Dağıtım ve Satış A.Ş is a joint venture company, controlled by The Coca Cola Company (TCCC) and Anadolu Group, one of the biggest business groups in Turkey.

cola products", which is a narrower market than the one defined in the previous decision. Finally, the TCA assessed also the market power in "the market for carbonates soft drinks", and concluded that there is enough evidence for withdrawing the exemption according to the both of these relevant market definitions.

In his defense in the first case above, Coca Cola A.Ş. argued that the relevant product market is the "market for commercial beverages". This is obviously a larger market than those defined by the TCA. The acceptance of such market definition by the TCA might have resulted in rejecting the claims of abuse of dominance.

Although the TCA used some empirical techniques in defining the relevant product market in both of these decisions, his conclusion did not depend on a more sophisticated analysis that include estimation and assessment of price elasticities of demand for cola and alternative beverages. Cross price elasticities between alternative products could have been estimated in order to identify products which can be considered as substitute or complementary with respect to each other. For the same purpose, the approach that is known as "SSNIP[3] test" could have been implemented. The SSNIP test asks whether a price increase by 5% or 10% will be profitable for a hypothetical monopolist which is the sole supplier of a certain product. If the answer to this question is yes, the test concludes that there is no effective competitive pressure on these products and the relevant market is limited to this particular product. If the answer is no, the test suggests that there are some strong alternatives to which consumers would shift. Then, in the second step, the test assumes that the hypothetical monopolist owns both the product in the first set and its closest alternative and asks again whether a 5-10% price increase would be profitable. There is no consensus in literature whether the prices of the closest alternative should also be increased or hold constant in implementing the SSNIP test (Filistrucchi, 2008). The price increase may be profitable if sufficient amount of demand shifts to the closest substitute which is now assumed to be supplied by the

[3] SSNIP: Small but Significant Non-Transitory Increase in Prices

hypothetical monopolist. On the other hand, the gains from the demand shifted to the second product and from the increased price may not be large enough to compensate the loss caused by the decrease in demand for the first product. The test continues in this logic until a set of product is found for which a price increase of 5-10 % is profitable for the monopolist who possess all of them. This final set of products determines the boundaries of the relevant product market. In order to implement this test, a relatively simple analysis that depends on few number of data, has been developed (i.e. critical loss analysis), however a more sophisticated assessment should depend on the econometric estimation of the own-price and cross price elasticities of demand. For this purpose, in this chapter a multi-stage budgeting approach will be used to estimate the demand structure for beverage products such as cola, flavored and clear carbonated soft drink, fruit juice, mineral water, water, tea, instant coffee, Turkish coffee, beer and rakı[4]. Using parameters of the demand system, the elasticities of demand will be calculated. Then, the estimated elasticities will be used for implementing a SSNIP test for cola products.

4.2. Previous Demand Studies for Turkey

There are many studies that estimate elasticities of demand for various commodities in Turkey, however, to our knowledge, none of them focused on the products analyzed in this chapter. Most of them estimated the demand for commodities that are classified in upper levels of product classification. For example, Koç and Alpay (2003) estimated demand elasticities for aggregate commodity and services such as, clothing, education, entertainment, furnishing, health, housing, tourism and transportation. Erdil (2003) estimated demand elasticities for agricultural products that belong to categories of cereals, meats, diary products and oils for Turkey and other OECD countries. Koç (1999) studied the demand for meat and fish products in Turkey. Koç, Dölekoğlu and Ertürk (2001) estimated demand structure for vegetable

[4] *Rakı* is a spirit with high alcohol content. It is usually drunk with meals.

oil and butter products. Koç and Tan (2001) investigate the effects of the household composition on diary products. Only in Akbay, Bilgiç and Miran (2008), demand elasticities for tea and coffee have been reported, however those for soft drinks and other beverages have not been estimated. In this chapter, the elasticities of demand for beverage products will be estimated with a classification that is suitable for relevant market definition in Turkish beverage industry. The properties of this classification are explained in the next section.

4.3. Two-Stage Budgeting For Beverage Products in Turkey

Estimation of a complete demand system would necessitate taking into account hundreds of different products and estimating huge number of parameters. In order to address this difficulty, a "multi-stage budgeting" approach can be used to estimate demand systems. In multi-stage budgeting, consumers are assumed to allocate their total income between some broad categories of goods and services (i.e. rent, education, health, food, transportation etc.) and then, re-allocate the budget for one of these categories between the goods that belongs to the same category (i.e. meat products, diary products etc. for groups that belongs to food category). Same type of allocation can be designed for lower stages.

Edgerton (1997) discusses the conditions for the appropriateness of the multi-stage budgeting. He states that in an ideal multi-stage budgeting, unconditional and conditional Marshallian demand functions must yield the same result (Edgerton, 1997: 63). *Unconditional* (or total demand) Marshallian demand functions can be defined as the demand functions for the products that could be obtained without dividing budget allocation into stages. On the other hand, *conditional* (or within group) Marshallian demand functions are functions that can be defined if a given group budget is allocated between goods in that group.

The consistency of the multi-stage budgeting requires some conditions to be hold. The first condition is about the consistency of the second (or lower) stages of the budgeting. This requires that the “weak separability” assumption about the consumer preferences needs to be satisfied. Weak separability means that preferences for products in one group are independent of the goods outside the group. This means that a change in price of a commodity in one group is assumed to affect the demand for all commodities in another group in the same manner (Edgerton, 1997:62-63). Edgerton thinks that although this condition is rigorous it is not implausible.

For the consistency of the first stage (or, of all stages but the last stage) Edgerton states that preferences need to be homothetic for commodities in the same group. Or, the utility function should be additive between groups and indirect subutility functions need to be of Gorman generalized polar form. These conditions for the higher stages (but not the last stage) are needed in order to ensure that prices of all goods can be replaced by a single price index. Edgerton (1997:63) says that these conditions are very restrictive and suggests that an approximate justification need to be established for the use of price and quantity indices for the aggregate demand functions. He argues that Paasche or Laspeyres indices can be used as an approximation to the true cost of living index (TCOL), which is the ratio of the group cost function at two price levels (the current price p_r and the base price π_r) at a given reference subutility stage u_r; $P_r = \frac{c_r(u_r, p_r)}{c_r(u_r, \pi_r)}$. His argument depends on the theoretical requirement that price indices need to be invariant to the utility level (this is exactly possible if preferences are homothetic), on the fact that Paasche and Laspeyres indices are based on constant utility level (base or current stages) and on the empirical observation that most prices indices are highly collinear (Edgerton, 1997: 64).

In this thesis, the Tornqvist price indices are used as the group price indices, using the argument that all price indices of the form $\sum w_k . p_k$ will be highly correlated with each other (Edgerton, 1997 64). The formula of the Tornqvist price index for the products k belonging to the group K is given as:

$$\ln P_{Kt} = \sum_{k=1}^{N} (\frac{w_{k0} + w_{kt}}{2}).\ln(\frac{p_{kt}}{p_{k0}}) \qquad (4.1)$$

where zero and "t" are subscripts for the base and current periods, w's are weights, p's are prices. The advantage of the Tornqvist price index over other indices is that it is free of unit of measurement.

In this chapter, households are assumed to allocate a certain proportion of their total income for expenditures of the fast-moving consumer goods. In a complete system of demand the allocation of budget between fast-moving consumer goods and other goods and services such as education, transportation, rent, health, food-away from-home, entertainment etc. must be specified and estimated. However, this level of budgeting is ignored in this chapter due to lack of data. The budgeting specification in this chapter began with assuming those households distribute their budget for fast-moving consumer products between commodity groups such as beverages, food, cleaning products, personal care products and "other" products that can be purchased in supermarkets or groceries. This allocation constitutes the first stage of the budgeting assumed in this chapter. Having decided on how much to spend for beverages, then households are assumed to allocate their beverage budget between products such as cola, flavored and clear carbonated soft drink, fruit juice, mineral water, water, tea, instant coffee, Turkish coffee, beer and rakı. This is the second-stage of the budgeting. It is also possible to model allocations for brands within each of these beverage products as the third stage, however for the purpose of this chapter, (i.e. for finding whether cola constitute a distinct relevant product market) the two-stage budgeting as explained above is sufficient. The stages of the budgeting used in this chapter are shown in the table below. After deciding on a relevant product market, the demand elasticities for brands belonging to this relevant product market will be estimated in Chapter 5.

Table 4.1. Two-stage budget allocation for beverage products

1st STAGE : CATEGORIES IN FAST-MOVING CONSUMER GOODS

- BEVERAGES
- FOOD PRODUCTS
- CLEANING PRODUCTS
- PERSONAL CARE PRODUCTS
- OTHER

2nd STAGE : BEVERAGE GROUPS

- Cola (i.e. Coca Cola, Pepsi etc.)
- Flavored Carbonated Soft Drinks (i.e. Fanta, Yedigün, Schweppes Lemon etc.)
- Clear Carbonated Soft Drinks (i.e. Sprite, Çamlıca, Uludağ, Seven up etc.)
- Fruit Juice
- Mineral Water
- Bottled Water
- Tea
- Instant Coffee
- Turkish Coffee
- Beer
- Rakı

4.4. Almost Ideal Demand System (AIDS)

The model that will be used in estimating the demand system for beverages is a version of the Almost Ideal Demand System (AIDS) that was developed by Deaton and Muellbauer (1980a). This section presents the theoretical properties of the AIDS model.

The AIDS model has several advantages compared to other demand models like Rotterdam model and translog model (Deaton and Muellbauer, 1980:312). First, the AIDS model is derived from a particular cost function that can be regarded as a local second-order approximation to the underlying cost function. Second, the equations to be estimated contain sufficient parameters to be considered as a local first-order approximation to any demand system. Another advantage of the AIDS model is that it allows aggregation over consumers. In addition, it allows imposing and testing theoretical restrictions of homogeneity and symmetry. On the other hand, the theoretical restriction of concavity of cost function cannot be directly restated into a condition on the matrix of the coefficients of the model (Erdil, 2003:37). Another disadvantage is that the original AIDS model must be estimated using non-linear estimation techniques.

In the following part the derivation of the AIDS model is presented. This part is mainly drawn on (Deaton and Muellbauer, 1980: 313). The derivation of the AIDS model starts from assuming a specific class of preferences, known as PIGLOG class that can be represented by an expenditure function of the following form:

$$\log c(u,p) = (1-u)\log\{a(p)\} + u\log\{b(p)\} \tag{4.2}$$

where “u” is between 0 (subsistence) and 1 (bliss). “a(p)” and “b(p)” are positive linearly homogenous functions that can express the cost of subsistence and bliss, respectively. As shown in Muellbauer (1975, 1976), this type of preferences permit exact aggregation over consumers. This means that the market demand can be represented as if it is the outcome of the decisions of a rational representative consumer.

If the specific functional forms for a (p) and b (p) are chosen as shown below,

$$\log a(p) = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2}\sum_k \sum_j \gamma_{kj}^* \log p_k \log p_j \tag{4.3}$$

$$\log b(p) = \log a(p) + \beta_0 \prod_k p_k^{\beta_k} \tag{4.4}$$

Then, the AIDS expenditure function can be written as follows:

$$\log c(p,u) = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2}\sum_k \sum_j \gamma_{kj}^* \log p_k \log p_j + u\beta_0 \prod_k p_k^{\beta_k} \tag{4.5}$$

where p's are prices, u is the utility and $\alpha_i, \beta_i, \gamma_{ij}^*$ are parameters.

The choice of these particular functional forms for a(p) and b(p) ensure that this expenditure function has a flexible functional form. That is, it has enough parameters that allow that the derivatives $\frac{\partial c}{\partial p_i}, \frac{\partial c}{\partial u}, \frac{\partial^2 c}{\partial p_i \partial p_j}, \frac{\partial^2 c}{\partial u \partial p_i}, \frac{\partial^2 c}{\partial u^2}$ exist at any single point.

Provided that $\sum_i \alpha_i = 1, \sum_j \gamma_{kj}^* = \sum_k \gamma_{jk}^* = \sum_j \beta_j = 0$, this expenditure functions is linearly homogenous in prices.

The derivative of the expenditure function with respect to log prices can be written;

$$\frac{\partial \log c(u,p)}{\partial \log p_i} = \frac{\partial c(u,p)}{\partial p_i} \frac{p_i}{c(u,p)}. \tag{4.6}$$

Using the Shephard's Lemma $\frac{\partial c(u,p)}{\partial p_i} = q_i$, the equation (4.6) will be equal to budget share of the product "i".

$$\frac{\partial \log c(u,p)}{\partial \log p_i} = \frac{\partial c(u,p)}{\partial p_i} \frac{p_i}{c(u,p)} = \frac{q_i p_i}{c(u,p)} = w_i. \tag{4.7}$$

Taking the derivative of the AIDS expenditure function (4.5) with respect log prices yields,

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i u \beta_0 \prod_k p_k^{\beta_k} \tag{4.8}$$

where $\gamma_{ij} = \frac{1}{2}(\gamma_{ij}^* + \gamma_{ji}^*)$. (4.9)

Using the idea that for a utility maximizing consumer the total expenditure (x) will be equal to the expenditure function c(u,p), from (4.5), "u" can be written;

$$u = \frac{1}{u\beta_0 \prod_k p_k^{\beta_k}}[\log x - (\alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2}\sum_k \sum_j \gamma_{kj}^* \log p_k \log p_j)] \quad (4.10)$$

If this is put in (4.8), the budget share of the product i can be obtained as follows:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(\frac{x}{P}) \quad (4.11)$$

where, $\ln P = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2}\sum_k \sum_j \gamma_{kj}^* \log p_k \log p_j$ (4.12)

is a price index.

The equations (4.11) and (4.12) give one of the demand equations to be estimated in the AIDS.

4.4.1. Restrictions of the Economic Theory

Economic theory requires demand functions to satisfy some restrictions such as adding-up, homogeneity in price, symmetry, and negativity of the expenditure function.

Adding-up restriction refers to the theoretical requirement that the demand over all commodities must sum to the budget (Deaton and Muellbauer, 1980b:15). In other words, the budget shares of all products must sum up to one: $\sum_{i=1}^{n} w_i = 1$. In terms of the parameters of the AIDS model in (4.11), the adding-up restrictions are

$$\sum_{i=1}^{n} \alpha_i = 1, \quad \sum_{i=1}^{n} \gamma_{ij} = 0, \quad \sum_{i=1}^{n} \beta_i = 0 \quad (4.13)$$

The restriction of homogeneity in prices in the AIDS model is expressed as

$$\sum_j \gamma_{ij} = 0 \tag{4.14}$$

The symmetry restriction comes from the fact that the cross-price derivatives of the Hicksian demands should be symmetric:

$$\frac{\partial h_i(u,p)}{\partial p_j} = \frac{\partial h_j(u,p)}{\partial p_i}, for\ i \neq j \tag{4.15}$$

The symmetry restriction in the AIDS model is shown by $\gamma_{ij} = \gamma_{ji}$. (4.16)

The negativity of the expenditure function means that the Slutsky matrix is negative semi-definite and the expenditure function is concave. As given by the Slustky equation, the elements of the Slustky matrix are the derivatives of the Hicksian demands with respect to prices:

$$s_{ij} = \frac{\partial h_i}{\partial p_j} = \frac{\partial q_i}{\partial x} q_j + \frac{\partial q_i}{\partial p_j}. \tag{4.17}$$

Parameters satisfying the adding-up restrictions can be calculated after estimating the model (4.11). The homogeneity and symmetry restrictions can be imposed in a restricted version of the model (4.11). The homogeneity and symmetry restrictions can be tested by comparing the unrestricted model with the restricted model. The negativity restriction can be checked by calculating the eigenvalues of the Slutsky matrix (Deaton and Muellbauer, 1980a: 316).

4.4.2. Aggregation Over Consumers

In the empirical work presented in this chapter, the AIDS model has been estimated using aggregated data. In most of the previous studies that use the AIDS model with aggregated data, the "total expenditures *per capita* ($\bar{x}$)" have been used to replace the variable "*x*" that takes place in the equation (4.11) above. In this chapter, "a *representative* budget level x_0" has been used in order to comply with the aggregation theory behind the aggregate AIDS model. The section below presents how the AIDS model is related to the aggregation theory.

In models that use aggregated data, there are two important questions. The first is about whether there exists an aggregate demand function that has the same functional form of the micro demand function. The second question is whether this aggregate function is able to satisfy restrictions derived from theory of utility maximization that depends on the behaviors of an individual consumer (Thomas, 1987:66). "Exact aggregation" is possible only if the aggregate consumer behavior can be seen as if it was the outcome of the decisions of single consumer who maximizes his utility. Deaton and Muellbauer (1980b) present the conditions under which "exact aggregation" is possible.

The preferences (or utility functions) of the "Gorman polarized form" are necessary and sufficient for "exact aggregation." Under this type of preferences, the expenditure function of an individual household is described as follows:

$$c^h(u^h, p) = a^h(p) + u^h b(p) \tag{4.18}$$

in which $a^h(p)$ is a function of prices and it may vary across households (h), whereas $b(p)$ may not. Utility varies also across households. Marshallian demand functions can be derived by inverting the expenditure function (to obtain the indirect utility function) and by using the Roy's identity. The indirect utility function can be written as follows;

$$v^h(p, x^h) = \frac{x^h - a^h(p)}{b(p)}. \tag{4.19}$$

After applying the Roy's Identity the Marshallian demand function of the household h for the product "*i*" can be obtained as follows (Deaton and Muellbauer, 1980b,150-151);

$$q_i^h = \alpha_i^h(p) + \beta_i(p)x^h \tag{4.20}$$

where, $\alpha_i^h(p) = \dfrac{\partial a^h(p)}{\partial p_i} - \beta_i(p)a_p^h(p)$ and $\beta_i(p) = \dfrac{\partial \log b(p)}{\partial p_i}$

After aggregating and taking the average over consumers, the demand functions (4.20), can be written as follows;

$$\overline{q}_i = \alpha_i^h(p) + \beta_i(p)\overline{x} \tag{4.21}$$

Therefore, provided that the individual preferences are of the Gorman polarized form and individuals (households) maximize their utility, the average demand function will automatically be consistent with utility maximization (Deaton and Muellbauer, 19b:150-151). In fact, a demand function of the form ($q_i^h = \alpha_i^h(p) + \beta_i(p)x^h$) is necessary and sufficient for getting the aggregate demand function ($\overline{q}_i = \alpha_i^h(p) + \beta_i(p)\overline{x}$) (Deaton and Muellbauer, 1980b: 151). This implies that provided that the general theoretical restrictions are satisfied by the micro demand functions, they will be satisfied also by the aggregate demand functions. However, the only cost function that leads to demand functions in (4.21) is the cost function implied by the preferences of the Gorman polar form (Thomas, 1997:67). In other words, if the demand functions of the form in (4.21) are assumed, then the cost function related to the Gorman polar form preferences is necessarily implied.

On the other hand, the assumption that preferences are of the Gorman polarized form is very restrictive in the sense that they give rise to linear Engel curves which have the same slope for different households (Thomas, 1997:68). However, Muellbauer (1975 and 1976) demonstrated that aggregation with non-linear Engel curves is possible. The conditions under which exact aggregation is possible with non-linear Engel curves are explained also in Deaton and Muellbauer (1980b: 154-158) and Thomas (1997:68).

For aggregation with non-linear Engel curves, Muellbauer states that the average aggregate demands $(\overline{w}_i)$ need to be expressed as function of prices and of the total expenditure of "*representative*" household (x_0), rather than as a function of the "mean" expenditure $(\overline{x})$ (Thomas, 1997: 68). The average aggregate demand or the share of aggregate expenditure on good "*i*" in the aggregate budget of all households can be expressed as the weighted average of the individual household budget shares for the good "*i*":

$$\overline{w}_i = \frac{\sum_h p_i q_{ih}}{\sum_h x_h} = \sum_h \frac{x_h}{\sum_h x_h} . w_{ih} \tag{4.22}$$

where weights are proportional to the expenditure of each household.

The representative budget (x_0) is a function of the distribution of expenditures and of the prices. In other words, the representative budget (x_0) will be some point in the distribution of expenditures. The position of it will be determined by the degree of non-linearity of the Engel curves and the prices.

In order that the average aggregate budget share of the product "*i*" can be expressed as a function of the representative budget (x_0), a particular utility function $\psi(x, p)$ and a corresponding expenditure function $c(u, p)$ should be defined. In this case for some $u_0 = \psi(x_0, p)$, the average aggregate budget share for *i*th good can be expressed as follows:

$$\overline{w}_i = w_i(u_0, p) = \frac{\partial \log c(u_0, p)}{\partial \log p_i} = \sum_h \frac{x_h}{\sum_h x_h} \frac{\partial \log c^h(u^h, p)}{\partial \log p_i} \quad (4.23)$$

where $u^h = \psi(x^h, p)$ and $c^h(u^h, p)$ are utility and expenditure functions for household "h" (Deaton and Muellbauer, 1980b, 154).

The particular cost function that makes "exact aggregation" possible in the AIDS model is expressed as follows:

$$\log c^h = \log k^h + (1 - u^h)\log a(p) + u^h \log b(p) \quad (4.24)$$

(for the household "h")

$$\log c = (1 - u^o)\log a(p) + u^o \log b(p) \quad (4.25)$$

(for the representative household)

The term k^h is a scalar that shows a measure for the size of household. It also takes into account the demographic composition of the household. For the representative household it is normalized to one; k^h=1.

The individual and the representative budget share equations that can be derived from the expenditure functions above by applying the Shephard's Lemma are given below:

$$w_{ih} = \varsigma_i^* + \eta_i^* \log(\frac{x^h}{k^h}) \qquad \text{(for the household "h")} \quad (4.26)$$

$$\overline{w}_i = \varsigma_i^* + \eta_i^* \log(x_0) \qquad \text{(for the representative household)} \quad (4.27)$$

The terms ς_i^* and η_i^* are functions of prices, $\overline{w}_i$ is the average aggregate budget share for the good "i" and x_0 is the representative expenditure level. The Engel curve that corresponds to the equation (4.26) is;

$$p_i q_{ih} = \varsigma_i^* + \eta_i^* x_h \log(\frac{x^h}{k^h}) \qquad (4.28)$$

and it is non-linear (Thomas, 1997:69).

Therefore, using the equation (4.22) $\overline{w}_i = \frac{\sum_h p_i q_{ih}}{\sum_h x_h} = \sum_h \frac{x_h}{\sum_h x_h}.w_{ih}$ and an explicit form of the equation (4.26), Deaton and Muellbauer (1980a: 314) show that the share of the aggregate expenditure on the product "*i*" in the aggregate budget of all households can be written as follows:

$$\overline{w}_i = \alpha_i + \sum_j \gamma_{ij} \log p_j - \beta_i \log P + \beta_i \{\sum_h \frac{x_h}{\sum_h x_h} \log(\frac{x_h}{k_h})\} \qquad (4.29)$$

If the same derivation is done using $\overline{w}_i = \varsigma_i^* + \eta_i^* \log(x_0)$ given in equation (4.27), the log of the representative expenditure x_0 in the AIDS model can be expressed as the weighted average of the expenditures of households deflated by the measure of household size and composition;

$$\log(x_0) = \sum_h \frac{x_h}{\sum_h x_h} \log(\frac{x_h}{k_h}) \qquad (4.30)$$

At this point, it will be helpful to comment on the parameter k_h which is used to deflate the budget of the household "h" in order to evaluate the budget in terms of "needs corrected" at "per capita" level. Ideally, the parameter k_h does not include only "the number of persons in a household", but should also incorporate the effects of the composition and of the other characteristics of the household. For example, the effect of the budget of a household consisting of 2 adults and 2 children at age 3 and 4 can be different than that of a household consisting of 2 adults and 2 children at age 17 and 19. However, in the equations that have been in this chapter, the parameter k_h includes only the household size.

Many empirical studies use the "total expenditure per capita" ($\bar{x}$) instead of using the representative level of total expenditures (x_0). In this way, the underlying Engel curves are not restricted to be linear. The data used in this dissertation is at household level and it permits to calculate the representative total expenditure. In order to calculate log (x_0), the monthly total expenditures of each household is deflated by the household size and then its logarithmic value is weighted by the share of the household's total expenditure in the aggregate expenditure.

4.4.3. Linear Approximation for AIDS (LAIDS)

Considering the equation (4.11) and the price index in (4.12), the estimation of the AIDS model requires non-linear estimation techniques. Deaton and Muellbauer (1980a: 316) say that in practice the identification of α_0 can be problematical. They suggest interpreting α_0 as the level of expenditure required for a minimal standard of living (subsistence) when prices are unity. Then, a reasonable value of it can be chosen.

They also suggest that if prices are closely collinear, that is $P \cong \phi P^*$, a simpler estimation method in which the price index $\ln P$ can be approximated by a particular price index $\ln P^*$. Deaton and Muellbauer suggest using the Stone price index: $\ln P^* = \sum_{k=1}^{n} w_k \ln p_k$. It is the price index that is frequently used in the literature.

In this case the model in (4.11) takes the following form,

$$w_i = \alpha_i^* + \sum_j \gamma_{ij} \log p_j + \beta_i \log(\frac{x}{P^*}) \tag{4.31}$$

where, $\alpha_i^* = \alpha_i - \beta_i \ln \phi$. In demand literature, this version of the AIDS model is generally called as Linearized AIDS (LAIDS). $\sum_{i=1}^{n} \beta_i = 0$ is required as an adding-up restriction. $\sum_{i=1}^{n} \alpha_i^* = 0$ is also required so that $\sum_{i=1}^{n} \alpha_i = 0$ is satisfied as another adding-up restriction.

Pashardes (1993) has criticized the presumption that the Stone index provides a good approximation. Buse (1994), by going further, showed theoretically that the Stone index or any other price index similar to it, will yield biased and inconsistent estimates because of omitted variable problem, and it is impossible to obtain consistent estimates even if an instrumental variable estimator is used. However, Buse (1994: 783) added that it is possible for standard (inconsistent) estimators to have reasonable finite sample properties. To investigate these properties, Buse and Chan (2000) carried out Monte Carlo studies and compared “the aggregate bias” and “the trace mean square error” of the elasticities resulting from four different price indices, such as the Stone, the Paasche, the Laspeyres and the Tornqvist indices. The formulas for these indices are as follows:

$$\text{Paasche Index:} \ln P^{Paasche} = \sum_k w_{kt} \ln(\frac{p_{kt}}{p_{k0}}) \tag{4.32}$$

$$\text{Laspeyres Index:} \ln P^{Laspeyres} = \sum_k w_{k0} \ln(p_{kt}) \tag{4.33}$$

$$\text{Tornqvist Index:} \ln P^{Tornqvist} = \sum_k (\frac{w_{k0} + w_{kt}}{2}).\ln(\frac{p_{kt}}{p_{k0}}) \tag{4.34}$$

where “ w_{k0} ” and w_{kt} are weights for the base and current period, respectively.

In order to compare the bias that results from these indices, they also calculated elasticities that come from the non-linear AIDS model using three alternative values for α_0. These price indices have been compared using three different types of collinearity between prices: positive, zero and mixed collinearity. Positive collinearity means that all of the correlations between price pairs are positive. In mixed collinearity case, some of the correlations between price pairs can be either positive, negative or zero.

The results in Buse and Chan (2000: 531) showed that, under positive collinearity, all indices generated unbiased estimates of the expenditure elasticities. Only the Tornqvist index performed very well under the zero and negative collinearity. In addition, the bias has been reduced significantly as the sample size increases in the model with the Tornqvist index (Buse and Chan, 2000: 532). Under positive collinearity the Tornqvist index is the best among others when the trace of MSE is taken into account in assessing the bias in the price elasticities. In terms of the “aggregate bias”, the Tornqvist index is the second best after the Laspeyres index. Under zero and negative collinearity, the bias with the Tornqvist index is again the lowest among other linear indices. They argue that under mixed collinearity the Tornqvist index is preferable. Buse and Chan (2000: 536) present also a result for the overall performance of the indices across all types of collinearity. According to this overall result, in terms of the aggregate bias, the Tornqvist is even better than any of three non-linear indices that are used in Monte Carlo experiments.

The correlations between the deflated price indices used in this chapter are shown in the table below. It is observed that there is mixed collinearity among price indices.

Table 4.2. Correlation structure of price indices

	Cola	Flavored CSD	Clear CSD	Fruit juice	Mineral water	Bottled water	Tea	Instant coffee	Turkish coffee	Beer
Cola	1.000									
Flavored CSD	0.665	1.000								
Clear CSD	0.467	0.567	1.000							
Fruit juice	0.011	0.111	0.145	1.000						
Mineral water	0.135	0.148	0.262	0.091	1.000					
Bottled water	0.301	0.247	0.186	-0.133	0.060	1.000				
Tea	0.073	-0.101	-0.014	-0.041	-0.469	0.290	1.000			
Instant coffee	0.254	0.309	0.372	0.023	0.109	0.384	0.183	1.000		
Turkish coffee	0.129	0.489	0.392	0.236	-0.028	0.257	0.247	0.328	1.000	
Beer	-0.149	-0.456	-0.434	-0.297	0.031	-0.095	0.011	-0.284	-0.536	1.000
Rakı	-0.265	-0.455	-0.331	-0.348	-0.356	-0.348	0.097	-0.296	-0.417	0.631

Author's own calculations using Ipsos/KGM data.

Following the suggestion in Buse and Chan (2000), the Tornqvist index has been used in estimating the linear version of the AIDS model (LAIDS) in this chapter.

4.5. A Demand System for Beverages in Turkey

4.5.1. Model Specification

In this section, a two-stage demand system for the beverage products in Turkey will be specified within a linearized AIDS (LAIDS) framework.

In AIDS-type models, prices of all goods that are in the system need to be used in the estimation. However, since the original data covers is at household level, it only covers the prices of the goods that a household has bought. In other words, prices of goods that a household did not buy are unobserved. One way of solving this problem is to aggregate the data over households and to calculate a price index for each product. Therefore the data in this chapter have been aggregated and the econometric model has been specified at aggregate level. The details about how these price indices are calculated will be explained later in the section 4.5.2. below.

The equations in the second-stage of the two-stage budgeting are as follows:

The second-stage equations:

$$\overline{w}_{ict} = \alpha_i^* + \sum_j \gamma_{ij} \log p_{ict} + \beta_i \log(\frac{x_{bev,ct}}{P^*_{bev,ct}}) + Demog_{ct}.\delta + H\phi + u_{ict} \qquad (4.35)$$

The second-stage is composed of 11 demand equations, one for each of the beverage types such as cola, flavored and clear carbonated soft drink, fruit juice, mineral water, water, tea, instant coffee, Turkish coffee, beer and rakı. The subscripts i,c,t represent beverage type "i" in city "c" in time "t". The left-hand side variable is the aggregate expenditure share of the beverage type "i" in city "c" in time "t". The variables $\log p_{ict}$ are the corresponding Tornqvist price indices for all beverage types. The term $\frac{x_{bev,ct}}{P^*_{bev,ct}}$ is the representative total expenditures for all beverage types deflated by the Tornqvist price index of beverages. This overall price index is calculated using the weights of each beverage type and their corresponding price indices $\log p_{ict}$.

The set of demographical variables, shown by the term $Demog_{ict}$, include the following variables;

- the percentages of households belonging to AB, C1 or C2 socio-economic groups in a city/time pair,
- the average age of head of households and its squared value in a city/time pair,

- the average age of the purchasing person in the household and its squared value in a city/time pair,
- the percentage of households living in urban area in a city/time pair.

The percentage of households of DE socio-economic group is not included in estimations.

A graphical analysis of the data shows that the demand for beverages increases significantly during summer and at times of religious fests and on the last day of the each year. To capture the effects of demand shocks that can occur during these times, the model includes binary variables for 11 months (January to November). Dummy variables for each city (except Samsun) are also added in the model to capture time-invariant city-specific effects. Other explanatory variables are the percentage of holidays in a certain month and the monthly average temperature. These two variables are expected to increase the consumption of beverages at home. All these variables are summarized with the term *H* in the specification above. The last term u_{ict} is the error term assumed to be independently and identically distributed. Other terms ($\alpha, \gamma, \beta, \delta, \phi$) are the parameters to be estimated.

The first-stage equations

The first-stage consists of the five demand equations of the following specification:

$$\overline{W}_{ict} = a_i^* + \sum_j g_{ij} \log P_{ict} + b_i \log(\frac{X_{fmcg,ct}}{P^*_{fmcg,ct}}) + H\phi + \varepsilon_{ict} \quad (4.36)$$

The left-hand side variables are the share of aggregate expenditures for *beverages, food, cleaning products, personal care products* and for an aggregate category of "other *fast-moving consumer goods*". The variables $\log P_{ict}$ are the log of the Tornqvist price indices for each commodity group. These indices have been calculated using the weights and price indices of the lower level products belonging to one of these upper groups. The term $\frac{X_{fmcg,ct}}{P^{*}_{fmcg,ct}}$ shows the total expenditures for fast-moving consumer goods deflated by a Tornqvist price index for these goods.

The term *H* has the same content as in the specification of the second-stage. The last term ε_{ict} is the error term assumed to be independently and identically distributed. Other terms (a, g, b, ϕ) are the parameters to be estimated.

4.5.2. Data for the LAIDS Model

The sample consists of monthly aggregated observations in 12 cities of Turkey between May 2000 and May 2006. The cities that are included in the sample are Adana, Ankara, Antalya, Gaziantep, İstanbul, İzmir, Kayseri, Kocaeli, Konya, Osmaniye and Samsun. The sum of population in these cities amounts to 46 % of the total population of 81 cities in Turkey by 2007. The number of observations is 876 (12x73).

The price indices of the each beverage type in the second stage have been calculated in the following way. First, for each beverage type, the packaging types that are sold frequently are determined. Then, the average prices of these packs have been calculated by dividing the aggregate sales by the aggregate volumes in a city/month pair. The average pack prices have been converted to the prices per one liter. When the purchase of a particular type is not observed in a certain city/month, this unobserved data has been replaced by the average of the prices in the previous and subsequent period. If the unobserved data are more than one period, then these have been replaced by the average of the prices in other cities. In doing this replacement, first the observed prices have been regressed on the 11-city average and the predicted values have been used in place of the unobserved points.

The Tornqvist price index of a particular beverage type have been calculated by using the average prices and expenditure shares of the packs at the base period (May 2000) and at the current period in each city "c" and time ""t". The formula for the Tornqvist price index is:

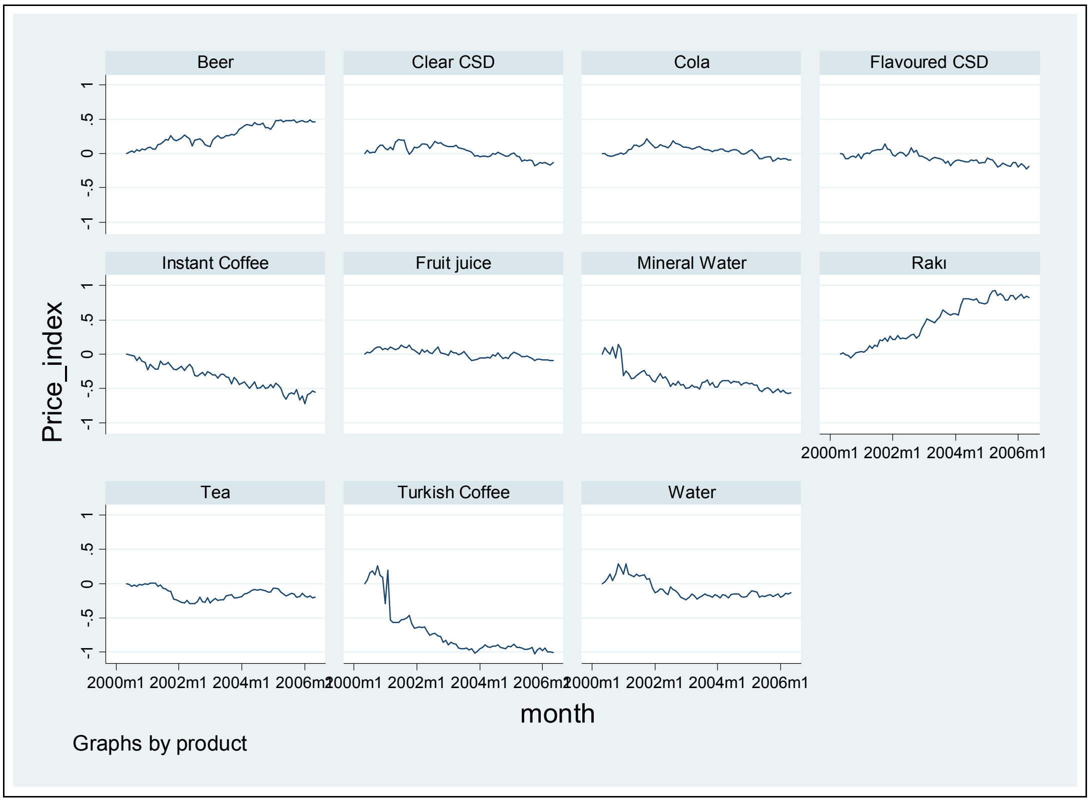
$$\ln p_{ict} = \sum_{k=1}^{N} (\frac{w_{kic0} + w_{kict}}{2}).\ln(\frac{p_{kict}}{p_{kic0}}) \qquad (4.37)$$

where *k'*s are the pack types chosen for the beverage type "*i*" , w_{kic0} and w_{kict} are the base and the current period expenditure shares of the pack type *k* in the total expenditures on the beverage type "*i*" in city "*c*". Same calculations have been done also for each beverage types belonging to the second-stage.

The Tornqvist price indices ($\log P_{ict}$) of the product categories in the first-stage (beverages, food, cleaning products, personal care products and "others") have been calculated in the following method. The Tornqvist price index of the "beverages" has been constructed using the Tornqvist price indices and expenditure shares of the beverage types (namely, cola, flavored or clear carbonated soft drinks, fruit juices, mineral water, bottled water, tea, instant coffee, Turkish coffee, beer and rakı). For calculating the price indices of the upper categories other than *beverages*, first, a subset of the lower product types belonging to these categories has been chosen. This choice has been done depending on the criterion that a particular product type has been purchased in at least 80% of 876 points of observations (city/month pairs) in the sample. For example, the product types that have been sold in at least 700 of the total 876 points of observation (12 cities x 73 periods) have been included in the calculations of the Tornqvist price index of the related upper category. A list of the included product groups are presented in Appendix A. All price indices are deflated by the price index of all fast-moving-consumer goods.

4.5.3. Descriptive Statistics

In this section, some descriptive statistics are reported related to the variables used in this chapter. The graphics of the price indices of the products in the second stages are shown below.



Graph 4.1. Deflated Tornqvist price indices of the products in the second stage.
Author's own calculations using Ipsos/KGM data.

The reel price indices for the carbonates soft drinks (cola, flavored and clear CSD), the fruit juices and tea follow similar pattern. Their value at the end of sample period is slightly below the values in the initial point. The prices of the alcoholic beverages (beer and rakı) are increasing during the sample period. Their deflated index values are between 0 and 5 for beer, 0 and 1 for rakı. The prices of the mineral water and of the Turkish coffee decline sharply in 2001, then they follow a steady pattern.

In the table below, the descriptive statistics of the average expenditure shares of the beverage products take place.

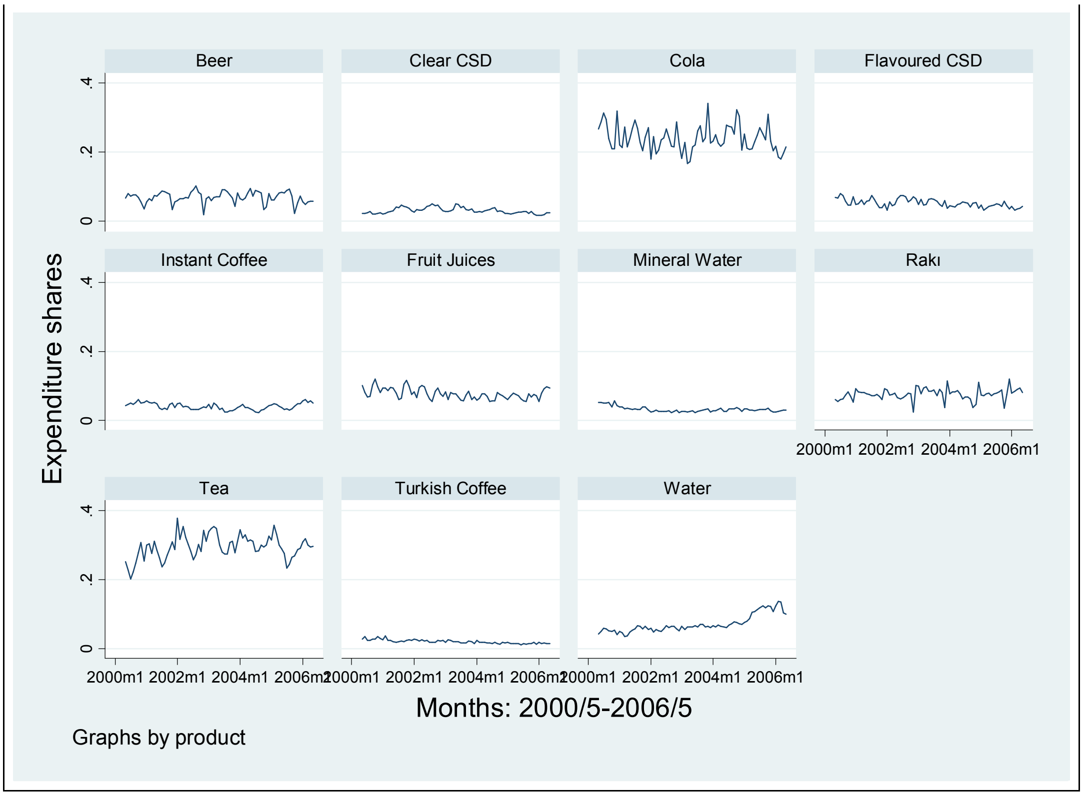
Table 4.3. Average of the aggregate expenditure shares of beverage products

Product	Obs	Mean	Std.Dev.	Min	Max
Cola	73	0.240	0.038	0.167	0.341
Flavored CSD	73	0.051	0.012	0.030	0.079
Clear CSD	73	0.030	0.009	0.016	0.050
Fruit Juices	73	0.078	0.016	0.054	0.120
Mineral Water	73	0.031	0.008	0.022	0.057
Water	73	0.071	0.025	0.035	0.137
Tea	73	0.295	0.034	0.201	0.378
Instant Coffee	73	0.040	0.010	0.022	0.061
Turkish Coffee	73	0.020	0.005	0.011	0.037
Beer	73	0.069	0.017	0.019	0.101
Rakı	73	0.076	0.017	0.023	0.121

Author's own calculations using Ipsos/KGM data.

In average, expenditures on cola and tea products take the largest shares in budgets allocated to beverages. Their expenditure shares are 24% (for cola) and %29.5 (for tea). The share of the fruit juices (7.8%) is higher than those of flavored and clear carbonated soft drinks (5% and 3%). The expenditure shares of beer and rakı are similar to each other, %7 and %7.6 respectively.

The patterns of the budget shares of the beverage types are shown in graphics below. The budget shares of tea and cola products have high variations across time. The peak times of these expenditure shares correspond to the times of religious fests and the lasts day of the year. The demand for the Turkish coffee and mineral water is relatively stable.



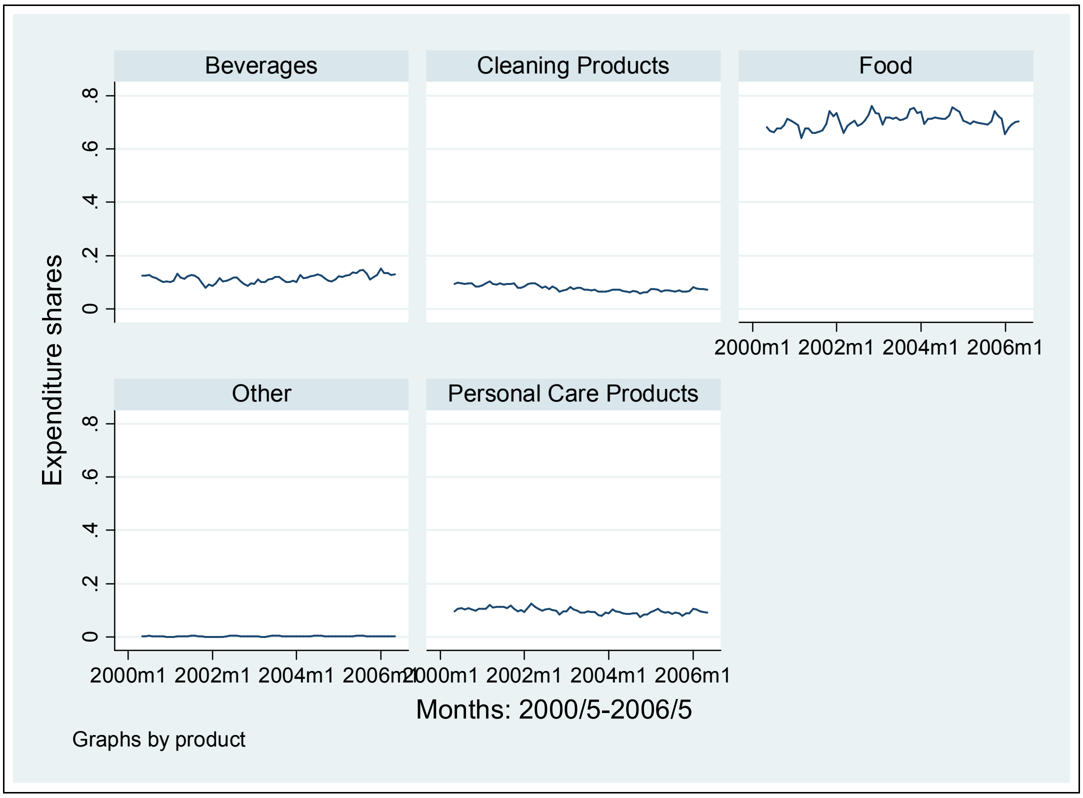
Graph 4.2. Expenditure shares of the beverage types
Author's own calculations using Ipsos/KGM data.

Concerning the product categories in the first-stage, it is observed that 70% of the budgets of households for fast-moving consumer goods have been allocated to the food expenditures. The share of beverages is 11.6 %. These shares are given in the table and graph below.

Table 4.4. Descriptive statistics for aggregate expenditure shares of upper product categories

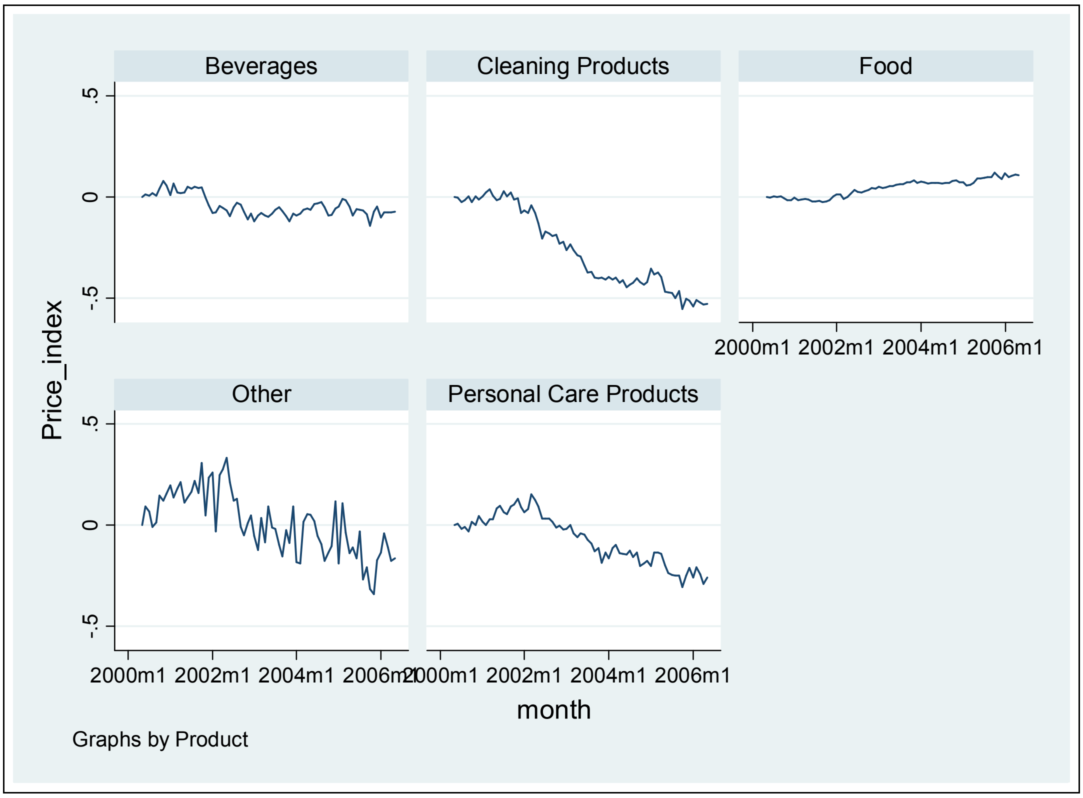
Product Category	Obs.	Mean	Std. Dev.	Min	Max
Beverages	73	0.116	0.015	0.081	0.153
Food	73	0.704	0.026	0.641	0.760
Cleaning Products	73	0.079	0.012	0.059	0.104
Personal Care Products	73	0.098	0.010	0.074	0.125
Other	73	0.003	0.001	0.001	0.006

Author's own calculations using Ipsos/KGM data.



Graph 4.3. Expenditure shares of the product categories in the first stage.
Author's own calculations using Ipsos/KGM data.

Finally, the price indices of the product categories in the first-stage are presented in the graph below. The deflated Tornqvist price index for all beverages follows a similar pattern to that of cold drinks. It fluctuates around the initial level and it ends up below it. The price indices of *cleaning products* and *personal care products* decrease after 2002, but these are no sharp falls. The price index of "*other*" products has high variation around the initial level. The price index of *food products* is relatively smooth and increase slightly after the starting period.



Graph 4.4. Deflated Tornqvist Price indices of the product groups in the first-stage.
Author's own calculations using Ipsos/KGM data.

The distributions of households according to their social-economic status (SES) for different particular beverage types are presented in the table below. For example, %27 of the households buying cola is in the AB group in average. The C1 group is the most populated group in average among all households that buy beverage products other than water and rakı. For bottled water, mineral water, Turkish coffee, beer and rakı, the difference between the share of the richest group (AB) and the poorest group (DE) is larger than 10%, (i.e. 42% vs. 13% for water and 39% vs. 15% for rakı, respectively) whereas for tea the shares of these two groups are very close to each other.

Table 4.5. Distribution of households by social-economic status and beverage products

Beverage	SES Group	Obs.	Mean	Std. Dev.	Min	Max
Cola	AB	876	0.27	0.096	0.073	0.614
	C1	876	0.33	0.079	0.119	0.577
	C2	876	0.22	0.073	0.047	0.448
	DE	876	0.18	0.100	0.020	0.508
Flavored CSD	AB	876	0.24	0.122	0.000	1.000
	C1	876	0.30	0.110	0.000	0.867
	C2	876	0.23	0.097	0.000	0.714
	DE	876	0.23	0.142	0.000	0.688
Clear CSD	AB	876	0.29	0.158	0.000	1.000
	C1	876	0.32	0.139	0.000	1.000
	C2	876	0.20	0.110	0.000	1.000
	DE	876	0.19	0.141	0.000	0.727
Fruit Juices	AB	876	0.28	0.117	0.011	0.694
	C1	876	0.28	0.084	0.033	0.588
	C2	876	0.23	0.098	0.023	0.754
	DE	876	0.21	0.114	0.000	0.554
Mineral water	AB	876	0.32	0.135	0.000	0.750
	C1	876	0.34	0.109	0.000	0.714
	C2	876	0.19	0.098	0.000	0.588
	DE	876	0.15	0.117	0.000	0.692
Water	AB	876	0.42	0.187	0.000	1.000
	C1	876	0.29	0.133	0.000	0.800
	C2	876	0.17	0.121	0.000	1.000
	DE	876	0.13	0.107	0.000	0.857
Tea	AB	876	0.23	0.094	0.000	0.533
	C1	876	0.30	0.069	0.067	0.538
	C2	876	0.23	0.069	0.065	0.507
	DE	876	0.24	0.123	0.020	0.643
Instant Coffee	AB	876	0.27	0.169	0.000	1.000
	C1	876	0.30	0.144	0.000	1.000
	C2	876	0.24	0.151	0.000	1.000
	DE	876	0.19	0.160	0.000	1.000
Turkish Coffee	AB	876	0.31	0.152	0.000	1.000
	C1	876	0.32	0.134	0.000	1.000
	C2	876	0.19	0.112	0.000	1.000
	DE	876	0.18	0.140	0.000	0.778

Table 4.5.Continued

Beverage	SES Group	Obs.	Mean	Std. Dev.	Min	Max
Beer	AB	876	0.30	0.206	0.000	1.000
	C1	876	0.32	0.216	0.000	1.000
	C2	876	0.19	0.173	0.000	1.000
	DE	876	0.18	0.191	0.000	1.000
Rakı	AB	876	0.39	0.246	0.000	1.000
	C1	876	0.31	0.240	0.000	1.000
	C2	876	0.14	0.159	0.000	1.000
	DE	876	0.15	0.218	0.000	1.000

Author's own calculations using Ipsos/KGM data.

4.5.4. Endogeneity of Prices and Instrumental Variables

In the LAIDS model explained above, the Tornqvist price indices of the product categories in the first-stage (beverages, food, cleaning products, personal care products and "others") "$\log P_{ict}$" and of the product groups in the second-stage "$\log p_{ict}$", the total expenditures on *beverages* "$x_{bev,ct}$" and on all *fast-moving consumer goods* $x_{fmcg,ct}$ may be endogenous. One source of endogeneity related to price variables can be the fact that the price of a certain product can be affected by the demand shocks to this product. Another reason for endogeneity of prices can be originated from the possibility that error terms of different equations can be correlated and this correlation can affect price variables in other equations. For example, the price of *cola*, which is also one of the explanatory variables in the equation of *coffee*, may be correlated with the error term of the coffee demand if the demand shocks to cola and coffee are correlated. As demand shocks for a particular product that can affect the total expenditures on that product, the total expenditures on fast-moving consumer goods "$X_{fmcg,ct}$" and on beverages "$x_{bev,ct}$" are also assumed to be endogenous.

In the presence of the endogenous explanatory variables, the OLS method yields "inconsistent" estimates of the parameters. To solve this problem, the use of instrumental variables is suggested in the econometric literature. There are two important properties that instrumental variables must satisfy: *the relevance* and *the validity*. A *relevant* instrument should be correlated with the endogenous price variable. For the *validity*, it is needed that the instrument should be exogenous, in other words it should not be affected by the error terms of the model.

In general, cost variables satisfy these criteria since they are directly related to the price and they have not affected by the demand shocks. Therefore, in this chapter, the data on input costs, provided by TURKSTAT[5], have been used as instrumental variables. The first set of input costs consists of the *wage per hour* paid in industry groups that are categorized by TURKSTAT under the names "food and beverage", "beverages", "beer", "rakı", "soft drinks", cleaning and personal care". These instruments do not vary across cities. The second set of input costs consists of the prices of water, electricity, oil. These variables vary across cities, except the price of electricity.

Hausman et al. (1994: 165) and Nevo (2001: 320) suggest also using "prices in other cities or regions" as instrumental variables. The identifying assumption in this suggestion is that city-specific valuations of products are uncorrelated across cities. The correlation within a city is allowed. In addition, the prices of the item "j" in different cities can be correlated via the common production costs. On the other hand, a city-specific demand shock to a particular product would not affect prices of that product in other cities. Therefore, the price of the item "j" in other cities can be a relevant and valid instrument for the same item sold in a certain city. However, in case of nation-wide demand shocks, this assumption will be violated and the prices in other cities may not be used as valid instruments. National TV advertising is largely used in the beverage industry and may be a source of the correlation across

[5]Turkish Statistical Institute (TURKSTAT)

cities. In order to circumvent this problem, one period lagged values of the average of the other cities' price indices have been used as instrumental variables instead of their current values.

These instruments have been tested for their relevance and validity. Test methods and results will be presented later in the text while discussing estimation results.

4.6. Estimation Methods

The linearized AIDS (LAIDS) model are usually estimated using Seeming Unrelated Regressions (SUR) or Three-stage Least Squares (3SLS) methods in the literature. These methods take into account the correlation of the error terms across equations and yield more efficient estimates. In addition, they allow imposing and testing cross equations restrictions (i.e. symmetry). If all the equations have the same explanatory variables or the error terms are uncorrelated across equations, then the SUR and 3SLS methods collapse to OLS and Two-stage Least Squares (2SLS) methods. In the empirical model estimated in this chapter, price indices in the first-stage and in the second-stage are different from each other. In addition, cross equations restrictions have been imposed and tested. For these reasons, the SUR and 3SLS methods are preferred rather than single-equation methods. For comparison purposes, the LAIDS model will also be estimated with OLS and 2SLS methods. The properties of the SUR and 3SLS methods are summarized in the following part.

A multi-equation linear model with G dependent variables can be written,

$$\mathbf{y}_i = \mathbf{X}_i\beta + \mathbf{u}_i \ , \qquad i = 1, \dots ,N. \tag{4.38}$$

where $\mathbf{y}_i$ and $\mathbf{u}_i$ are $G \times 1$ vectors, $\mathbf{X}_i$ is a $G \times K$ matrix and β is a $K \times 1$ column vector. Each g^{th} equation in the system having G equations in total can be presented as:

$$y_{ig} = \mathbf{x}_{ig}^{'}\beta_g + u_{ig} \qquad \text{g = 1,….,G and i = 1, …, N} \qquad (4.39)$$

where $i's$ are observation units, $\mathbf{x}_{ig}$ are regressors that are assumed to be exogenous and β_g are $K_g \times 1$ parameter vector. The variables y_{ig} can be thought as the expenditure shares in the LAIDS model. The relationship between equations in the system comes through correlation in the error terms across different equations. In other words, the equations are related if the errors u_{ig} in different equations are correlated (Cameron and Trivedi, 2005:209).

The observations and equations can be stacked and a consistent "system OLS" estimation can be implemented under assumptions that $\mathrm{E}(\mathbf{X}_i\mathbf{u}_i) = 0$ and $\mathrm{E}(\mathbf{X}_i^{'}\mathbf{X}_i)$ is nonsingular (has rank K) (Wooldridge, 2002: 149). The system OLS estimators are identical to equation-by-equation OLS estimators if there are no cross equation restrictions. However, if cross equation restrictions need to be tested - as it is the case in LAIDS model - then the SUR system should be estimated using FGLS (Feasible Generalized Least Squares) technique. For a consistent estimation, the FGLS within the SUR context requires the assumption that $\mathrm{E}(\mathbf{X}_i \otimes \mathbf{u}_i) = \mathbf{0}$, where $\otimes$ is the Kronecker product. This assumption means that each element of $\mathbf{u}_i$ is uncorrelated with each element of $\mathbf{X}_i$. This assumption puts more restrictions on the explanatory variables than the assumption $\mathrm{E}(\mathbf{X}_i\mathbf{u}_i) = \mathbf{0}$ does. (Wooldridge, 2002:153-154). The assumption $\mathrm{E}(\mathbf{X}_i \otimes \mathbf{u}_i) = \mathbf{0}$ can also be expressed as $\mathrm{E}(\mathbf{x}_{ig}^{'}u_{ih}) = \mathbf{0}$ where *g, h* = 1, 2, G for the SUR structure. In order that parameters of the system are identified, it is needed that $\mathrm{E}(\mathbf{X}_i^{'}\mathbf{\Omega}^{-1}\mathbf{X}_i)$ is nonsingular and the unconditional variance matrix of $\mathbf{u}_i$, $\mathbf{\Omega} \equiv \mathrm{E}(\mathbf{u}_i\mathbf{u}_i^{'})$ (a G x G symmetric matrix) is positive definite. In AIDS models, the dependent variables across equations satisfy an adding up constraint, that is, the expenditure shares sum to one. Therefore, in order to ensure that $\mathrm{E}(\mathbf{X}_i^{'}\mathbf{\Omega}^{-1}\mathbf{X}_i)$ is nonsingular, one equation must be dropped from estimation (Wooldridge, 2002: 154).

The FGLS estimator $\boldsymbol{\beta}$ can be obtained by the formula:

$$\hat{\boldsymbol{\beta}} = (\sum_{i=1}^{N} \mathbf{X}_i^{'} \hat{\boldsymbol{\Omega}}^{-1} \mathbf{X}_i)^{-1} (\sum_{i=1}^{N} \mathbf{X}_i^{'} \hat{\boldsymbol{\Omega}}^{-1} \mathbf{y}_i) \tag{4.40}$$

or

$$\hat{\boldsymbol{\beta}} = \left[\mathbf{X}^{'} (\mathbf{I}_{\mathrm{N}} \otimes \hat{\boldsymbol{\Omega}}^{-1}) \mathbf{X} \right]^{-1} \left[\mathbf{X}^{'} (\mathbf{I}_{\mathrm{N}} \otimes \hat{\boldsymbol{\Omega}}^{-1}) \mathbf{Y} \right] \tag{4.41}$$

where $\boldsymbol{\Omega}$ is estimated by $\hat{\boldsymbol{\Omega}} = N^{-1} \sum_{i=1}^{N} \hat{\hat{\mathbf{u}}}_i \hat{\hat{\mathbf{u}}}_i^{'}$, where $\hat{\hat{\mathbf{u}}}_i = \mathbf{u}_i - \mathbf{X}_i \hat{\hat{\boldsymbol{\beta}}}$ are system OLS residuals.

Under system-homoskedasticity, the estimator for the asymptotic variance of $\boldsymbol{\beta}$ can be expressed as $A\,\mathrm{var}(\hat{\beta}) = (\sum_{i=1}^{N} \mathbf{X}_i^{'} \hat{\boldsymbol{\Omega}}^{-1} \mathbf{X}_i)^{-1}$. (4.42)

Since the correlation of the error terms across equations is taken into account in this method, the FGLS estimators are more efficient than the system OLS estimators.

The system OLS and FGLS methods rely on the assumption that explanatory variables are exogenous. If some explanatory variables are endogenous in the system, then these methods yield inconsistent parameters. In this case, LAIDS model may be estimated using three-stage leas squares technique (3SLS) which takes into account the endogeneity of the explanatory variables in the system and the correlation of the error terms across equations. The 3SLS estimator is given by the formula below:

$$\hat{\boldsymbol{\beta}}_{\mathbf{3SLS}} = \left(\sum_{i=1}^{N} \hat{\mathbf{X}}_i^{'} \hat{\boldsymbol{\Omega}}^{-1} \hat{\mathbf{X}}_i \right)^{-1} \left(\sum_{i=1}^{N} \hat{\mathbf{X}}_i^{'} \hat{\boldsymbol{\Omega}}^{-1} \mathbf{y}_i \right) = \left[\hat{\mathbf{X}}^{'} (\mathbf{I}_{\mathbf{N}} \otimes \hat{\boldsymbol{\Omega}}^{-1}) \hat{\mathbf{X}} \right]^{-1} \hat{\mathbf{X}}^{'} (\mathbf{I}_{N} \otimes \hat{\boldsymbol{\Omega}}^{-1}) \mathbf{Y} \tag{4.43}$$

where the GxG matrix $\hat{\boldsymbol{\Omega}}$ is $\hat{\boldsymbol{\Omega}} \equiv N^{-1}\sum_{i=1}^{N}\hat{\mathbf{u}}_i\hat{\mathbf{u}}_i^{'}$ and $\hat{\mathbf{u}}_i$ are residuals from a system 2SLS estimation. $\hat{\boldsymbol{\Omega}}$ is assumed to be a consistent estimator of $\boldsymbol{\Omega}$, $\underset{N\to\infty}{plim}\ \hat{\boldsymbol{\Omega}} = \boldsymbol{\Omega} = \mathrm{E}(\mathbf{u}_i\mathbf{u}_i^{'})$. The expression $\hat{\mathbf{X}}_i$ stands for the predictions from the first-stage estimation of regressors (including endogenous regressors as well) on the instrumental variables (**Z**): $\hat{\mathbf{X}}_i = \mathbf{Z}_i\hat{\boldsymbol{\Pi}}$ and $\hat{\boldsymbol{\Pi}} = (\mathbf{Z}^{'}\mathbf{Z})^{-1}\mathbf{Z}^{'}\mathbf{X}$. In order that $\hat{\boldsymbol{\beta}}_{\mathbf{3SLS}}$ is consistent, the assumption that $\mathrm{E}\left[(\mathbf{Z\Pi})^{'}\boldsymbol{\Omega}^{-1}\mathbf{u}_i\right] = \boldsymbol{\Pi}^{'}\mathrm{E}\left[(\boldsymbol{\Omega}^{-1}\mathbf{Z}_i)^{'}\mathbf{u}_i\right] = \mathbf{0}$ needs to be hold. This assumption is stronger than the assumption in system 2SLS method in which instrumental variables for a particular equation are assumed to be uncorrelated with the error terms of that equation: $\mathrm{E}\left[\mathbf{Z}_\mathbf{i}^{'}\mathbf{u}_\mathbf{i}\right] = \mathbf{0}$ or $\mathrm{E}\left[\mathbf{z}_{ig}^{'}u_{ig}\right] = \mathbf{0}$, g = 1,2,3…G. In other words, if instrumental variables in the equation "g" is correlated with the error terms of the equation "h", then the estimators in equation (4.43) will be in inconsistent (Wooldridge:2002, 197). Therefore, for consistent 3SLS estimation it is assumed that any exogenous variable in one equation is exogenous in all equations. The identification for 3SLS estimation requires that the rank condition $\mathrm{E}\left[\mathbf{Z}_\mathbf{i}^{'}\mathbf{X}_\mathbf{i}\right] = K$ should be satisfied. Finally, similar to the FGLS case, the 3SLS estimation assumes that the errors in the system are homoskedastic.

4.7. The Results

In this section the results of the estimations of the two-stage LAIDS model will be presented.

In order to ensure the non-singularity of the error variance matrix, the equation for the *other products* has been dropped from first-stage of the demand system. Therefore, only 4 equations have been estimated in the first-stage. In the second-stage of the demand system, the equation for *rakı* products has been eliminated for the same reason. Therefore, in total 14 demand equations have been estimated simultaneously in demand system.

The error terms of these equations have been assumed to be correlated across equations. However, these errors have been assumed to be distributed independently and identically (i.i.d) within the same equation. The coefficients of the dropped equations have been derived using the estimates of the other equations and the adding-up constraint. The estimations have been done by OLS, 2SLS, SUR and 3SLS methods.

The results of the tests for the relevancy and validity of instruments will be presented below. The endogeneity of regressors have been tested using Durbin-Wu-Hausman test. After deciding on the model to be used for calculating elasticities, the theoretical restrictions of homogeneity and symmetry have been tested.

The results of the restricted OLS, 2SLS and SUR models can be seen in Appendix B. These results show that the standard errors of the coefficients in SUR and 3SLS methods are smaller than those in OLS and 2SLS, respectively. However, the difference in standard errors between system methods (SUR and 3SLS) and single equation methods (OLS and 2SLS) is not large. Therefore, it can be said that the efficiency gains brought by system estimation methods over the single-equation estimation methods is limited. On the other hand, the magnitudes of the coefficients of price coefficients differ significantly between the system methods and the single-equation methods. This finding implies that some regressors may be correlated with error terms. The endogeneity of regressors have been tested as explained in the following section.

4.7.1. Testing endogeneity of regressors (Hausman test)

The Hausman test of endogeneity of regressors has been explained in Cameron and Trivedi (2005: 276) for single-equation models. Since a system approach is used in this chapter for estimation the LAIDS model, the two-step procedure of the Hausman test has been adapted to the system estimation as follows: First, reduced-form regressions have been estimated by regressing each suspected endogenous regressor (i.e. the price indices, the total expenditures on FMCG and on beverages) separately on the exogenous explanatory variables (demographical variables, city and time dummies, percentage of holidays in a month and average temperature) and on the all excluded instrumental variables used in the whole system. Then, the residuals from these reduced form regressions have been saved. In the second step of the test, the residuals of the reduced-form regression have also been added as regressors in the whole system which has been estimated using the SUR method. Additionally, the restrictions of homogeneity and symmetry have been imposed. Then, the joint significance of these residuals has been tested. The value of the Chi-square statistics and the associated p-values of these joint tests are reported in the table below.

Table 4.6. Results of the Hausman test of endogeneity

Equation	Chi2-statistic	p-value
Beverage	636.356	0.000
Food	207.836	0.000
Cleaning	161.732	0.000
Personal care	134.199	0.000
Cola	152.701	0.000
Flavored CSD	142.285	0.000
Clear CSD	167.632	0.000
Fruit juice	50.23	0.000
Mineral water	141.821	0.000
Bottled water	175.664	0.000
Tea	86.686	0.000
Instant coffee	89.292	0.000
Turkish coffee	46.014	0.000
Beer	101.57	0.000

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The results of the Hausman test show that price indices, the representative total expenditures on fast-moving consumer goods and on beverages are endogenous in all equations of the demand system. Therefore, it is preferable to use the 3SLS method rather than the SUR method in estimating the demand system for beverages.

4.7.2. Testing the instrumental variables

The following sub-sections present how instrumental variables have been tested for two criteria that they must satisfy: the relevance and validity.

4.7.2.1. Testing the relevance of instruments

If instrumental variables are uncorrelated with endogenous regressors, the estimators obtained from an instrumental variable regression will be biased in finite samples. For testing whether instrumental variables are relevant, Cameron and Trivedi (2005: 105) suggest to run the reduced form regressions, in which endogenous regressors are regressed on the set of excluded instruments and the set of all other exogenous variables, and then to test whether the coefficients of the instrumental variables are jointly zero. If the coefficients of the instruments are not jointly significant, then it can be suspected that one or more instruments are not relevant. One important remark at this point is that this method is suggested for single-equation models and there is no test developed yet in literature for testing the correlation between instruments and endogenous regressors in system estimation methods like 3SLS. Therefore, the method summarized above for single-equation case has been followed for the empirical application in this chapter. For this, each endogenous regressor has been regressed separately on all the exogenous variables, including the excluded instruments, and then the joint significance of the excluded instruments has been tested. The partial F-statistics for the joint significance of instruments and p-values are reported in the table below:

Table 4.7. Testing the correlation between excluded instruments and endogenous regressors

Endogenous regressor	Partial F-statistic	Prob>F
Price of		
Beverages	16.04	0.000
Food Products	102.97	0.000
Cleaning products	158.34	0.000
Personal care products	80.74	0.000
Other products	3.71	0.016
Cola	136.55	0.000
Flavored CSD	46.88	0.000
Clear CSD	26.90	0.000
Fruit juice	11.53	0.000
Mineral water	28.77	0.000
Bottled water	16.36	0.000
Tea	13.76	0.000
Instant coffee	7.82	0.000
Turkish coffee	33.58	0.000
Beer	47.17	0.000
Rakı	53.42	0.000
Total FMCG expenditures	13.76	0.000
Total beverage expenditures	9.48	0.000

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The null hypothesis that the excluded instruments are jointly insignificant is rejected for all endogenous regressors. Therefore, it can be concluded that excluded instruments are correlated with endogenous regressors.

4.7.2.2. Testing the validity of instruments

To test whether the excluded instruments are exogenous and uncorrelated with the error terms of every equations in the system, the Sargan Overidentification test has been implemented. The statistics for this test is equal to the value of GMM function that is minimized in estimating the system. In Sargan test, the joint null hypothesis is that the instruments are not correlated with the error terms of the system. The Sargan statistics is distributed with a Chi-squared distribution with degrees of freedom (L-K), where L is the total number of excluded and included instruments, K is the number of regressors. For implementing this test in the model specified in this chapter, again each equation have been estimated separately by 2SLS method and all excluded instruments have been used in every equation. The table below shows that the results of the Sargan test do not reject the null hypothesis.

Table 4.8. Results of Sargan Overidentification test for validity of instruments (equation-by-equation)

Equations	Sargan statistics	P-value
Beverages	0.280	0.964
Food Products	0.386	0.943
Cleaning products	0.518	0.915
Personal care products	0.429	0.934
Other products	1.186	0.756
Cola	0.948	0.814
Flavored CSD	0.097	0.992
Clear CSD	0.004	1.000
Fruit juice	1.328	0.722
Mineral water	1.066	0.785
Bottled water	0.685	0.877
Tea	0.140	0.987
Instant coffee	2.677	0.444
Turkish coffee	0.059	0.996
Beer	2.464	0.482
Rakı	0.266	0.966

Author's own calculations using Ipsos/KGM and TURKSTAT data.

4.7.3. Estimation results from restricted 3SLS model

Before presenting the details of the estimation results for each equation, general statistics about each equation in the restricted 3SLS model are presented below.

Table 4.9. General statistics about equations in restricted 3SLS model

Equations	Number of observations	Number of Parameters	RMSE	Chi-square statistic	p-value
Beverages	864	37	0.014	1362.43	0.000
Food Products	864	37	0.023	1206.04	0.000
Cleaning products	864	37	0.009	1061.35	0.000
Personal care products	864	37	0.010	1080.79	0.000
Cola	864	43	0.051	824.56	0.000
Flavored CSD	864	43	0.015	1135.03	0.000
Clear CSD	864	43	0.010	2019.12	0.000
Fruit juice	864	43	0.019	749.55	0.000
Mineral water	864	43	0.012	464.96	0.000
Bottled water	864	43	0.033	4136.79	0.000
Tea	864	43	0.041	3353.58	0.000
Instant coffee	864	43	0.021	354.11	0.000
Turkish coffee	864	43	0.009	638.89	0.000
Beer	864	43	0.028	967.46	0.000

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The test statistics for overall significance (Chi-squared statistics) show that the coefficients of every equation are jointly significant. The RMSE values show that the standard deviation of residuals is generally around 0.01 or 0.02 market shares. This range can be considered as sufficiently low for a good fit. Only for cola and tea equations, it is 0.05 and 0.04.

The elasticities of demand will be calculated depending on the results of the restricted 3SLS model, which are presented in tables below. For presentation purposes, the estimates for the city and time fixed effects are not reported below; however, they can be seen in Appendix B.

Table 4.10. Results of the restricted 3SLS model for the products in the first-stage

	Dependent variables: Expenditure shares of				
	Beverages	Food Products	Cleaning Products	Personal Care Products	Other Products
Explanatory variables					
Price of Beverages	0.037**	0.023*	0.013	-0.059***	-0.014**
	(0.0158)	(0.0128)	(0.0086)	(0.0089)	(0.0061)
Price Food Products	0.023*	0.021	-0.047***	-0.009	0.012**
	(0.0128)	(0.0155)	(0.0080)	(0.0080)	(0.0047)
Price Cleaning Products	0.013	-0.047***	0.037***	0.0002	-0.003
	(0.0086)	(0.0080)	(0.0090)	(0.0080)	(0.0049)
Price of Personal Care Products	-0.059***	-0.009	0.0002	0.061***	0.006
	(0.0089)	(0.0080)	(0.0080)	(0.0095)	(0.0049)
Price of Other Products	-0.014**	0.012**	-0.003	0.006	-0.0004
	(0.0061)	(0.0047)	(0.0050)	(0.0050)	(0.0045)
Total FMCG Expenditure	-0.001***	0.001***	-0.001***	-6.22e-07	-0.00008
	(0.0002)	(0.0003)	(0.0002)	(0.0001)	(0.00008)
% of AB group	-0.014*	0.028**	-0.005	-0.009	-0.0003
	(0.0079)	(0.0126)	(0.0064)	(0.0061)	(0.0031)
% of C1 group	-0.027**	0.037**	-0.002	-0.008	-0.0004
	(0.0116)	(0.0185)	(0.0095)	(0.0091)	(0.0047)
% of C2 group	0.018	-0.033*	0.007	0.006	0.0008
	(0.0124)	(0.0195)	(0.0103)	(0.0097)	(0.0050)
Avg. age of head of household	0.011	-0.00004	-0.006	-0.003	-0.0022
	(0.0128)	(0.0206)	(0.0105)	(0.0100)	(0.0050)
Sq. avg. age of head of household	-.0002	0.00006	0.00005	0.00002	0.00002
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.00006)
Avg. age of purchasing person	-0.009	0.024**	-0.011**	-0.005	0.0020
	(0.0068)	(0.0110)	(0.0056)	(0.0053)	(0.0027)
Sq. avg. age of purchasing person	0.0002*	-0.0004***	0.0002**	0.00009	-0.00003
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.00004)
% of households in urban area	-0.012***	0.020***	-0.008**	-0.0003	0.0002
	(0.0041)	(0.0065)	(0.0034)	(0.0032)	(0.0016)
% of holidays in a month	0.049***	-0.102***	0.019**	0.031***	0.0026
	(0.0104)	(0.0161)	(0.0085)	(0.0081)	(0.0044)
Monthly avg. temperature	0.001**	-0.001***	0.0004	0.000	-0.00004
	(0.0003)	(0.0005)	(0.0002)	(0.0002)	(0.00012)
Constant	0.057	0.179	0.481***	0.265	0.018
	(0.2234)	(0.3588)	(0.1829)	(0.1736)	(0.0885)

Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 4.11. Results of the restricted 3SLS model for the products in the second-stage (1)

	Dependent variables: Expenditure Shares of					
	Cola	Flavored CSD	Clear CSD	Fruit Juice	Mineral Water	Bottled Water
Explanatory variables						
Price of Cola	-0.142***	-0.070	-0.020	0.021	-0.019	-0.024
	(0.0543)	(0.0435)	(0.0162)	(0.0263)	(0.0123)	(0.0237)
Price of Flavored CSD	-0.070	0.035	0.098***	-0.027	-0.010	-0.002
	(0.0435)	(0.0504)	(0.0133)	(0.0242)	(0.0102)	(0.0149)
Price of Clear CSD	-0.020	0.098***	0.009	-0.030**	-0.014***	-0.014
	(0.0162)	(0.0133)	(0.0098)	(0.0119)	(0.0050)	(0.0091)
Price of Fruit Juice	0.021	-0.027	-0.030**	0.113***	0.009	0.020
	(0.0263)	(0.0242)	(0.0119)	(0.0276)	(0.0090)	(0.0155)
Price of Mineral Water	-0.019	-0.010	-0.014***	0.009	0.032***	-0.028***
	(0.0123)	(0.0102)	(0.0050)	(0.0090)	(0.0054)	(0.0076)
Price of Bottles Water	-0.024	-0.002	-0.014	0.020	-0.028***	0.091***
	(0.0237)	(0.0149)	(0.0091)	(0.0155)	(0.0076)	(0.0218)
Price of Tea	0.137***	-0.016	-0.012	-0.062***	0.024***	-0.092***
	(0.0262)	(0.0164)	(0.0091)	(0.0163)	(0.0085)	(0.0173)
Price of Instant Coffee	-0.010	-0.027	-0.015	-0.021	-0.005	0.035**
	(0.0270)	(0.0279)	(0.0123)	(0.0233)	(0.0100)	(0.0144)
Price of Turkish Coffee	-0.011	0.025***	0.003	-0.013	0.007*	0.007
	(0.0112)	(0.0089)	(0.0050)	(0.0084)	(0.0037)	(0.0076)
Price of Beer	0.118***	-0.016	-0.016	0.004	0.016*	0.010
	(0.0261)	(0.0100)	(0.0100)	(0.0176)	(0.0089)	(0.0184)
Price of Rakı	0.020	0.010	0.012*	-0.014	-0.013**	-0.003
	(0.0202)	(0.0112)	(0.0067)	(0.0123)	(0.0061)	(0.0144)
Total Beverage Exp.	-0.032***	0.001	-0.001	-0.004*	-0.002	0.025***
	(0.0049)	(0.0020)	(0.0013)	(0.0022)	(0.0013)	(0.0031)
% of AB group	0.005	-0.011	0.004	0.003	-0.002	0.012
	(0.0257)	(0.0088)	(0.0056)	(0.0100)	(0.0067)	(0.0168)
% of C1 group	0.043	0.006	0.009	-0.009	0.008	0.012
	(0.0396)	(0.0138)	(0.0088)	(0.0157)	(0.0104)	(0.0261)
% of C2 group	0.071*	-0.015	0.003	0.017	-0.006	-0.040
	(0.0415)	(0.0146)	(0.0092)	(0.0166)	(0.0109)	(0.0273)
Avg. age of head of household	0.022	-0.002	-0.009	0.002	0.009	-0.035
	(0.0438)	(0.0154)	(0.0097)	(0.0173)	(0.0115)	(0.0284)
Sq. avg. age of head of household	-0.0002	0.00003	0.0001	-0.00004	-0.00009	0.0004
	(0.0005)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0003)
Avg. age of purchasing person	-0.021	-0.001	0.008	-0.004	-0.004	-0.002
	(0.0227)	(0.0081)	(0.0050)	(0.0089)	(0.0059)	(0.0149)

Table 4.11. (Continued)

	Dependent variables: Expenditure Shares of					
	Cola	Flavored CSD	Clear CSD	Fruit Juice	Mineral Water	Bottled Water
Explanatory variables						
Sq. avg. age of purchasing person	0.0002	8.74e-09	-0.0001*	0.00006	0.00005	0.00002
	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
% of households in urban area	-0.006	0.008	0.003	-0.0003	0.001	0.006
	(0.0143)	(0.0051)	(0.0033)	(0.0058)	(0.0038)	(0.0093)
% of holidays in a month	0.269***	0.073***	0.019***	-0.080***	-0.004	-0.013
	(0.0327)	(0.0117)	(0.0073)	(0.0132)	(0.0086)	(0.0214)
Monthly avg. temperature	0.004***	-0.00003	0.0002	0.001	0.001***	-0.002***
	(0.0010)	(0.0004)	(0.0002)	(0.0004)	(0.0003)	(0.0007)
Constant	0.188	0.073	0.042	0.148	-0.083	0.720
	(0.7608)	(0.2765)	(0.1721)	(0.3062)	(0.2001)	(0.4960)

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 4.12. Results of the restricted 3SLS model for the products in the second-stage (2)

	Dependent variables: Expenditure Shares of				
	Tea	Instant coffee	Turkish coffee	Beer	Rakı
Explanatory variables					
Price of Cola	0.137***	-0.010	-0.011	0.118***	0.020
	(0.0262)	(0.0270)	(0.0112)	(0.0261)	(0.0202)
Price of Flavored CSD	-0.016	-0.027	0.025***	-0.016	0.010
	(0.0164)	(0.0279)	(0.0089)	(0.0100)	(0.0112)
Price of Clear CSD	-0.012	-0.015	0.003	-0.057***	0.054***
	(0.0091)	(0.0123)	(0.0050)	(0.0170)	(0.0165)
Price of Fruit juice	-0.062***	-0.021	-0.013	0.004	-0.014
	(0.0163)	(0.0233)	(0.0084)	(0.0176)	(0.0123)
Price of Mineral water	0.024***	-0.005	0.007*	0.016*	-0.013**
	(0.0085)	(0.0100)	(0.0037)	(0.0089)	(0.0061)
Price of Bottles water	-0.092***	0.035**	0.007	0.010	-0.003
	(0.0173)	(0.0144)	(0.0076)	(0.0184)	(0.0144)
Price of Tea	0.003	-0.004	-0.015**	0.032*	0.006
	(0.0280)	(0.0175)	(0.0076)	(0.0192)	(0.0144)
Price of Instant coffee	-0.004	0.091***	-0.017*	-0.007	-0.021*
	(0.0175)	(0.0305)	(0.0086)	(0.0165)	(0.0114)
Price of Turkish coffee	-0.015**	-0.017*	0.024***	-0.023***	0.013**
	(0.0076)	(0.0086)	(0.0053)	(0.0085)	(0.0058)
Price of Beer	0.032*	-0.007	-0.023***	-0.085***	-0.034*
	(0.0192)	(0.0165)	(0.0085)	(0.0307)	(0.0177)
Price of Rakı	0.006	-0.021*	0.013**	0.008	-0.019
	(0.0144)	(0.0114)	(0.0058)	(0.0173)	(0.0145)
Total Beverage Exp.	-0.021***	0.008***	0.0002	0.008**	0.017***
	(0.0038)	(0.0023)	(0.0012)	(0.0033)	(0.0032)
% of AB group	-0.011	-0.003	0.003	-0.005	0.004
	(0.0217)	(0.0105)	(0.0053)	(0.0154)	(0.0170)
% of C1 group	-0.126***	-0.013	-0.007	0.021	0.057**
	(0.0335)	(0.0163)	(0.0084)	(0.0240)	(0.0263)
% of C2 group	-0.102***	-0.026	0.004	0.032	0.061**
	(0.0350)	(0.0172)	(0.0088)	(0.0253)	(0.0278)
Avg. age of head of household	0.039	-0.043**	-0.009	0.028	-0.001
	(0.0368)	(0.0182)	(0.0092)	(0.0267)	(0.0289)
Sq. avg. age of head of household	-0.000	0.0005**	0.0001	-0.0003	0.00002
	(0.0004)	(0.0002)	(0.0001)	(0.0003)	(0.0003)
Avg. age of purchasing person	0.003	0.001	0.002	0.001	0.017
	(0.0192)	(0.0093)	(0.0048)	(0.0136)	(0.0150)
Sq. avg. age of purchasing person	4.55e-06	-6.98e-06	-0.00002	-0.00002	-0.0002
	(0.0003)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
% of households in urban area	-0.021*	-0.000	-0.001	-0.005	0.015
	(0.0121)	(0.0060)	(0.0031)	(0.0089)	(0.0095)

Table 4.12. (Continued)

	Dependent variables: Expenditure Shares of				
	Tea	Instant coffee	Turkish coffee	Beer	Rakı
Explanatory variables					
% of holidays in a month	-0.140***	-0.005	0.005	-0.040**	-0.084***
	(0.0276)	(0.0138)	(0.0069)	(0.0197)	(0.0216)
Monthly avg. temperature	-0.002**	-0.000	-0.0003	-0.001	-0.0001
	(0.0008)	(0.0004)	(0.0002)	(0.0006)	(0.0007)
Constant	-0.429	0.962***	0.190	-0.576	-.235
	(0.6357)	(0.3231)	(0.1618)	(0.4667)	.5019

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

The coefficients of price variables have no direct interpretations for their effects on the expenditure shares of a certain product. In order to find the effect of a change in price indices on the dependent variables, the estimate of the deflated total expenditure variables "ln(x/P)" and the share a particular price index in the general price index for the category (lnP), should also be taken into account. In addition, positive signs of the price coefficients should not be interpreted as if the quantity demanded increases after an increase in the price of a particular product. Since the dependent variables in these models are expenditure shares (but not quantity demanded), a positive price coefficient may mean that the expenditure on a particular product might increase because of the increase in its price although its quantity demanded might have fallen.

By taking into account these facts, for the products in the first-stage of the demand system it can be said that the expenditure share of *beverages*, *cleaning products* and *personal care products* will increase, whereas that of *food products* will fall as a result of an increase in their own price index. The own-price effect of *"Other products"* on its expenditure share is insignificant. As to the products in the second-stage of the demand system; the expenditure shares of *cola, beer* and *rakı* will fall when their own price indices increases. The expenditure shares of *fruit juice*, *mineral water*, *bottled water*, *tea*, *instant coffee* and *Turkish coffee* will increase as their own price indices increase. Those of *flavored CSD* and *clear CSD* will not change. Since the coefficients of the total beverage expenditure and of the cola price index in equations for *flavored CSD* and *clear CSD* are insignificant, it can be said that an increase in cola prices will not change the expenditure shares of these two product groups.

The effects of the socio-economic status of households are insignificant in general for expenditures on many beverage products. It is estimated that when the percentage of households in C1 and C2 groups increases by %1 with respect to DE group, the expenditure share of *tea* products decreases by %0.126 and % 0.102. This may indicate that the poorest group spends more for *tea* than the other groups do. An inverse situation is observed for *rakı*. If the percentages of the households in C1 and C2 groups increase by 1% with respect to DE group, the expenditure share of *rakı* increase by %0.57 and %0.61, respectively.

When the average age of the purchasing persons in household is considered, it is estimated that the expenditure share of *food* increases if the person is below 30 and then in older ages it decreases. The expenditure share of *cleaning products* starts to increase after an average age of 27.5.

The distribution of households by regional categories like urban, semi-urban and suburban does not affect significantly the expenditure share of beverage products. Only exception is for *tea*, for which 1% increase in the population living in urban area (with respect to other areas in a city/month pair) decreases the expenditure share by %0.21.

If the percentage of holidays in a month increases, the expenditure share of *carbonated soft drinks* increases and those of *alcoholic drinks, tea* and *fruit juices* decrease.

An increase in average temperature increases the expenditure share of *beverages* in general by 0.001, and decreases that of *food products* by the same amount. The effect of temperature is positive for the expenditure shares of *cola* and *mineral water*. If the average temperature increases by 1%, the shares of tea and bottled water decrease by 0.002.

As indicated above, since the dependent variables in the LAIDS model are expenditure shares, the effects of explanatory variables depend on both the price and the quantity demanded of the relevant product. Therefore, a more direct interpretation of the relation of prices and quantity demanded should be obtained by analyzing elasticities of demand as will be derived in the following sections. In order to comply with the economic theory, elasticities will be calculated using the results of the *restricted* 3SLS model. Before proceeding for elasticities, the results of the *unrestricted* 3SLS model are presented in tables below (City and time effects of these regressions can be seen in Appendix C).

Table 4.13. Results of the unrestricted model for the products in the first-stage

	Dependent variables: Expenditure shares of				
	Beverages	Food Products	Cleaning Products	Personal Care Products	Other Products
Explanatory variables					
Price of Beverages	0.053	-0.091	0.038	-0.003	0.003
	(0.0392)	(0.0631)	(0.0258)	(0.0264)	(0.0034)
Price Food Products	0.082	-0.674*	0.485***	0.107	0.000
	(0.2414)	(0.3905)	(0.1598)	(0.1633)	(0.0208)
Price Cleaning Products	0.092***	-0.274***	0.130***	0.052**	-0.001
	(0.0326)	(0.0527)	(0.0216)	(0.0220)	(0.0028)
Price of Personal Care Products	-0.129***	0.064	0.025	0.039*	0.001
	(0.0337)	(0.0542)	(0.0222)	(0.0227)	(0.0029)
Price of Other Products	-0.026	0.013	0.015	-0.002	-0.000
	(0.0165)	(0.0267)	(0.0109)	(0.0112)	(0.0014)
Total FMCG Expenditure	-0.000	-0.000	-0.000	0.000**	0.000
	(0.0003)	(0.0004)	(0.0002)	(0.0002)	(0.0000)
% of AB group	-0.014*	0.028**	-0.006	-0.008	0.000
	(0.0079)	(0.0127)	(0.0052)	(0.0053)	(0.0007)
% of C1 group	-0.030**	0.044**	-0.006	-0.008	-0.000
	(0.0122)	(0.0196)	(0.0080)	(0.0082)	(0.0010)
% of C2 group	-0.008	0.020	-0.007	-0.005	0.000
	(0.0133)	(0.0213)	(0.0087)	(0.0089)	(0.0011)
Avg. age of head of household	0.012	0.005	-0.012	-0.003	-0.002*
	(0.0133)	(0.0212)	(0.0087)	(0.0089)	(0.0011)
Sq. avg. age of head of household	-0.000	-0.000	0.000	0.000	0.000*
	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0000)
Avg. age of purchasing person	-0.007	0.013	-0.003	-0.004	0.001**
	(0.0073)	(0.0117)	(0.0048)	(0.0049)	(0.0006)
Sq. avg. age of purchasing person	0.000	-0.000	0.000	0.000	-0.000*
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0000)
% of households in urban area	-0.015***	0.022***	-0.005	-0.002	-0.000
	(0.0045)	(0.0072)	(0.0030)	(0.0030)	(0.0004)
% of holidays in a month	0.035***	-0.077***	0.018**	0.022***	0.002*
	(0.0114)	(0.0183)	(0.0075)	(0.0076)	(0.0010)
Monthly avg. temperature	0.001*	-0.001**	0.000**	0.000	-0.000***
	(0.0003)	(0.0005)	(0.0002)	(0.0002)	(0.0000)
Constant	-0.032	0.327	0.453***	0.234	0.018
	(0.2251)	(0.3599)	(0.1472)	(0.1502)	(0.0191)

Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 4.14. Results of the unrestricted model for the products in the second-stage (1)

	Dependent variables: Expenditure Shares of					
	Cola	Flavored CSD	Clear CSD	Fruit Juice	Mineral Water	Bottled Water
Explanatory variables						
Price of Cola	-0.155	-0.087*	-0.013	-0.040	-0.000	-0.422***
	(0.1613)	(0.0503)	(0.0373)	(0.0602)	(0.0525)	(0.1044)
Price of Flavored CSD	-0.102	0.033	0.109**	0.015	-0.058	0.393***
	(0.2015)	(0.0629)	(0.0467)	(0.0753)	(0.0657)	(0.1305)
Price of Clear CSD	-0.012	0.106***	0.006	-0.009	-0.019	-0.006
	(0.0633)	(0.0198)	(0.0147)	(0.0237)	(0.0207)	(0.0410)
Price of Fruit Juice	-0.077	-0.052*	-0.016	0.084**	0.049	0.076
	(0.1004)	(0.0313)	(0.0233)	(0.0375)	(0.0327)	(0.0650)
Price of Mineral Water	-0.026	-0.011	-0.003	-0.017	0.015	-0.012
	(0.0424)	(0.0132)	(0.0098)	(0.0159)	(0.0138)	(0.0275)
Price of Bottles Water	0.081	-0.018	-0.001	-0.016	-0.031*	-0.025
	(0.0554)	(0.0172)	(0.0128)	(0.0206)	(0.0180)	(0.0358)
Price of Tea	0.127**	-0.021	-0.032**	-0.010	0.058***	-0.096**
	(0.0632)	(0.0197)	(0.0146)	(0.0235)	(0.0205)	(0.0408)
Price of Instant Coffee	0.125	-0.010	-0.039	0.032	0.070*	-0.067
	(0.1185)	(0.0370)	(0.0274)	(0.0442)	(0.0386)	(0.0767)
Price of Turkish Coffee	-0.067**	0.025**	0.010	-0.009	-0.022**	-0.000
	(0.0336)	(0.0105)	(0.0077)	(0.0125)	(0.0109)	(0.0217)
Price of Beer	0.041	0.005	-0.023	0.029	0.015	0.081*
	(0.0686)	(0.0214)	(0.0159)	(0.0256)	(0.0224)	(0.0444)
Price of Rakı	0.056	-0.003	0.026**	-0.035*	-0.023	-0.006
	(0.0493)	(0.0154)	(0.0114)	(0.0184)	(0.0161)	(0.0319)
Total Beverage Exp.	-0.025***	-0.000	-0.001	0.000	0.001	0.013***
	(0.0075)	(0.0024)	(0.0017)	(0.0028)	(0.0025)	(0.0049)
% of AB group	0.014	-0.011	0.003	0.008	-0.000	0.006
	(0.0281)	(0.0087)	(0.0064)	(0.0103)	(0.0090)	(0.0180)
% of C1 group	0.006	0.003	0.008	0.005	0.009	0.026
	(0.0444)	(0.0137)	(0.0101)	(0.0163)	(0.0143)	(0.0285)
% of C2 group	0.051	-0.021	0.003	0.018	-0.013	-0.028
	(0.0471)	(0.0146)	(0.0107)	(0.0173)	(0.0152)	(0.0303)
Avg. age of head of household	0.006	-0.004	-0.003	-0.016	-0.002	-0.027
	(0.0507)	(0.0157)	(0.0116)	(0.0186)	(0.0163)	(0.0326)
Sq. avg. age of head of household	-0.000	0.000	0.000	0.000	0.000	0.000
	(0.0006)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0004)
Avg. age of purchasing person	-0.005	-0.002	0.009	-0.006	-0.006	0.000
	(0.0258)	(0.0080)	(0.0059)	(0.0095)	(0.0083)	(0.0166)

Table4.14. (Continued)

	Dependent variables: Expenditure Shares of					
	Cola	Flavored CSD	Clear CSD	Fruit Juice	Mineral Water	Bottled Water
Explanatory variables						
Sq. avg. age of purchasing person	0.000	0.000	-0.000	0.000	0.000	-0.000
	(0.0004)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
% of households in urban area	-0.015	0.008	0.002	0.004	0.001	0.017
	(0.0168)	(0.0052)	(0.0038)	(0.0062)	(0.0054)	(0.0108)
% of holidays in a month	0.284***	0.079***	0.017*	-0.073***	-0.007	-0.022
	(0.0384)	(0.0119)	(0.0088)	(0.0141)	(0.0123)	(0.0246)
Monthly avg. temperature	0.004***	0.000	0.000	0.001*	0.001**	-0.002**
	(0.0013)	(0.0004)	(0.0003)	(0.0005)	(0.0004)	(0.0008)
Constant	0.221	0.153	-0.113	0.548	0.170	0.537
	(0.9429)	(0.2916)	(0.2154)	(0.3466)	(0.3037)	(0.6060)

Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 4.15. Results of the unrestricted model for the products in the second-stage (2)

	Dependent variables: Expenditure Shares of				
	Tea	Instant coffee	Turkish coffee	Beer	Rakı
Explanatory variables					
Price of Cola	0.023	-0.003	0.061**	0.452***	0.184*
	(0.1518)	(0.1054)	(0.0295)	(0.1192)	(0.1107)
Price of Flavored CSD	0.164	-0.133	-0.053	-0.304**	-0.063
	(0.1900)	(0.1319)	(0.0369)	(0.1493)	(0.1385)
Price of Clear CSD	0.067	0.033	-0.001	-0.064	-0.100**
	(0.0598)	(0.0415)	(0.0116)	(0.0470)	(0.0436)
Price of Fruit juice	-0.050	-0.020	-0.029	0.098	-0.062
	(0.0946)	(0.0657)	(0.0184)	(0.0743)	(0.0689)
Price of Mineral water	0.047	-0.050*	-0.000	0.055*	0.001
	(0.0400)	(0.0278)	(0.0078)	(0.0314)	(0.0292)
Price of Bottles water	-0.053	-0.013	0.001	0.028	0.047
	(0.0519)	(0.0361)	(0.0102)	(0.0408)	(0.0379)
Price of Tea	-0.015	0.054	0.004	-0.029	-0.041
	(0.0593)	(0.0412)	(0.0116)	(0.0466)	(0.0433)
Price of Instant coffee	-0.159	0.187**	0.005	-0.139	-0.006
	(0.1115)	(0.0775)	(0.0217)	(0.0876)	(0.0813)
Price of Turkish coffee	0.024	-0.031	0.028***	0.033	0.010
	(0.0315)	(0.0219)	(0.0062)	(0.0247)	(0.0230)
Price of Beer	0.044	0.068	-0.018	-0.050	-0.192***
	(0.0647)	(0.0449)	(0.0126)	(0.0508)	(0.0471)
Price of Rakı	0.052	-0.078**	-0.004	-0.028	0.043
	(0.0464)	(0.0322)	(0.0090)	(0.0365)	(0.0339)
Total Beverage Exp.	-0.022***	0.009*	0.002	0.007	0.016***
	(0.0071)	(0.0049)	(0.0014)	(0.0056)	(0.0052)
% of AB group	-0.007	-0.004	0.004	-0.012	-0.001
	(0.0260)	(0.0182)	(0.0052)	(0.0204)	(0.0190)
% of C1 group	-0.102**	-0.004	-0.003	0.035	0.017
	(0.0411)	(0.0287)	(0.0082)	(0.0323)	(0.0301)
% of C2 group	-0.064	-0.035	0.001	0.014	0.074**
	(0.0437)	(0.0305)	(0.0087)	(0.0343)	(0.0320)
Avg. age of head of household	0.042	-0.066**	-0.013	0.051	0.032
	(0.0470)	(0.0328)	(0.0093)	(0.0369)	(0.0344)
Sq. avg. age of head of household	-0.000	0.001**	0.000	-0.001	-0.000
	(0.0005)	(0.0004)	(0.0001)	(0.0004)	(0.0004)
Avg. age of purchasing person	0.010	-0.008	-0.002	-0.012	0.021
	(0.0240)	(0.0167)	(0.0047)	(0.0188)	(0.0175)
Sq. avg. age of purchasing person	-0.000	0.000	0.000	0.000	-0.000
	(0.0003)	(0.0002)	(0.0001)	(0.0003)	(0.0002)
% of households in urban area	-0.009	0.005	-0.002	-0.006	-0.004
	(0.0156)	(0.0109)	(0.0031)	(0.0122)	(0.0114)
% of holidays in a month	-0.155***	-0.000	0.008	-0.053*	-0.078***
	(0.0356)	(0.0248)	(0.0071)	(0.0280)	(0.0260)
Monthly avg. temperature	-0.003**	0.001	-0.000	-0.001	-0.000
	(0.0012)	(0.0008)	(0.0002)	(0.0009)	(0.0009)
Constant	-0.662	1.608***	0.338*	-0.830	-0.969
	(0.8760)	(0.6107)	(0.1732)	(0.6879)	(0.6406)

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

4.7.4. Testing theoretical restrictions of homogeneity and symmetry

The restrictions of homogeneity and symmetry have been tested by implementing Wald test on the unrestricted 3SLS model. The tables below show the results of these tests.

Table 4.16. Test results of homogeneity restriction for each equation

Equations	Chi-square statistics	p-value
Beverage	0.045	0.832
Food	3.016	0.082
Cleaning	9.355	0.002
Personal care	0.696	0.404
Cola	0.011	0.915
Flavored CSD	1.536	0.215
Clear CSD	1.438	0.23
Fruit juice	0.669	0.414
Mineral water	3.685	0.055
Bottled water	2.426	0.119
Tea	3.456	0.063
Instant coffee	0.065	0.799
Turkish coffee	0.118	0.731
Beer	0.721	0.396

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Considering 5 % significance level, Table 4.16 shows that the homogeneity restrictions have not been rejected in the equations other than the equation of *cleaning products*. Tables 4.18 and 4.19 below present the p-values of the Wald test for symmetry restrictions in the both stages of the demand system.

Table 4.17. P-values of the Wald test for symmetry restrictions in the first-stage

	Beverage	Food	Cleaning	Personal care
Beverage				
Food	0.547			
Cleaning	0.166	0.000		
Personal care	0.001	0.827	0.360	

Author's own calculations using Ipsos/KGM and TURKSTAT data.

In the first-stage of the demand system, of the total 6 symmetry restrictions only the restrictions for pairs *beverage-personal care products*, *food-cleaning products* have been rejected at 5 % level.

Table 4.18. P-values of the Wald test for symmetry restrictions in the second-stage

	Cola	Flavored CSD	Clear CSD	Fruit juice	Mineral water	Bottled water	Tea	Instant coffee	Turkish coffee
Cola									
Flavored CSD	0.943								
Clear CSD	0.994	0.957							
Fruit juice	0.750	0.415	0.829						
Mineral water	0.708	0.482	0.441	0.057					
Bottled water	0.000	0.002	0.908	0.179	0.554				
Tea	0.528	0.331	0.106	0.664	0.770	0.525			
Instant coffee	0.416	0.367	0.182	0.546	0.040	0.526	0.109		
Turkish coffee	0.005	0.042	0.800	0.375	0.097	0.952	0.547	0.247	
Beer	0.004	0.039	0.062	0.389	0.276	0.374	0.364	0.034	0.068

Author's own calculations using Ipsos/KGM and TURKSTAT data.

In the second stage of the demand system there are 45 symmetry restrictions. Only 9 of them have been rejected at 5 % significance level.

The homogeneity and symmetry restrictions can also be tested using the Likelihood Ratio (LR) test. In this test, the log likelihood (ll) values of the unrestricted and restricted models are compared. The LR-test statistic is calculated with the formula below:

LR-statistic = 2 (log likelihood of unrestricted model – log likelihood of restricted model)

The result of the LR-test and related statistics are shown in the table below.

Table 4.19. LR-test for homogeneity and symmetry restrictions

Model	Number of observation	Log likelihood	Degrees of freedom	AIC	BIC
Restricted 3SLS	864	34853.08	541	-68624.17	-66048.16
Unrestricted 3SLS	864	34197.44	606	-67182.87	-64297.36

LR statistic	-1131.29
p-value	1.000

Author's own calculations using Ipsos/KGM and TURKSTAT data.

From this table, it is seen that the restrictions of homogeneity and symmetry are not rejected. However, LR-statistic is calculated as a negative value because the log likelihood of the restricted model is higher than that of the unrestricted model. The reason of negative LR-statistic may be the fact that the model suffers from problem of degrees-of-freedom. LR test is an asymptotic test and may require a larger sample for the model estimated in this chapter.

It can be concluded that the restrictions homogeneity and symmetry have not been rejected as a whole in the LR-test. When each restriction is tested separately, only 12 of the total 65 restrictions have been rejected. A possible explanation for the cases where the restrictions have been rejected may be the fact that the LAIDS model have been estimated using aggregated data. AIDS models have been originally derived for micro behaviors. In the application in this chapter, a "representative level" for total expenditures have been calculated to comply with the aggregation theory. However, the rejection of restrictions in some cases casts doubt on the approach used in calculating the "*representative level*" of the total expenditures on beverages and on fast-moving consumer goods. In this calculation, the total expenditures of each household have been deflated by the size of households. The data does not contain information on the distribution of age or sex in household. If they were available they might have been used in calculating a richer index "k" for deflating the total expenditures of each household. It can be argued that deflating total expenditure only by the size of household, may be one of the causes of not rejecting restrictions in some cases. However, since the LR-test shows that restrictions have not been rejected as a whole, it can be concluded that the results of the restricted 3SLS model is consistent with the economic theory.

4.8. Elasticities of Demand and Expenditure

4.8.1. Expenditure elasticities of demand

The formula of the expenditure elasticities of demand have been given in Green and Alston (1991: 874) as,

$$E_{i,x} = 1 + \frac{\beta_i}{w_i} \tag{4.44}$$

where β_i is the coefficient of the total expenditure in equation *i* and w_i is the expenditure share of product *i*. The expenditure elasticities of demand for products analyzed in this chapter are shown in the table below. The expenditure elasticities for the first-stage products should be interpreted as the percentage change in the demand for these products as a response to one percentage change in total expenditures on FMCG products. Similarly, the expenditure elasticities for the second-stage products should be interpreted as the percentage change in the demand for these products as a response to one percentage change in total expenditures for *beverage* products.

Table 4.20. Expenditure elasticities

Products	Expenditure elasticities	t-statistic for Ho: Expenditure Elasticity is unity
Beverage	0.995	-2.90
Food	1.002	3.86
Cleaning	0.995	-3.39
Personal care	1.000	0.00
Other	0.974	-1.06
Cola	0.867	-6.53
Flavored CSD	1.010	0.26
Clear CSD	0.964	-0.85
Fruit juice	0.951	-1.70
Mineral water	0.937	-1.46
Bottled water	1.353	8.14

Table 4.20. (Continued)

Products	Expenditure elasticities	t-statistic for Ho: Expenditure Elasticity is unity
Tea	0.929	-5.58
Instant coffee	1.206	3.67
Turkish coffee	1.012	0.21
Beer	1.123	2.55
Rakı	1.228	5.37

Author's own calculations using Ipsos/KGM and TURKSTAT data.

If the income elasticity of fast-moving consumer goods is unity, the *expenditure elasticities* can be interpreted as *income elasticities*. Same argument can be said for the products in the second stage of the demand system. If the elasticity of the total expenditures for beverages with respect to changes in total expenditures for FMCG is unity, the expenditure elasticities of the second-stage products can be read as their corresponding *income elasticities*. In this case, if the income elasticity of a particular product is higher than 1, this will mean that this product is a luxury good.

All expenditure elasticities are significant at 1% level. The expenditure elasticities have also been tested to see whether they are statistically equal to unity. The null hypothesis that these are equal to one have not been rejected for *personal care products, other products, flavored CSD, clear CSD fruit juices, mineral water, Turkish coffee products.*

It is observed that the expenditure elasticity of *beverage products* is very close to unity (0.995). The expenditure elasticity of *cola* is 0.867. The expenditure elasticity of *tea products* is also very close to 1 from below. For other products, the expenditure elasticities are higher than 1. Especially, for *bottled water, instant coffee, beer* and *rakı*, the expenditure elasticities are significantly higher than 1 (from 1.23 to 1.35). These results suggest that these products are luxury goods. It can be argued that water is not expected to be a luxury good because of its importance for human health. This argument can be matched by arguing that the water products that are considered in this chapter are "bottled water" and households tend to satisfy their need for water from bottled water rather than tap water as their income increases.

4.8.2. Price elasticities of demand

Most of the research in the demand literature uses the formulas given by Green and Alston (1990) for calculating the price elasticities of demand. However, the formulas of elasticities for the LAIDS models in Green and Alston (1990) are derived for cases where the price indices used in deflating the total expenditures are approximated by the Stone price index. However, in this chapter, the Tornqvist price index has been used instead of the Stone index. Although Buse and Chan (2000) and Moschini (1994) used the Tornqvist price index in their studies, they have not reported the formulas of the elasticities that have been derived by using the Tornqvist index. Therefore, the formulas of the price elasticities of demand (for the products in the second-stage of the demand system) have been derived in this thesis as below:

$$\varepsilon_{ij} = -\lambda + \frac{\gamma_{ij}}{s_i} + \left[w_j^T + \frac{1}{2}\sum_k^K \gamma_{kj} \ln p_k^T \right]\left[1 + \frac{1}{2}\sum_k^K \beta_k \ln p_k^T \right]^{-1}\left[(1+\delta) - \frac{\beta_i}{s_i} \right] \quad (4.45)$$

where, $\lambda = 1$ if $i = j$ and $\lambda = 0$ if $i \neq j$. The steps for deriving this formula can be found in Appendix D. In this formula, parameters and the subscripts have the following meanings:

ε_{ij} : Marshallian cross-price elasticity of i with respect to the a change in price *j*.

γ_{ij} : Price coefficients of the product j in the equation for i in the LAIDS model.

w_i : Expenditure share of product i.

w_j^T :Share of the price of product j in the Tornqvist price index. It can be expressed as the average of the expenditure shares of product j in the base and current period: $w_j^T = \frac{1}{2}(w_j^o + w_j^t)$

γ_{kj} Price coefficients of product j in the equation for k in the LAIDS model.

p_k : Price of product k.

β_k :Coefficient of the total expenditure in equation k.

β_i :Coefficient of the total expenditure in equation i

δ : Elasticity of demand for "beverages" in the first-stage of the demand system.

The elasticities of demand for products in the first-stage of the demand system can be calculated using a similar formula above. However, the elasticity of demand for fast-moving consumer goods is assumed to be $\delta^{FMCG} = -1$ since an upper stage of demand system for the larger group of expenditures (i.e. FMCG, education, rent, health, transport etc.) has not been estimated.

The Marshallian price elasticities of demand for *beverage products* have been estimated as "-0.684" and it is significant at 1% level. This means that beverages as a group have relatively inelastic demand.

The own-price and cross-price elasticities of demand for the products in the second-stage are in the table below. Elasticity values have been calculated by evaluating the elasticity formula above at mean levels of price indices and expenditure shares.

Table 4.21.Own and cross-price elasticities of products in the second stage of the demand system

		Prices of										
		Cola	Flavored CSD	Clear CSD	Fruit juice	Mineral water	Bottled water	Tea	Instant coffee	Turkish coffee	Beer	Rakı
Quantities of	Cola	-1.45***	-0.27	-0.06	0.13	-0.07	-0.08***	0.70***	-0.04	-0.04***	0.51***	0.12
	Flavored CSD	-1.27	-0.30	1.92***	-0.50	-0.18	-0.02***	-0.23	-0.51	0.48	-0.29	0.21
	Clear CSD	-0.57	3.32***	-0.69***	-0.99***	-0.46***	-0.46***	-0.30	-0.51	0.09	-0.52	0.44**
	Fruit juice	0.39	-0.33	-0.38***	0.49	0.13	0.28	-0.69***	-0.27	-0.16***	0.06	-0.15
	Mineral water	-0.50	-0.28	-0.43***	0.34	0.04	-0.89***	0.89***	-0.15	0.22***	0.53**	-0.38**
	Bottled water	-0.35	-0.02	-0.20	0.29	-0.40***	0.28	-1.31***	0.50***	0.10***	0.14	-0.04
	Tea	0.58***	-0.03	-0.03	-0.18***	0.09***	-0.29***	-0.88***	-0.01	-0.05***	0.12**	0.05
	Instant coffee	-0.21	-0.66	-0.37	-0.52	-0.12	0.88	-0.06	1.26**	-0.41***	-0.16	-0.52**
	Turkish coffee	-0.46	1.27***	0.15	-0.62	0.35**	0.38	-0.66**	-0.83**	0.21***	-1.17***	0.70***
	Beer	1.78***	-0.22	-0.83***	0.07	0.24**	0.16	0.52**	-0.09	-0.34***	-2.23***	0.13
	Rakı	0.29	0.13	0.71***	-0.17	-0.16***	-0.04***	0.10	-0.28**	0.18***	-0.44**	-1.24***

*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Author's own calculations using Ipsos/KGM and TURKSTAT data.

The own-price elasticities of *cola, clear CSD, tea, beer* and *rakı* are negative and statistically significant at 5% level. The own-price elasticities of *flavored CSD, fruit juices, mineral water, bottled water* are insignificant.

The demand for *tea* is inelastic (-0.876). This shows the particular importance of tea products for Turkish households. The demand for *instant coffee* is not affected by a change in tea prices and vice-versa. This suggests that *tea* and *instant coffee* cannot be seen as substitutes for each other. Signs of the cross-price elasticities between *Turkish coffee* and *instant coffee* (-0.411 and -0.833) or between *Turkish coffee* and *tea* (-0.045 and -0.664) are negative. The own-price elasticities of instant coffee and Turkish coffee are positive.

Although the own-price elasticity of rakı (-1.237) is above one in absolute value, it can be considered as being low enough to show that *rakı* drinkers have a kind of special loyalty for this drink. This observation is supported by the insignificant cross-price elasticity of *beer* with respect to the price of *rakı*. Demand for beer is not affected by the increase in rakı prices.

As to the *bottled* and *mineral water*, their own-price elasticities are insignificant. This indicates that demand for these products is inelastic. Their cross-price elasticities are both negative.

It is observed that there are strong mutual substitutability between flavored CSD and clear CSD. The cross-price elasticities between them are 3.323 and 1.917. However, a price increase in both of these products does not affect the demand for cola. Similarly, the demand for flavored or for clear CSD does not change after an increase in the price of cola. Cola itself has a negative and significant own-price elasticity (-1.45). These facts imply that cola constitutes a separate *relevant product market* instead of being in the same product market with flavored and clear CSD products. Taking into account the positive cross elasticity and the similarity in product characteristics between *flavored* and *clear carbonated soft drinks,* it can be argued that these two CSD types can be considered being in the same product market.

As said above, the values of the elasticities presented in Table 4.15 have been calculated by evaluating the elasticity formula in equation (4.45) at the mean level of price indices and of expenditure shares. It is also possible to calculate the values that these elasticities will take at a particular price level that is observed in a particular city/month pair. The elasticities of *cola* that have been calculated for each point of observation are shown in Appendix E. The table below shows the summary of the own-price elasticity for cola for each city in the sample.

Table 4.22. Summary of own-price elasticity of demand for cola by cities

	Obs	Mean	Std. Dev.	Min	Max
Cities					
Adana	73	-1.177	0.066	-1.364	-1.003
Ankara	73	-1.373	0.138	-1.799	-1.144
Antalya	73	-1.396	0.134	-1.936	-1.178
Bursa	73	-1.472	0.138	-1.807	-1.166
Gaziantep	73	-1.284	0.129	-1.682	-1.008
İstanbul	73	-1.569	0.099	-1.780	-1.353
İzmir	73	-1.445	0.141	-1.782	-1.187
Kayseri	73	-1.399	0.157	-1.835	-1.102
Kocaeli	73	-1.393	0.145	-1.805	-1.123
Konya	73	-1.399	0.118	-1.807	-1.133
Osmaniye	73	-1.192	0.127	-1.621	-0.991
Samsun	73	-1.400	0.167	-1.782	-1.075

Author's own calculations using Ipsos/KGM and TURKSTAT data.

There are no big differences among cities regarding the elasticity of demand for cola products. The most and the least elastic values take place in Istanbul (-1.569) and in Osmaniye (-1.192), respectively.

The next section presents an application of the SSNIP test for defining the relevant product market concerning beverage products.

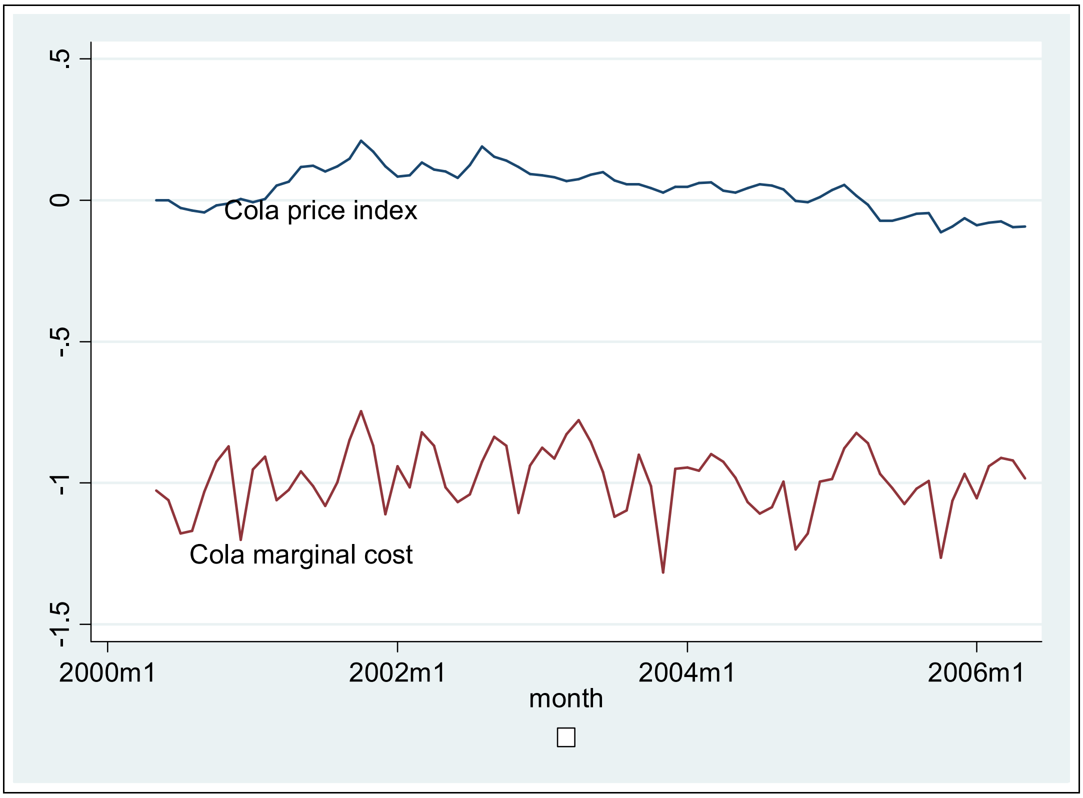
4.9. Relevant product market definition: an application of the SSNIP test

This section aims to implement the SSNIP test for defining the relevant market for beverage products. As explained in Chapter 1, the SSNIP test is the state-of the-art among techniques used in the economics of competition law. There is a slight difference in its implementation between merger cases and investigations on the abusive behaviors of a dominant position. In merger cases, the effect of "the 5-10% price increase" is analyzed at "current level" of prices, whereas in dominance cases the test is implemented by beginning from "a competitive level" of price. The reasoning of this difference can be explained as follows: In a dominance case, it is probable that the firm under investigation may be charging currently high prices due to its monopolistic power and the own-price elasticity of demand may be highly elastic at the current level of prices. An extra price increase of 5-10% would be unprofitable since consumers would be expected to shift to some alternative products which might not be conceived as substitutes at competitive prices. This may cause to define the relevant market too broad. This situation is called as "the cellophane fallacy" in the economics of competition law and dates back to famous antitrust case about Du Pont Company (the cellophane monopolist) in U.S. This case has been criticized in the literature on the fact that the relevant market in this case has been defined depending on the current levels of prices and hence, included other products which have very low substitutability for the cellophane in real economic life. After this case, it has been accepted that the SSNIP test should be implemented at "competitive prices" if the case at hand is about the abuse of dominance (EU Commission Notice: 1997, para 19). Since the two investigations that the Turkish Competition Authority conducted in the cola market concerned abuse of dominant position held by the market leader, in the empirical application in this chapter the "competitive prices" is taken into account.

However, this choice is not without problem since it is difficult to decide on which level of price should be considered as the "competitive level". In this chapter, the competitive price will be assumed to be equal to marginal cost. In order to find the marginal cost (or competitive price) it is assumed that the hypothetical cola monopolist maximizes its profits at every point of observation in the sample (every city/time pair). Having estimated own-price elasticity at each point of observation in the previous section, it is possible to calculate marginal costs at each city/time pair using the inverse elasticity rule which is the result of the first-order condition of the monopolist's profit function:

$$\frac{p_{ct} - c_{ct}}{p_{ct}} = \frac{1}{|\varepsilon_{ct}|} \quad (4.46)$$

These marginal costs are accepted as equal to the competitive prices. The graph below shows a comparison of marginal costs (calculated at points of profit maximization) and current cola prices in İstanbul.



Graph 4.5. Marginal cost and prices of cola in İstanbul
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Then, new expenditure shares, w_{ct}^{h}, are predicted using the parameters of the demand equation that has been estimated in the previous section. New own-price elasticities have been calculated using these shares and competitive prices again for each city/time pair. Finally, the value of the profit function of the cola monopolist has been calculated for times before and after the 5-10 % increase in prices as suggested in the SSNIP test. It is obvious that the profits (π_{ct}^{0}) are zero before the price increase since prices are equal to marginal costs. The post SSNIP (relative) profit function can be written as follows:

$$\frac{\pi_{ct}^{h}}{x^{BEV}} = \frac{(p_{ct}^{h} - c_{ct})}{p_{ct}^{h}} \times \frac{q_{ct}^{h} p_{ct}^{h}}{x^{BEV}} \times (1 + \frac{\varepsilon_{ct}^{h}}{h}) \tag{4.47}$$

$$\frac{\pi_{ct}^{h}}{x^{BEV}} = \frac{(p_{ct}^{h} - c_{ct})}{p_{ct}^{h}} \times w_{ct}^{h} \times (1 + \frac{\varepsilon_{ct}^{h}}{h}) \tag{4.48}$$

$where, p_{ct}^{h} = c_{ct} \times (1 + h)$ and x^{BEV} is the total beverage expenditure that is held constant. The rate of price increase is shown by *h*=0.05 or 0.10. After calculating the effect of the *h* % price increase over competitive prices, it is seen that the cola monopolist is able to increase its relative profits at each point of observation. At mean values, the relative profits after SSNIP are 0.023 and 0.043 for h=0.05 and h=0.10. This is shown in table below.

Table 4.23. Relative profits of cola monopolist after SSNIP

Relative profit	Obs	Mean	Std. Dev.	Min	Max
Rate of price increase					
h = 0.05	875	0.023	0.006	0.006	0.072
h= 0.10	875	0.043	0.012	0.011	0.140

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Therefore, it can be concluded that according to results of SSNIP test, cola products constitutes a distinct relevant market. However, for a proper analysis of the relevant market definition, the result of the SSNIP test should be supported by other qualitative or quantitative factors related to the market under investigation. For example, it should be analyzed whether alternative products can be substitutes of cola regarding the products' characteristics and their intended use.

Depending on the cross-price elasticities between cola and two other carbonated soft drinks, it was concluded that cola is not in the same relevant product market with flavored and clear CSD. As seen in the Table 4.15, it has been predicted that one percent increase in cola prices increases the demand for tea and beer by %0.58 and %1.78, respectively. This finding may challenge the view that cola products constitute a distinct relevant market. However, it can be argued that cola, tea and beer have different product characteristics from many aspects and are consumed by consumers for different purposes. First of all, beer is an alcoholic beverage and even this feature may be sufficient to distinguish it form cola and tea. Tea is a hot drink and generally consumed in breakfast and after lunch and dinners, whereas cola is generally served with meals. In cases when cola is consumed without meals it is generally for refreshing purpose whereas tea as a hot drink may not serve to this purpose. As a product characteristic, cola is a ready-to-use drink but the tea needs to be infused before serving. Along with the result of SSNIP test, these arguments also support the view that cola products constitute a distinct relevant antitrust market.

4.10. Conclusion of Chapter 4

In this chapter it is aimed to seek an answer for the question whether cola products constitute a distinct “relevant product market” in the meaning of competition law. Although there are several quantitative techniques that can be used for identifying the relevant market, the SSNIP approach has been preferred for this purpose in this chapter. The choice of the SSNIP methodology has been motivated by the fact that it is more suitable than other techniques in taking into account the properties of demand substitution, which is the main factor to be considered in the relevant market definition. A proper implementation of the SSNIP test necessitates having information on the elasticities of demand for the products that are candidates to be an element of the relevant market.

There are many different econometric estimation methods that can be used in estimating the demand elasticities; however the more flexible models that allows estimating without imposing restrictions on the substitution patterns are more preferable than others. In this respect, a linearized version of the Almost Ideal Demand System (AIDS) model has been used in this chapter. This model is a first-order approximation to any demand system and is very flexible in estimating all parameters that determine the substitution patterns among alternative products. It permits exact aggregation without assuming linear Engel curves. The AIDS model allows estimating demand equations for different products in a system approach that takes into account the correlation among the demand shocks of the different products. It allows imposing and testing the restrictions of adding-up, homogeneity and symmetry that are derived in microeconomic theory.

In this chapter, in order to diminish the number of parameters that have to be estimated, a two-stage budgeting approach has been used. In the first-stage of the demand system, the demand equations for upper product categories, such as beverage, food, cleaning products, personal care products, have been specified. In the second-stage, the demand for the product groups like cola, flavored and clear carbonated soft drinks, fruit juice, mineral water, bottled water, tea, instant coffee, Turkish coffee, beer and rakı have been estimated. This specification has been thought to be suitable for defining the relevant market that is related to beverage products. The three-stage least squares method has been used as the estimation technique by taking into account that regressors such as prices and total expenditures may be endogenous.

The elasticities of demand for beverage types have been calculated using the results of the restricted linearized AIDS model. The income elasticities of each beverage type have been tested under the null hypothesis that they are equal to unity. Those of the flavored and clear carbonated soft drinks, fruit juice, mineral water and Turkish coffee have been found to be statistically equal to unity. The income elasticity of cola and tea are lower than one (0.86 and 0.92). On the other hand, the income elasticities of bottled water, instant coffee, beer and rakı are higher than unity. These products can be classified as luxury goods, whereas cola and tea are necessity goods.

The own-price elasticities of most of the products in the system have been found to be statistically significant and have the expected sign. The own-price elasticity of cola product have been estimated as -1.45. This is more inelastic than the value of own-price elasticity of cola found in Cotterill et al. (1996, 38) which is -3.01. No substitution have been identified between cola and two other types of carbonated soft drink. On the other hand, flavored and clear carbonated soft drinks have positive cross-price elasticities with respect to each other. These findings suggest that cola and other two types of carbonated soft drinks are in different relevant product markets. In addition, the results of the SSNIP test also showed that a hypothetical monopolist of cola products can profitably increase its price by 5-10% and therefore, cola is a distinct relevant product market. Another interesting result of this chapter is that the demand for beer is not affected by a change in the price of rakı. This implies that rakı and beer are in different relevant product markets.

In the next chapter, the demand elasticities of cola products will be estimated at brand and package level.

CHAPTER 5

ESTIMATION OF THE DEMAND ELASTICITIES AND THE MARKET POWER IN TURKISH COLA INDUSTRY AT PRODUCT LEVEL

5.1. Introduction

This chapter aims to deepen the analysis of market power in the cola industry and therefore, estimates the price elasticities of demand for cola products at brand and package level. The demand elasticities at that level can serve as a tool of identifying the market power in the industry or can be used in evaluating the effects of the potential mergers among cola producers.

Although tastes of alternative cola brands are similar for most of the consumers, products are differentiated by brand names, calorie content and packaging. Cola products are classified as "diet" and "normal" according to their calorie content. They are marketed with more than 10 different packages. It can be argued that the brand loyalty exists for most of the consumers for various reasons.

By 2002, there were 12 cola suppliers who were active in the market. By 2003, one of the large business groups in food and beverage industry, Ülker, entered the cola market by introducing its new brand, "Cola Turca". By the help of its large distribution channels and advertising campaign it succeeded in holding the third place in the market after brands of Coca Cola and Pepsi. Beside the national brands, there are also "private labels" sold by the chain supermarkets. If every different package is accepted as a single product, it can be said that by 2005 there were 115 different cola products that were marketed under 27 different brand names and produced by nearly 10 competing firms in Turkey. Despite the presence of large number of differentiated products, the Turkish cola market has an oligopolistic and concentrated structure. The largest part of the market is divided between three leading firms.

In this chapter, the econometric models developed by Berry (1994) will be used for estimating the demand elasticities of cola products. Berry (1994) shows how the *simple logit* and the *nested logit* models can be used for demand estimation. These models make the estimation of demand for large number of products possible and solves the dimensionality problem encountered in the demand estimation literature. In the *nested logit* model used in this chapter, the demand structure of cola products is assumed to have "one level nest". That is, households are assumed to choice between "normal" or "diet" cola products once they decide to buy a cola product. The correlation among the utilities of products within the same nest is assumed to be higher than the correlation between any of these products and another product in a different nest.

The same raw data that have been used in Chapter 4 will be used in this chapter. Like in the previous chapter, the original data, which is at household level, will be aggregated at *market* level. The original data before aggregation contains information on expenditures of more than 6000 households in Turkey. It covers 77 months between January 2000 and May 2006. The number of cities covered in the data increases with years and it is between 14 and 34. The data also contains details of the demographics of the panel participants and of the product characteristics, especially the type of products and packaging details. To address the endogeneity problem, prices in other cities, characteristics of products of other firms and some input prices will be used as instrumental variables.

Some of the discrete choice models in the demand literature define the market unit[6] at city (e.g. Nevo (2001)) or at country level (Ivaldi and Verboven, (2005)). The market unit in this thesis is defined as the combination of shop types (chain shops, groceries etc.) and cities. Combined with the time dimension, this specification allows calculating demand elasticities of products sold at a particular shop type in a city at a certain time. This information may have practical importance for marketing professionals.

The plan of this chapter is as follows. In the next section the data used in this chapter will be described. In the third section, the specification of the *simple logit* and the *nested logit* models will be presented. Then, the estimation method and instrumental variables will be explained in the fourth and fifth sections. After, the results of econometric estimations will be presented and discussed. Elasticities of demand will be calculated and compared in the seventh section. Finally, there will be a conclusion on the research in this chapter.

5.2. Data used in estimating demand for cola products

The data set that will be used for estimating the demand elasticities of cola brands in this chapter has been prepared by using the original data set that has been described in Chapter 3. For the purpose of this chapter, the expenditures on cola products have been aggregated over households to obtain monthly average prices and quantities of a particular product at a given market and time. The *market unit* is defined as the city/shop type pair. Shops are classified into 5 types: Chain shops, medium shops or groceries, discounters, non-chain shops, *other shops*. The *other shops* include wholesalers and bazaars.

[6] The *market unit* here should not be understood as *the relevant market* in antitrust terms. Here, the market unit is defined in order to specify the econometric model and to calculate the market share data that will be used as the left hand side.

Cola products are sold with packs of 200 ml, 250 ml, 300 ml, 330 ml, 500 ml, 600 ml,1000 ml, 1500 ml, 1750 ml, 2000 ml, 2250 ml, 2500 ml and 3000 ml In addition, cola products are marketed as single-pack or multi-pack items. Multi-pack products may contain 2, 3, 4, 6, 8 or 12 items. In the data used in this chapter, different multi-pack products of the same pack size have been aggregated. For example, instead of accepting "12-pack of 330 ml" or "6-pack of 330 ml" as separate products, a multi-pack of 330 ml has been taken as a distinct product. Any pack size of a single-pack item is also considered as a separate product. The most remarkable differentiation among cola products is seen in their sugar content. Therefore, diet or normal cola products have been considered as separate products. Therefore, a *product* is defined by the combination of 4 characteristics: *Supplier, pack size, pack type, calorie content*. For example, "*Pepsi_1000ml_Multi pack_Diet*" is considered as one separate product. In the *nested logit* model that will be estimated in this chapter, diet and normal cola products are placed in different nests.

Each observation point in the data set is one of the elements of 4-dimensional product and market space. For example, p_{jcst} means the price of product "j" in shop type "s" in city "c" in month "t". In this case, the total number of observation is 54 835.

The monthly average price of a product has been calculated by dividing the total expenditures by the total quantity demanded for that product in every *market* in a given month. Total volume of a particular product (in a market/month) has been converted into units per 1000 ml in order to calculate the quantity for that product

Market shares of products have been calculated using quantities sold in a market/month pair. As will be explained in the following sections, as a requirement of the specification of *simple logit* and *nested logit* models, a category of "outside goods" has been defined. In calculating the market shares of cola products, the volumes of "outside goods" are also taken into account. In the empirical work in this chapter, following Slade (2004; 147) the carbonated soft drinks other than cola have been accepted as “outside goods” and their total volumes sold in a given market /month have been included in the calculations of market shares of cola products. In the sample used in this chapter, the average market share of outside goods is 30.4% over all cities and time. The observations in which the share of outside goods is zero and in which the market share of an inside good is one have been dropped from the sample.

The firms whose total revenue market shares over all periods and markets are below %0.2 are grouped in the category of “other firms”. The volume market shares of cola producers are shown in the table below by years.

Table 5.1. Market shares and concentration levels in cola market (calculated using volume sales)

Firms	2000	2001	2002	2003	2004	2005	2006
Coca Cola	0.753	0.698	0.695	0.619	0.616	0.648	0.662
Pepsi	0.206	0.246	0.220	0.195	0.174	0.178	0.183
Ülker (Cola Turca)	0.000	0.000	0.000	0.104	0.165	0.136	0.124
Private labels	0.018	0.036	0.054	0.055	0.029	0.026	0.026
Kristal	0.019	0.012	0.025	0.016	0.010	0.008	0.003
Others (nearly 10 firms)	0.005	0.007	0.006	0.011	0.006	0.004	0.002
HHI	6096	5498	5350	4354	4374	4709	4878

Author's own calculations using Ipsos/KGM data.

The Herfindahl-Hirschman Index (HHI) shows that the Turkish cola industry is a highly concentrated industry compared to the thresholds that antitrust agencies consider for a concentrated market (level 1800 or 2000). Coca Cola is the market leader although its share declined by 7% after the entry of Cola Turca in 2003. However, the market share of Cola Turca has been 10% in the first year of his entrance and has always been above this level. The market share of Pepsi increased by 4% in 2001, but decreased after this year until 2006. The share of the fourth competitor, Kristal, has been 2.5 % at most between 2000-2006.

The distributions of observations of pack sizes of suppliers are shown in the table below:

Table 5.2. Distribution of pack sizes for a given supplier

Pack size	Coca Cola	Pepsi	Cola Turca	Kristal	Other	Private Label	Total
200	0.014	0.019	0.033	0.012	0.076	-	0.019
250	0.018	0.004	0.047	0.161	0.125	0.001	0.029
300	-	0.002	-	-	0.001	-	0.001
330	0.178	0.138	0.092	0.043	0.067	0.189	0.146
500	0.076	0.029	-	0.036	0.010	0.002	0.045
600	-	0.060	-	-	-	-	0.016
1000	0.290	0.197	0.131	0.050	0.127	0.281	0.225
1250	-	0.001	-	-	-	-	0.000
1500	0.005	0.057	0.000	0.092	0.056	0.018	0.025
1750	0.001	-	-	-	-	-	0.000
2000	0.141	0.155	0.146	0.071	0.046	-	0.130
2250	-	0.0002	-	-	-	-	0.000
2500	0.277	0.337	0.338	0.535	0.488	0.508	0.336
3000	-	-	0.213	-	0.004	-	0.029
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Author's own calculations using Ipsos/KGM data.

Table 5.3. Distribution of suppliers for a given pack size

Packs (ml)	Coca Cola	Pepsi	Cola Turca	Kristal	Private Label	Other	Total
200	0.419	0.237	0.190	0.038	-	0.116	1.000
250	0.361	0.021	0.228	0.253	0.008	0.128	1.000
300	-	0.983	-	-	-	0.017	1.000
330	0.694	0.189	0.046	0.006	0.059	0.007	1.000
500	0.835	0.130	-	0.029	0.003	0.003	1.000
600	-	1.000	-	-	-	-	1.000
1000	0.778	0.136	0.029	0.003	0.050	0.004	1.000
1250	-	1.000	-	-	-	-	1.000
1500	0.029	0.841	-	0.070	0.032	0.028	1.000
1750	1.000	-	-	-	-	-	1.000
2000	0.768	0.176	0.050	0.004	-	0.001	1.000
2250	-	1.000	-	-	-	-	1.000
2500	0.661	0.208	0.065	0.017	0.042	0.007	1.000
3000	-	-	0.999	-	-	0.001	1.000

Author's own calculations using Ipsos/KGM data.

Table 5.2 shows that most of the observations in the sample are for pack of 2500 ml for every firm. The packs of 1000 ml are in the second rank. Packs of 330 ml and

2000 ml are also items that are frequently sold. The pack of 3000 ml is almost exclusively sold by Cola Turca. Similarly, the pack of 2250 ml is marketed only by Pepsi. Its share is very low among all other Pepsi products.

According to the Table 5.3, % 76.8 of 2000 ml packs are sold by Coca Cola. Pepsi seems to differentiate its products by marketing different packaging for which Coca Cola has low presence. For example, in packs of 300 ml and 1500 ml Pepsi's products hold the first place in the ranking. Similar situation is observed for Cola Turca for 3 lt packs.

The distribution of pack size according to calorie content is presented in the table below:

Table 5.4. Distribution of pack sizes for a given calorie content (normal and diet)

Pack size	Normal cola	Diet cola
200	0.0218	-
250	0.0297	0.0196
300	0.0006	0.0002
330	0.1251	0.2984
500	0.0405	0.0746
600	0.0153	0.0207
1000	0.1774	0.5793
1250	0.0002	-
1500	0.0284	0.0028
1750	0.0003	-
2000	0.1472	0.0031
2250	0.0001	-
2500	0.3806	0.0015
3000	0.0329	-
Total	1.00	1.00

Author's own calculations using Ipsos/KGM data.

Most of the normal cola products are in pack of 2.5lt It is followed by packs of 1 lt, 2 lt and 330 ml Diet cola products are mostly sold in 1 lt and 330 ml packs.

The table below shows the ranking of volume market shares of each product in diet and normal categories over all markets and time. In the normal segment, the single-pack 2.5 lt of Coca Cola is the market leader with an average market share of %46. It is followed by the same type of product of Pepsi and the single-pack 2 lt of Coca Cola with market shares close to 14%. Then, there is a third group of products with shares between 4.5% and 1%. In this group, there are large size (2 lt, 2.5 lt or 3 lt) single-pack products of Cola Turca, Pepsi Kristal and private labels. The share of the single-pack 1 lt of Coca Cola is also in this range. In the diet segment, products of 1 lt pack hold the first four place in the ranking. The single-1 lt product of Coca Cola is the leader with 50.5 % market share. Its multi-pack 1 lt is in the second rank with 11.8 % market share. It is followed by Pepsi and private label products of the same pack size with market shares 8.9 % and 7.7 %.

Table 5.5. Volume market shares of normal and diet cola products over all markets and whole sample period

Normal Cola Products	Volume market share	Diet Cola Products	Volume market share
Coca Cola_Single_2500_Normal	0.4597	Coca Cola_Single_1000_Diet	0.5054
Pepsi_Single_2500_Normal	0.1446	Coca Cola_Multi_1000_Diet	0.1164
Coca Cola_Single_2000_Normal	0.1391	Pepsi_Single_1000_Diet	0.0896
Cola Turca_Single_2500_Normal	0.0455	Private Label_Single_1000_Diet	0.0772
Coca Cola_Single_1000_Normal	0.0428	Coca Cola_Single_330_Diet	0.0545
Pepsi_Single_2000_Normal	0.0319	Coca Cola_Multi_330_Diet	0.0473
Private Label_Single_2500_Normal	0.0295	Pepsi_Multi_1000_Diet	0.0236
Cola Turca_Single_3000_Normal	0.0287	Coca Cola_Single_500_Diet	0.0229
Kristal_Single_2500_Normal	0.0115	Pepsi_Single_330_Diet	0.0149
Coca Cola_Multi_1000_Normal	0.0095	Private Label_Single_330_Diet	0.0120
Cola Turca_Single_2000_Normal	0.0091	Cola Turca_Single_1000_Diet	0.0092
Pepsi_Single_1500_Normal	0.0079	Pepsi_Single_600_Diet	0.0060
Pepsi_Single_1000_Normal	0.0072	Coca Cola_Single_250_Diet	0.0052
Coca Cola_Single_330_Normal	0.0065	Pepsi_Multi_330_Diet	0.0050
Other_Single_2500_Normal	0.0047	Other_Single_330_Diet	0.0016
Private Label_Single_1000_Normal	0.0024	Other_Single_1500_Diet	0.0016
Coca Cola_Single_500_Normal	0.0022	Coca Cola_Single_2000_Diet	0.0016
Pepsi_Single_330_Normal	0.0020	Other_Single_2500_Diet	0.0014
Cola Turca_Single_1000_Normal	0.0020	Pepsi_Single_500_Diet	0.0011
Pepsi_Multi_1000_Normal	0.0019	Cola Turca_Single_330_Diet	0.0011
Coca Cola_Multi_330_Normal	0.0017	Pepsi_Single_1500_Diet	0.0006
Pepsi_Single_600_Normal	0.0017	Kristal_Single_330_Diet	0.0005
Kristal_Single_2000_Normal	0.0007	Other_Single_1000_Diet	0.0005
Kristal_Single_1500_Normal	0.0007	Cola Turca_Single_250_Diet	0.0003
Private Label_Single_330_Normal	0.0006	Pepsi_Single_2000_Diet	0.0003
Cola Turca_Single_330_Normal	0.0006	Private Label_Single_500_Diet	0.0002

Table 5.5. (Continued)

Normal Cola Products	Volume market share	Diet Cola Products	Volume market share
Pepsi_Single_500_Normal	0.0004	Kristal_Single_1000_Diet	0.0001
Pepsi_Multi_330_Normal	0.0004	Pepsi_Single_250_Diet	0.00006
Kristal_Single_250_Normal	0.0003	Other_Single_500_Diet	0.00002
Coca Cola_Single_250_Normal	0.0003	Pepsi_Single_300_Diet	0.00001
Cola Turca_Single_250_Normal	0.0003		
Other_Single_1000_Normal	0.0003		
Private Label_Single_1500_Normal	0.0003		
Cola Turca_Multi_1000_Normal	0.0003		
Kristal_Single_1000_Normal	0.0003		
Coca Cola_Single_200_Normal	0.0003		
Pepsi_Multi_2500_Normal	0.0002		
Coca Cola_Single_1500_Normal	0.0002		
Other_Single_2000_Normal	0.0002		
Other_Single_1500_Normal	0.0002		
Other_Single_250_Normal	0.0002		
Coca Cola_Multi_2500_Normal	0.0002		
Pepsi_Single_200_Normal	0.0002		
Cola Turca_Single_200_Normal	0.0001		
Cola Turca_Multi_330_Normal	0.0001		
Kristal_Single_500_Normal	0.0001		
Kristal_Single_330_Normal	0.00008		
Other_Single_200_Normal	0.00007		
Coca Cola_Multi_1750_Normal	0.00007		
Coca Cola_Multi_250_Normal	0.00006		
Other_Single_330_Normal	0.00006		
Pepsi_Single_300_Normal	0.00003		
Pepsi_Single_250_Normal	0.00003		
Coca Cola_Multi_1500_Normal	0.00003		
Kristal_Single_200_Normal	0.00002		
Other_Single_3000_Normal	0.00002		
Private Label_Multi_1000_Normal	0.00002		
Pepsi_Single_1250_Normal	0.00001		
Private Label_Single_250_Normal	0.00001		
Other_Single_500_Normal	0.00001		
Pepsi_Single_2250_Normal	0.00001		
Private Label_Single_500_Normal	0.000003		
Other_Single_300_Normal	0.000001		

Author's own calculations using Ipsos/KGM data.

Descriptive statistics and the distribution of the dependent variable for the three leading firms' most popular packs are shown in the tables and graphs below. As will be shown in the following section, the dependent variable in the *simple logit* and in the *nested logit* models is expressed as "*lns_jm - lns_0m*" which is the difference between logarithms of market shares of each product "j" and outside goods "0" and shows the *mean utility level* of the product "j" in a certain market/month. The dependent variable has a distribution close to normal distribution for every supplier. In average, the highest mean utility level is provided by Coca Cola in every pack size. Among the three biggest suppliers, the largest variance of the mean utility belongs to Pepsi in every pack size. For packs of 330 ml and 1 lt, the distributions of the dependent variable for Coca Cola, Pepsi and Cola Turca are similar to each other.

Table 5.6. Descriptive statistics of the dependent variable by firms for packs of 330 ml and 1 lt,

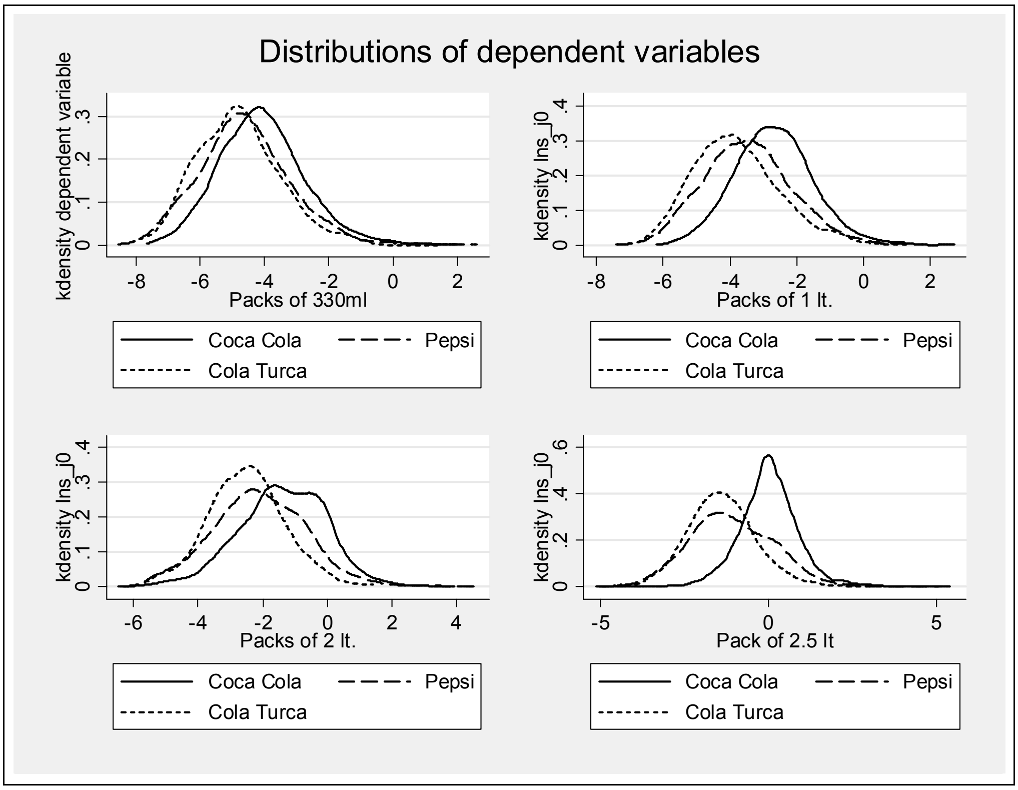
	Packs of 330 ml				Packs of 1 lt			
Firms	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Coca Cola	-4.086	1.331	-7.666	1.792	-2.682	1.175	-6.187	2.718
Pepsi	-4.614	1.428	-8.526	2.580	-3.462	1.325	-7.417	1.386
Cola Turca	-4.810	1.303	-8.161	2.069	-3.812	1.285	-7.052	1.281
Kristal	-5.191	1.418	-8.526	-1.109	-4.147	1.189	-7.256	0.000
Private Label	-4.158	1.601	-8.166	0.278	-2.878	1.626	-7.239	2.234
Other	-5.205	1.609	-8.526	-1.262	-4.383	1.299	-7.252	-0.405

Author's own calculations using Ipsos/KGM data.

Table 5.7. Descriptive statistics of the dependent variable by firms for packs of 2 lt and 2.5 lt

	Packs of 2 lt				Packs of 2.5lt			
Firms	Mean	Std. Dev.	Min	Max.	Mean	Std. Dev.	Min	Max
Coca Cola	-1.387	1.346	-6.448	3.912	0.011	0.886	-5.134	5.069
Pepsi	-2.109	1.453	-6.320	4.605	-1.097	1.252	-5.037	5.521
Cola Turca	-2.504	1.178	-5.657	1.396	-1.401	1.016	-4.506	2.996
Kristal	-3.571	1.348	-6.724	1.801	-2.661	1.239	-6.033	2.941
Private Label	-	-	-	-	-1.546	1.690	-6.141	4.700
Other	-3.522	1.283	-6.559	0.876	-2.984	1.360	-6.501	3.124

Author's own calculations using Ipsos/KGM data.



Graph 5.1. Densities of dependent variables by firms and pack sizes.
Author's own calculations using Ipsos/KGM data.

Descriptive statistics about the deflated prices (per liter) of the products in packs of 330 ml, 1 lt, 2 lt, and 2,5 lt and their density graphs are presented below.

Table 5.8. Descriptive statistics of deflated prices by firms and packs of 330 ml and 1 lt

	Pack of 330 ml					Pack of 1 lt				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Coca Cola	4420	0.697	0.118	0.259	1.647	7201	0.360	0.081	0.153	1.095
Pepsi	2009	0.691	0.145	0.271	1.647	2860	0.338	0.086	0.139	1.209
Cola Turca	684	0.605	0.088	0.271	0.918	978	0.305	0.039	0.171	0.463
Kristal	131	0.513	0.174	0.098	1.315	154	0.265	0.074	0.127	0.564
Private Label	625	0.363	0.062	0.139	0.819	929	0.198	0.051	0.114	0.602
Other	110	0.609	0.460	0.157	4.800	208	0.373	0.146	0.091	0.870

Author's own calculations using Ipsos/KGM data.

Table 5.9. Descriptive statistics of deflated prices by firms and packs of 2 lt and 2.5 lt

	Pack of 2 lt					Pack of 2.5lt				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Coca Cola	3505	0.271	0.031	0.147	0.540	6875	0.239	0.031	0.128	0.639
Pepsi	2246	0.266	0.038	0.163	0.503	4887	0.228	0.034	0.096	0.469
Cola Turca	1086	0.240	0.026	0.139	0.347	2514	0.207	0.023	0.101	0.303
Kristal	220	0.204	0.054	0.113	0.379	1647	0.175	0.040	0.090	0.395
Private Label	0					1676	0.142	0.030	0.060	0.401
Other	75	0.265	0.147	0.073	0.870	798	0.153	0.071	0.068	0.849

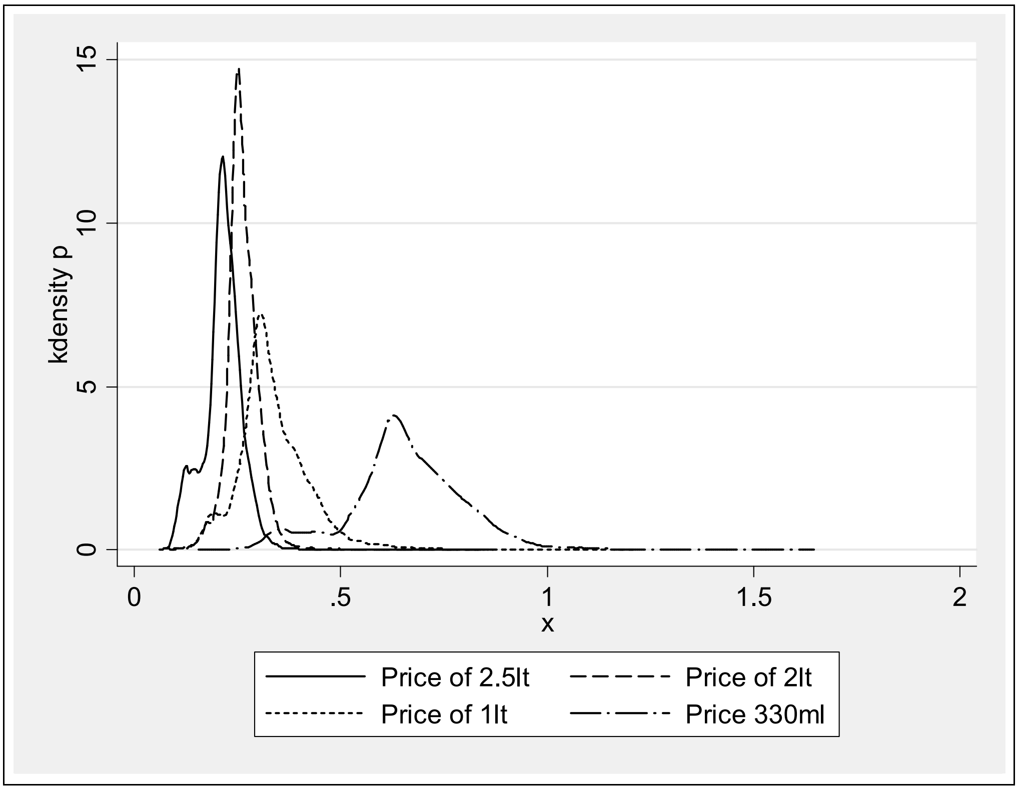
Author's own calculations using Ipsos/KGM data.

Table 5.10. Descriptive statistics of deflated prices by firms and packs of 2 lt and 2.5 lt

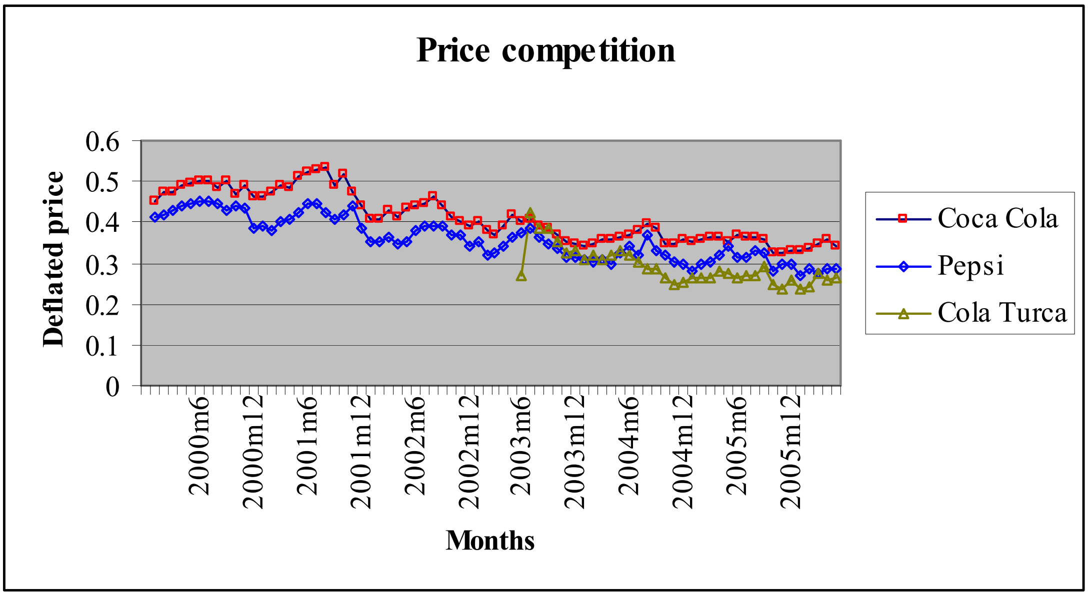
	Pack of 2 lt					Pack of 2.5lt				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Coca Cola	3505	0.271	0.031	0.147	0.540	6875	0.239	0.031	0.128	0.639
Pepsi	2246	0.266	0.038	0.163	0.503	4887	0.228	0.034	0.096	0.469
Cola Turca	1086	0.240	0.026	0.139	0.347	2514	0.207	0.023	0.101	0.303
Kristal	220	0.204	0.054	0.113	0.379	1647	0.175	0.040	0.090	0.395
Private Label	0					1676	0.142	0.030	0.060	0.401
Other	75	0.265	0.147	0.073	0.870	798	0.153	0.071	0.068	0.849

Author’s own calculations using Ipsos/KGM data.

From these tables and density graph below, it is seen that price per liter increases as the pack size becomes smaller. Especially, the prices of 330 ml packs are remarkably higher than other larger packs. The variance of price per liter is also large for smaller packs. The distributions of prices of 2 lt and 2.5 lt packs are similar. Distributions of prices are generally close to normal distribution.



Graph 5.2. Densities of prices by pack sizes
Author's own calculations using Ipsos/KGM data.



Graph 5.3. Prices before and after the entry of Cola Turca
Author's own calculations using Ipsos/KGM data.

The graph above shows that Cola Turca's price is generally below those of Coca Cola and Pepsi. It is observed that prices of Coca Cola and Pepsi has a decreasing trend after the entry of Cola Turca in mid-2003, but it can be said that this trend has started after mid-2001, nearly two years before the entry of Cola Turca. Therefore, the simple analysis of price trend is not enough to show how the new brand imposes competitive pressure on the incumbents (at least in this case).

The table below shows the distribution of the number of observations by shop types. It is seen that most of the observations are in Medium Markets-Groceries. It is followed by Chain shops. The frequencies of Chain and Non-Chain shops are close to each other.

Table 5.11. Distribution of observations by shop types

Shop type	Frequency	Percent
Chain	11,833	21.59
Discounter	5,820	10.62
Medium Market & Grocery	20,147	36.76
Non-Chain	9,928	18.12
Other shop	7,077	12.91
Total	54,805	100

Author's own calculations using Ipsos/KGM data.

The distribution of sales of cola brands by shop types are presented in the table below:

Table 5.12. Distribution of observations by shop types and firms

Shop type	Coca Cola	Pepsi	Cola Turca	Kristal	Other	Private Label
Chain Shops	0.141	0.107	0.123	0.054	0.204	0.217
Discounter Shops	0.047	0.048	0.009	0.008	0.025	0.718
Medium Market & Grocery	0.618	0.689	0.639	0.751	0.613	0.056
Non-Chain Shops	0.134	0.096	0.185	0.145	0.089	0.003
Other shops	0.060	0.060	0.044	0.041	0.068	0.005
Total	1.000	1.000	1.000	1.000	1.000	1.000

Author's own calculations using Ipsos/KGM data.

Most of the sales of cola (61%-75%) of all producers are done in Medium Markets-Groceries. On the contrary, 72% of the sales of Private Labels are observed in Discounter shops. The shares of the Chain and Non-Chain shops are similar for expenditures in Coca Cola and Pepsi products. Chain shops have a share of 20 % for "Other firms". The share of Non-Chain shops is higher than that of Chain shops for expenditures in Cola Turca products. In the empirical part of this chapter, the econometric models for cola demand will be estimated for every shop type separately.

The general properties of the *simple logit* and of the *nested logit* models that have been used in estimating demand parameters will be presented in the next section.

5.3. The *simple* and *nested logit* models for demand estimation

To a large extent, the description of the econometric models used in this chapter has been drawn on Berry (1994). Other points that are specific to the present empirical work will also be indicated if needed.

The *simple logit* and *nested logit* models are members of a general class of models known as "discrete choice models". The advantage of using discrete choice models is that they allow estimating demand structures with large number of products. In other words, they help to overcome the dimensionality problem. More precisely, in a traditional demand-and-supply model in differentiated products, one needs to regress demand variables on the prices of all relevant products. If there are N products in the market, at least NxN parameters need to be estimated. In discrete choice models, demand structures can be estimated with a small number of parameters by making some assumptions on consumer utility.

In discrete choice models, consumers are assumed to choose one unit of the product that gives them the highest utility among alternative products. However, in real life it is frequently seen that consumers purchase multiple units of products. The implication of this restriction is solved by the idea brought by Nevo (2001). He argues that although consumers may buy multiple items at a time, it can be assumed that they consume only one product in a particular consumption occasion.

The weak part of the discrete choice models in demand studies is related to the problem of endogeneity of prices. Prices are probably correlated with the unobserved demand factors. In discrete choice models, prices and unobservable factors enter the model non-linearly. This makes difficult the use of standard techniques of instrumental variables. One of the contributions brought by Berry (1994) to demand estimation literature is to show how linear instrumental variables can be used in discrete-choice models to solve the problem of endogeneity of prices. He introduces the idea of "inverting the market share function" to uncover the *mean utility* levels. Then, he describes the *mean utility* level as a function of observable and unobservable product characteristics, prices, and suggests using linear instrumental variables techniques.

Another contribution of the Berry is that his method allows using aggregate data at market level which is easier to find than the individual data.

5.3.1. Inverting the market share function

Berry (1994) assumes that the decisions of individual consumers and some of the product characteristics are not observed by the econometrician. On the other hand, the market outcomes like quantity sold by each firm and prices are observable.

The utility of consumer "i" for product "j", $U(x_j, \xi_j, p_j, v_i, \theta_d)$, depends on the observed and unobserved characteristics of the product and consumer. x_j and ξ_j are observed and unobserved product characteristics (by the econometrician). "p_j" is the price of the product j, θ_d are the demand parameters to be estimated. The term v_i

captures consumer-specific random taste parameters and it is not observed by the econometrician.

The mean utility level of product j is given by;

$$\delta_j = x_j \beta - \alpha p_j + \xi_j \tag{5.1}$$

Berry (1994, 248) defines a demand equation that relates observed market shares, S_j, to the market shares that are predicted by the model, s_j:

$$S_j = s_j(\mathbf{x}, \mathbf{p}, \boldsymbol{\xi}, \boldsymbol{\theta}) \tag{5.2}$$

He says that, if the distribution of the unobservable consumer characteristics is known then the market share function will be a function of only $\boldsymbol{\delta}$:

$$S_j = s_j(\boldsymbol{\delta}) \tag{5.3}$$

Conditional on the true values of $\boldsymbol{\delta}$ and given the distribution of unobservable consumer characteristics, the model should fit the data exactly. Then, Berry (1994, 249) shows that the means of consumer utility for each good can be obtained by inverting the market share function:

$$\boldsymbol{\delta} = s^{-1}(\mathbf{S}) \tag{5.4}$$

Berry shows that under weak regularity conditions on the distribution of unobservable consumer characteristics, there exists unique $\boldsymbol{\delta}^*(\mathbf{s})$ that satisfies $S_j = s_j(\boldsymbol{\delta}^*(\mathbf{s}))$. Then, he shows that the unique, calculated vector $\boldsymbol{\delta}^*(\mathbf{s})$ can be used in estimating demand parameters:

$$\boldsymbol{\delta}(\mathbf{s}) = x_j\beta - \alpha p_j + \xi_j \tag{5.5}$$

Once the mean utility levels is calculated, the standard instrumental variables techniques can be used to estimate the equation (5.5) in order to estimate the unknown parameters (β, α) Berry (1994: 249).

5.3.2. The *simple logit* model

The *simple logit* model is a particular application of the "random coefficient logit model". In the *simple logit* model, the random utility is defined as the function of prices and other (observed and unobserved) product characteristics:

$$u_{icsjt} = \delta_{jcst} + \varepsilon_{ijcst}\ , \tag{5.6}$$

or $$u_{ijcst} = x_{jcst}\beta - \alpha p_{jcst} + \xi_{jcst} + \varepsilon_{ijcst} \quad \text{for inside goods,} \tag{5.7}$$

and $$u_{i0cst} = \delta_{0cst} + \varepsilon_{i0cst} \quad \text{for outside goods} \tag{5.8}$$

where j = 1…J, c =1…C, s =1,…S, t = 1…T. Subscripts j, c, s and t stand for a particular product, city, shop types and time, respectively. In this thesis the *market* unit is defined as the combination of "city-shop type" pair (cs).

In discrete choice models, a category of "outside good" is defined (j=0) in order to assume that a general increase in cola prices will lead to a reduction in aggregate demand of colas.

In the *simple logit* model, the taste parameters β's are assumed to be constant across individuals $\beta_i = \beta$. This is an assumption that is relaxed in the "random coefficients logit model". This means that "random coefficients" are not allowed in the *simple logit* model. In addition, errors ε_{ij} are assumed to be distributed identically and independently across individuals and products with the "extreme value" distribution function: exp[-exp(-ε)]. The difference of the two random variables distributed with the extreme value distribution yields the logit distribution.

The market share of the product j is given by the logit formula:

$$s_{jcst}(\boldsymbol{\delta}) = \frac{e^{\delta_{jcst}}}{\sum_{k=0}^{N} e^{\delta_{kcst}}} \tag{5.9}$$

The mean utility of "outside good" is assumed to be zero, $\delta_0 = 0$.

The difference of the logs of the market shares of each product j and that of the "outside good" gives the mean utility of product j and is regressed on the product characteristics and prices.

$$\ln(S_{jcst}) - \ln(S_{0cst}) = \delta_{jcst} = x_{jcst}\beta - \alpha p_{jcst} + \xi_{jcst} \tag{5.10}$$

In this thesis, the equation above has been estimated with additional regressors and instrumental variables.

The equation to be estimated can be written as follows:

$$\ln(S_{jcst}) - \ln(S_{0cst}) = -\alpha p_{jcst} + \xi_{jcst} \tag{5.11}$$

The error term ξ_{jcst} is assumed to have the following error component structure:

$$\xi_{jcst} = demog_{ct}\gamma + F\varphi + product_j + city_c + month_m + u_{jcst} \tag{5.12}$$

The dependent variable $\ln(S_{jcst}) - \ln(S_{0cst})$ is the log of relative market shares of item *j* and "outside goods" in market *cs* in time *t*. The time unit has been taken as "month".

The variable p_{jcst}, is the deflated average price of the product j sold in market "cs" in time t. The observed product characteristics in the data set consist of the information on package type and calorie content of products. Package types will be used as instrumental variables, therefore they are not included as regressors. Calorie content is shown with a categorical variable indicating whether a product is diet or normal cola. This information will be used in classifying products into different nests in the *nested logit* model. Therefore, there is no other observed product characteristics that can be used as regressors. For this reason the variable x_j in the original model is dropped from the specification used in this chapter. All other product characteristics, except package type and calorie content, are assumed to be unobserved.

The expression $demog_{ct}$ stands for the demographical variables which have the following meanings:

ab	:percentage of households being in AB social economic group in a city/time
c1	:percentage of households being in C1 social economic group in a city/time
c2	:percentage of households being in C2 social economic group in a city/time
age_hh	:average age of the head of households in a city/time
sq_age_hh	:squared *age_hh*
age_ps	:average ages of the purchasing persons in the household in a city/time
sq_age_ps	:squared *age_ps*
size1	:percentage of households having size of 1-2 persons
size2	:percentage of households having size of 3-4 persons
urban	:percentage of households living in urban area

These variables are included in the model in order to capture the effects of demographical variables on the demand for different cola products. For example, the consumption of cola products may vary according to age and the size of the households. The larger families may prefer products with multiple pack or items with larger volumes.

The term F represents “other variables” that can affect the demand for cola products. It includes the percentage of holidays and the average temperature in a month. The term φ stands for the coefficients to be estimated for these variables.

The term $product_j$ is the product-specific effects that capture the effects of the time invariant product characteristics (i.e. quality or reputation) of a particular product. Nevo (2001:322) says that product fixed effects can improve the fit of the model especially if one is not sure about how well observed characteristics capture the true factors that determine utility. Another advantage of using product fixed effects is that the correlation between prices and the unobserved quality of the product is fully accounted and there is no need to use instruments for this kind of correlation. The city-specific demand shocks, $city_c$, have been controlled by including city-specific dummy variables. The term $month_m$ captures product invariant demand shocks specific to a particular month of a given year. For this purpose, 11 dummy variables, each for months from January to November, have been included in the model and the dummy for the month of December is excluded. The remaining u_{jcst} term is the classical error term that varies across products, markets and time. It is assumed to be i.i.d in the beginning, however this assumption will be relaxed later.

The *simple logit* model allows for an easy estimation procedure compared to alternative models. However, the model is characterized by the “Independence of the Irrelevant Alternatives” (IIA) assumption, which imposes some restrictions on the pattern of substitution among products. In the *simple logit* model, tastes for product characteristics are assumed to be constant across consumers and the idiosyncratic shock ε_{ij} is assumed to be i.i.d. across products. This brings a restriction on demand parameters such that the loss of quantity demanded for the product j as a result of a price increase, is distributed among the remaining products proportionate to their market shares. In other words, in the *simple logit* model, cross-price elasticities of products k and l with respect to the price of j are assumed to be equal: $\varepsilon_{kj} = \varepsilon_{lj},\ k \neq l$.

This restriction of the *simple logit* model can be overcome either by using a *nested logit* or a random coefficients model. In the *nested logit* model, the assumption on ε_{ij} is modified. In the random coefficients model, the restriction on taste parameters is relaxed and β_i's are allowed to differ among consumers. In this way, it becomes possible to obtain more reasonable substitution patterns. The specification of the *nested logit* model will be described in the next chapter.

5.3.3. The *nested* logit model

In the *nested logit* model, the idiosyncratic shocks ε_{ijcst} are allowed to be correlated between products belonging to the same nest. However, as in the *simple logit* model, taste parameters β's for products' characteristics are still assumed to be the same across consumers. This last assumption is changed in a random coefficients model which is more flexible than the logit and *nested logit* models.

In the *simple logit* model, substitution among brands is determined by market shares. This means that any two brands with the same market shares have the same cross price elasticities with respect to any third good. In the *nested logit* model, idiosyncratic shocks of the products belonging to the same segment are allowed to be correlated among themselves. In this case it is possible to obtain more reasonable cross price elasticities than those given by the *simple logit*.

In the *nested logit* model, products are grouped into g+1 mutually exclusive and exhaustive sets. In the empirical application in this chapter, colas are grouped into two nests: Normal cola products and diet cola products. This division depends on the observation that calorie content is significantly different between these two kinds and most of the consumers have personal preference for one of these types. In addition to these two nests, a third nest is also assumed for "outside goods" as a technical property of the simple and *nested logit* models.

The utility in the *nested logit* model is written as follows:

$$u_{ijcst} = \delta_{jcst} + \zeta_{igcst} + (1-\sigma)\varepsilon_{ijcst} \tag{5.13}$$

The term ζ_g is the utility that is common to all products in the same group "g" (in the same market and time) and has a distribution function that depends on σ, which is between zero and one, $0 \le \sigma < 1$. As σ approaches to one (zero) the within nest correlation of utility goes to one (zero).

Berry (1994) shows how the *nested logit* model can be derived for estimating demand parameters in differentiated products. The market share of the product j belonging to group g can be written as the multiplication of the group share s_g and the share of the product j in group g, $s_{j/g}$. (The subscript "cst" is ignored temporarily).

$$s_j = s_{j/g}.s_g \tag{5.14}$$

Given the utility function above, the market share of product j in group g can be derived as,

$$s_{j/g} = \frac{e^{\delta_j/(1-\sigma)}}{D_g} \;. \tag{5.15}$$

where $$D_g = \sum_{j \in G_g} e^{\delta_j/(1-\sigma)} \tag{5.16}$$

The group market share is,

$$s_g(\delta, \sigma) = \frac{D_g^{1-\sigma}}{\sum_g D_g^{1-\sigma}} . \tag{5.17}$$

Then, the market share of product j can be calculated as,

$$s_j = s_{j/g} . s_g = \frac{e^{\delta_j/(1-\sigma)}}{D_g^{\sigma} . \sum_g D_g^{(1-\sigma)}} . \tag{5.18}$$

The outside good is considered as the only good in the last nest and the mean utility is set to zero $\delta_0 = 0$ and $D_0 = 1$. Therefore, the market share of the outside good is given by,

$$s_0 = \frac{1}{\sum_g D_g^{(1-\sigma)}} . \tag{5.19}$$

The logarithm of the relative market shares of j with respect to outside goods yields,

$$\ln(s_j) - \ln(s_0) = \frac{\delta}{1-\sigma} - \sigma \ln D_g . \tag{5.20}$$

From the market share of the outside good it is obtained that $\ln D_g = \frac{\ln s_g - \ln s_0}{1-\sigma}$, and this can be inserted in equation (5.20) to obtain

$$\delta_j = \ln s_j - \ln s_0 - \sigma \ln s_{j/g} . \tag{5.21}$$

By setting the mean utility level as

$$\delta_j = x_j \beta - \alpha p_j + \xi_j \tag{5.22}$$

the model that will be estimated in this chapter can be specified as follows:

$$\ln s_{jcst} - \ln s_{ocst} = -\alpha p_{jcst} + \sigma \ln s_{j/g} + \xi_{jcst} \qquad (5.23)$$

where $\xi_{jcst} = demog_{ct}\gamma + F\varphi + product_j + city_c + month_m + u_{jcst}$, as in (5.12).

Demographical variables $demog_{ct}$, other variables F and fixed effects have the same meanings and contents as explained for the *simple logit* model above.

In addition to the price variable, the log of the market share of product j in group g ($\ln s_{j/g}$) is endogenous since it depends directly on the market share of product j. Therefore, it should be instrumented. Berry (1994:254) suggests using the characteristics of other products in the same group as instruments. Following the suggestion of Berry, the average pack size of products of other firms in the same nest will be used as instrumental variables.

As have been explained in the previous section, it can be argued that difference in calorie content constitutes an important criterion in product differentiation among cola brands. Therefore, the segmentation of cola products according to their calorie content seems reasonable. The random coefficients model depends heavily on product characteristics, however, the data set used in this thesis is not rich enough in terms of product characteristics to estimate a random coefficients model. Taking these concerns into account, the *simple logit* and the *nested logit* models have been preferred to estimate the demand equations for colas products.

5.4. Estimation

The price variable in the *simple logit* model is assumed to be correlated with the error term. In the *nested logit* model, in addition to price, the market share of product j within the nest to which it belongs is also assumed to be endogenous. Therefore, the two-stage least squares (2SLS) method has been used as the estimation method.

Cameron and Trivedi (2005: 744-747) present the properties of the 2SLS method for linear panel models as follows. The 2SLS method is a particular case of the generalized method of moments (GMM) technique. The 2SLS estimators can be obtained by assuming that the weighting matrix $\mathbf{W_N}$ in the GMM objective function is equal to $\mathbf{W_N} = \mathbf{(Z'Z)^{-1}}$. Under this assumption, 2SLS estimators $\hat{\beta}_{2SLS}$ minimize the GMM objective function given below:

$$\mathbf{Q_N(\beta)} = \left(\sum_{i=1}^{N} \mathbf{Z_i' u_i}\right)^{-1} \mathbf{W_N} \left(\sum_{i=1}^{N} \mathbf{Z_i' u_i}\right) \qquad (5.24)$$

$\mathbf{W_N}$ is a full-rank r x r symmetric weighting matrix, r is the number of instruments, **X** is the matrix of regressors and **Z** is the matrix of exogenous instruments (including exogenous regressors) and $\mathbf{u_i} = \mathbf{y_i} - \mathbf{X_i\beta}$. The 2SLS estimators can be expressed as follows:

$$\hat{\boldsymbol{\beta}}_{\mathbf{2SLS}} = \mathbf{[X'Z(Z'Z)^{-1}Z'X]^{-1}X'Z(Z'Z)^{-1}Z'y} \qquad (5.25)$$

The estimated variance-covariance matrix of the 2SLS estimators is given by Baum et. al (2002:5) as

$$\hat{\mathbf{V}}(\hat{\boldsymbol{\beta}}_{\mathbf{2SLS}}) = \hat{\boldsymbol{\sigma}}^2 \mathbf{(X'Z(Z'Z)^{-1}Z'X)^{-1}} \qquad (5.26)$$

in which $\hat{\sigma}^2 = \frac{\hat{u}'\hat{u}}{N}$, and $\hat{\mathbf{u}} = \mathbf{y} - \mathbf{X}\hat{\boldsymbol{\beta}}_{\mathbf{2SLS}}$.

If there is the problem of heteroscedasticity and/or autocorrelation, then the panel-robust standard errors can be obtained from the estimated variance-covariance matrix of the 2SLS estimator that is described in Cameron and Trivedi (2005:746) as follows:

$$\hat{\mathbf{V}}(\hat{\boldsymbol{\beta}}_{\mathbf{2SLS}}) = [\mathbf{X'ZW_N Z'X}]^{-1}\mathbf{X'ZW_N'}(\mathbf{N}\hat{\mathbf{S}})\mathbf{W_N'X'Z}[\mathbf{X'ZW_N Z'X}]^{-1} \qquad (5.27)$$

$\hat{\mathbf{S}}$ is a consistent estimate of the r x r matrix $\mathbf{S} = \mathbf{plim}\frac{\mathbf{1}}{\mathbf{N}}\sum_{\mathbf{i=1}}^{\mathbf{N}}\mathbf{Z_i'u_i u_i' Z_i}$ and independence over *i* is assumed.

For a White-type robust estimate, they report that $\hat{\mathbf{S}} = \frac{\mathbf{1}}{\mathbf{N}}\sum_{\mathbf{i=1}}^{\mathbf{N}}\mathbf{Z_i'\hat{u}_i\hat{u}_i'Z_i}$, where $\mathbf{\hat{u}_i = y_i - X_i}\boldsymbol{\beta}_{\mathbf{2SLS}}$ are Nx1 estimated residuals.

Demand shocks (error terms) for cola products belonging to the same supplier may be correlated because of the effects of national advertising or brand loyalty. In estimations in this chapter such correlations will also be taken into account by clustering products on manufacturers. In the presence of intra-cluster correlation, the robust standard errors of estimators can be calculated by substituting $\hat{\mathbf{S}} = \frac{\mathbf{1}}{\mathbf{N}}(\mathbf{Z}'\hat{\boldsymbol{\Omega}}_{\mathbf{c}}\mathbf{Z})$ in the formula of the estimated variance-covariance matrix given above,

$$\text{where } \hat{\boldsymbol{\Omega}}_{\mathbf{c}} = \begin{bmatrix} \hat{\boldsymbol{\Sigma}}_{\mathbf{1}} & & \mathrm{L} & & \mathbf{0} \\ & \mathbf{0} & & \mathrm{N} & \\ \mathrm{M} & & \hat{\boldsymbol{\Sigma}}_{\mathbf{m}} & & \mathrm{M} \\ & \mathrm{N} & & \mathbf{0} & \\ \mathbf{0} & & \mathrm{K} & & \hat{\boldsymbol{\Sigma}}_{\mathbf{M}} \end{bmatrix} \text{ and } \hat{\boldsymbol{\Sigma}}_{\mathbf{m}} = \mathbf{\hat{u}_m \hat{u}_m'}, \qquad (5.28)$$

$\hat{u}_m$ is a consistent estimate of the error terms for clusters *m* (Baum et al. 2002:9-10).

5.5. Instrumental variables

The average price of each item in every market may be correlated with the unobserved product characteristics. Nevo (2001:.320) states that even if dummy variables for controlling the product fixed-effects are included as regressors, the error term may contain market-specific deviations from the mean valuations of products. Market players such as shop owners or manufacturers observe and take into account these market-specific deviations from the mean valuations of the items. This influences the market-specific markups and hence, prices of products. In this case, least square estimation may yield inconsistent estimates. Theoretically a consistent parameter can be obtained by using relevant and valid instrumental variables. A relevant instrument should be correlated with the endogenous price variable. A valid instrument should not be correlated with the error term of the model.

Instrumental variables are generally constructed using the data on cost variables since they are assumed to satisfy the criteria of relevance and validity. In this chapter, the price index of electricity and the hourly wage index paid in cold drink and beverage industries have been used as instrumental variables. These variables are provided by Turkish Statistical Institute (TURKSTAT).

Berry (1994), BLP (1995) and Nevo (2000) advice using other products' observed characteristics as instrumental variables. The identifying assumption in this advice is that the "location" of brands in the characteristics space is exogenous and the markup of each brand will depend on the distance from the nearest neighbor. As the price is composed of marginal cost plus a markup, it will be correlated with characteristics of other products. Since product characteristics are assumed being exogenous, they can be considered as a valid instrument. In the *nested logit* model, one of the endogenous regressors is the market share of a product within the nest to which it belongs. The average pack size of other firms' products being in the same nest and in the same market with the instrumented product is also used as instrumental variable.

Hausman et al.(1994:165) and Nevo (2001: 320) also use the prices of a product sold in other cities or regions as another instrumental variable. The identifying assumption in this approach is that, having controlled for brand fixed-effects and demographics, city-specific valuations of products are uncorrelated across cities. They may be correlated within a city. In addition, the prices of the item “j” in different cities can be correlated via the common production costs. Therefore, the price of the item “j” in other cities can be a relevant and valid instrument for the same item sold in a certain city. However, compared to Hausman (1994) and Nevo (2001), the market unit in this thesis is narrower. While Hausman and Nevo define markets based on city and time pairs, the market unit in this thesis is defined as the combination of shop types, cities and months. Therefore, in this thesis, this type of instrumental variable is defined as the average of the prices of the item “j” sold in the same shop type “s” (i.e. chain shops) located in other cities. In this case, the identifying assumption is the independence between the same shop types across cities. In case of shop type-wide or nation-wide demand shocks (i.e. national advertising), this assumption would be violated and the prices of a particular product sold in shops located in other cities would not be used as valid instruments. This assumption has been tested by comparing results of the estimations that are obtained using this instrument to those obtained without it. One disadvantage of this instrumental variable is that some observations in the sample are lost when an item is sold only in one city at a given time and shop.

In summary, the list of the instrumental variables used in this chapter is as follows: the index of hourly wage paid in cold drink and beverage industries, the price index of electricity, the average pack size of other firms’ products being in the same nest and in the same market, the average of the average prices of the relevant product sold in the same shop type but in other cities. Only the instruments which pass the tests of relevance and the validity will be included in the econometric estimations in this chapter.

The validity of excluded instrumental variables will be tested by the Sargan test of over-identification. Baum et al. (2002:16) reports the Sargan test statistics as follows:

$$\text{Sargan's statistics}=\frac{\mathbf{1}}{\hat{\boldsymbol{\sigma}}^2}\hat{\mathbf{u}}'\mathbf{Z}(\mathbf{Z}'\mathbf{Z})^{-1}\mathbf{Z}'\hat{\mathbf{u}} \qquad (5.29)$$

where $\hat{\mathbf{u}} = \mathbf{y} - \mathbf{X}\hat{\boldsymbol{\beta}}_{\mathbf{2SLS}}$. The Sargan's statistics follows a Chi-squared distribution with a degrees of freedom r-K, where r is the number of moment conditions and K is the number of regressors. A high value exceeding the critical value leads to the rejection of the null hypothesis that instruments are jointly valid. Under heteroscedasticity and autocorrelation of errors, the "robustified Sargan statistic" is calculated from the "feasible efficient two-step GMM estimation" that is given in (Baum et al.:2002: 18) as below:

$$J(\hat{\beta}_{EGMM}) = \hat{\mathbf{u}}\mathbf{Z}'(\mathbf{Z}'\hat{\boldsymbol{\Omega}}\mathbf{Z})^{-1}\mathbf{Z}\hat{\mathbf{u}}' \overset{A}{:} \chi^2_{\mathbf{r-K}} \qquad (5.30)$$

where $\hat{\boldsymbol{\Omega}}$ is the variance-covariance matrix of 2SLS residuals.

Instrumental variables will also be tested for their correlation with the endogenous regressors. For this, the F-statistic will be calculated for testing the joint significance of the excluded instruments in the first-stage reduced form regressions of the 2SLS method. If the F-statistic is higher than 10, it will be concluded that excluded instruments are correlated with endogenous regressors and there is no bias in estimates because of a weak instrument problem.

5.6. Results of the Estimations

The *simple logit* and the *nested logit* models described above have been estimated for each shop type separately. Each model has been estimated by OLS and 2SLS methods. The models include dummy variables for each product in order to capture the product fixed-effects, such as quality. The panel fixed-effect estimation technique has been used in estimating these models. The data has been pooled over products and markets.

The instrumental variables that are used in 2SLS methods in the *simple logit* models are the deflated hourly wage index in cold drink industry and the deflated prices of electricity. Neither of these instruments have variations across cities and shop types, they vary only over time.

First, the results from the *simple logit* model for every shop types are presented in the table below. Meanings of explanatory variables in the *simple logit* and *nested logit* models are as below:

p	:deflated price of product j sold in a market "cs" and time "t".
ab	:percentage of households being in AB social economic group in a city/time
c1	:percentage of households being in C1 social economic group in a city/time
c2	:percentage of households being in C2 social economic group in a city/time
age_hh	:average age of the head of households in a city/time
sq_age_hh	:squared *age_hh*
age_ps	:average ages of the purchasing persons in the household in a city/time
sq_age_ps	:squared *age_ps*
size1	:percentage of households having size of 1-2 persons
size2	:percentage of households having size of 3-4 persons
urban	:percentage of households living in urban area
holiday	:percentage of holidays in month
temp	:monthly average temperature

Table 5.13. Estimation results from the *simple logit* models for each shop types

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Shop types	Chain shops		Discounters		Medium markets & Grocery		Non-Chain shops		Other Shops	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
p	-1.052***	-3.024***	-0.845***	-4.645***	-0.056	0.945	-0.140	4.130***	-0.128	0.166
	(0.126)	(0.746)	(0.263)	(1.142)	(0.087)	(0.660)	(0.113)	(1.077)	(0.174)	(1.414)
ab	-1.313***	-1.130***	0.244	0.360	1.098***	0.969***	-0.206	-0.635*	0.373	0.348
	(0.307)	(0.317)	(0.552)	(0.561)	(0.200)	(0.217)	(0.289)	(0.327)	(0.483)	(0.496)
c1	-0.148	0.005	-0.619	-0.396	-0.606***	-0.713***	-0.857***	-1.041***	0.385	0.346
	(0.297)	(0.305)	(0.514)	(0.525)	(0.206)	(0.218)	(0.288)	(0.311)	(0.479)	(0.512)
c2	0.556	0.781**	2.751***	2.739***	0.918***	0.725***	1.069***	0.254	2.520***	2.486***
	(0.374)	(0.386)	(0.615)	(0.624)	(0.248)	(0.278)	(0.374)	(0.449)	(0.591)	(0.610)
agehh	-0.236	-0.126	1.229**	0.787	-0.337	-0.312	-0.319	-0.445	-0.554	-0.562
	(0.289)	(0.295)	(0.537)	(0.559)	(0.209)	(0.210)	(0.313)	(0.336)	(0.456)	(0.456)
sq_agehh	0.002	0.000	-0.013**	-0.009	0.004	0.003	0.004	0.005	0.006	0.006
	(0.003)	(0.003)	(0.006)	(0.006)	(0.002)	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)
ageps	-0.870***	-0.881***	-0.502**	-0.332	-0.242**	-0.239**	-0.335**	-0.406***	0.988***	0.990***
	(0.149)	(0.150)	(0.251)	(0.259)	(0.094)	(0.095)	(0.136)	(0.147)	(0.222)	(0.222)
sq_ageps	0.012***	0.012***	0.006*	0.003	0.003**	0.003**	0.004**	0.005***	-0.013***	-0.013***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
size1	-1.175**	-1.641***	3.053***	1.573	0.248	0.330	-1.013**	-0.986*	1.574**	1.644*
	(0.492)	(0.526)	(0.946)	(1.053)	(0.329)	(0.334)	(0.486)	(0.520)	(0.775)	(0.840)
size2	-1.258***	-1.566***	-1.904***	-2.590***	-0.574***	-0.439**	-0.848***	-0.599*	1.453***	1.514***
	(0.293)	(0.317)	(0.495)	(0.541)	(0.190)	(0.210)	(0.287)	(0.313)	(0.457)	(0.539)
urban	1.210***	1.475***	2.080***	2.536***	1.244***	1.132***	1.122***	0.651***	-0.004	-0.038
	(0.153)	(0.183)	(0.291)	(0.324)	(0.098)	(0.122)	(0.152)	(0.201)	(0.235)	(0.283)
holiday	-0.957***	-0.940***	-0.623**	-0.619**	-0.915***	-0.901***	-0.754***	-0.822***	-0.562**	-0.558**
	(0.171)	(0.173)	(0.270)	(0.273)	(0.139)	(0.139)	(0.192)	(0.206)	(0.283)	(0.283)
temp	-0.001	0.004	0.009	0.010	0.010***	0.009**	0.002	-0.004	0.005	0.005
	(0.005)	(0.005)	(0.008)	(0.008)	(0.004)	(0.004)	(0.005)	(0.005)	(0.008)	(0.008)
Constant	22.046***		-19.417*		10.226***		13.143**		-8.714	
	(5.113)		(9.966)		(3.744)		(5.833)		(8.097)	
N. of observations	11694	11689	5530	5517	20139	20133	9778	9765	6496	6483
R-squared	0.359	0.345	0.422	0.400	0.246	0.241	0.346	0.248	0.286	0.286
F-statistic for instruments		48.62		48.62		48.62		48.62		48.62
P-value of Sargan statistic		0.69		0.35		0.77		0.64		0.08
Number of products	84	79	71	58	88	82	80	67	78	65

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1 Author's own calculations using Ipsos/KGM and TURKSTAT data.

For presentation purposes the parameter estimates for city and month fixed effects are not presented in the table above and they can be found in Appendix F. In the *simple logit* models estimated with 2SLS method, the F-statistic for testing the joint significance of excluded instruments in reduced-form regressions has been calculated as 48,62 which is quite higher than the threshold level 10. As to the validity of instruments, the p-values of Sargan test for each regression have been shown in the table above. According to the results of the Sargan test, the hypothesis that excluded instruments are valid has not been rejected in regressions for chain shops, discounters, medium markets-groceries and non-chain shops. For “other shops”, the Sargan statistic is significant at 5% level but not at 10% level. The coefficient of price is statistically significant and negative in regressions for chain shops and discounters both with OLS and 2SLS methods. For these shops, the magnitude of the price coefficient differs significantly between OLS and 2SLS models. Standard errors of price coefficients are remarkably larger in 2SLS than in OLS results. On the other hand, it is statistically insignificant for medium markets-groceries and “other” shops. It is statistically significant for non-chain shops only with 2SLS method, but in this case its sign is positive.

According to the results of the 2SLS models, if the transactions in chain shops are taken into account, the mean utility of cola products is lower for households in AB socio-economic group compared to households in DE group. But, it is higher for AB households in medium markets-groceries. The mean utility of cola is higher for C2 households than that for DE group in every shop types. The mean utility of cola increases after age 36 or 40 for purchasing person in the household depending on the shop types that are taken into account. In general, the mean utility of cola products is higher for larger households compared to households having the size 1-2 or 3-4 persons. When the percentage of households living in urban area increases (compared to populations in suburban and semi-urban areas in a city) the mean utility of cola increases in every shop types.

In general, holidays have negative effects on consumptions of cola products and temperature affects the market share of cola product positively only in medium market and groceries. In other shops, the effect of temperature is statistically insignificant.

As explained previously, the *simple logit* brings strong restrictions on the substitution patterns among products. In this model, cross-price elasticities of product "h" and "k" are assumed to be equal with respect to the price of "j". This restriction can be relaxed by imposing a nest structure on the demand for cola. Utilities given by products with similar characteristics are assumed to be correlated. Therefore, diet and normal cola product are assumed to be in different nests. As a difference from the *simple logit* model, an additional variable (the "within nest market share") is included in the *nested logit* model and the coefficient of this variable gives the correlation of utilities of products in the same nest. It is expected to be between zero and one. In addition, this variable is endogenous and needs to be instrumented. In this chapter, "the average pack size of other firm's products in the same nest" is used as an instrumental variable in addition to those in the *simple logit* model. Other common instrument in estimations for all types of shops is the deflated price index of electricity. The deflated hourly wage index in beverage industry have been used as an alternative instrument instead of the hourly wage index paid in the cold drink industry in cases where the validity of the latter has been rejected by the Sargan test of over-identification. The average of the price of product "j" over other cities has also been used as another alternative instrumental variable as suggested by Hausman et al.(1994:165) and Nevo (2001:320). However, the intense national advertising in cola industry may cause demand shocks to be correlated among brands belonging to the same manufacturer across cities. After testing the validity of this instrumental variable, equations have been re-estimated by taking into account the possible correlation of errors of the products belonging to the same firm. In this case, products have been clustered on "manufacturers" in order to obtain robust-clustered standard errors.

Heteroscedasticity of errors have been tested using the Breush-Pagan test in which the squared OLS residuals are regressed on some indicator variables that are suspected to be the sources of the heteroscedasticity, and the joint significance of these indicator variables is tested. If the indicators are found to be significant, the null hypothesis of homoscedasticity is rejected. All exogenous variables (including excluded instruments) and their squared values are used as the indicator variables[7]. To detect whether errors are autocorrelated, the residuals of the every estimation have been regressed on their lagged values and individual significance of coefficients of lagged residuals has been tested. In cases where errors have been found to be heteroscedastic and autocorrelated, the equations have been re-estimated using robust-2SLS method that yields “heteroscedasticity and autocorrelation (HAC) robust standard errors”.

In the tables below, the results of *nested logit* models for every shop type are presented. First, every model has been estimated by OLS method. Then, models have been estimated by 2SLS method by using instrumental variables and with robust standard errors as explained above. For presentation purposes only results for the price and within nest correlation will be presented along with related test statistics in the tables below.

It is seen that the coefficient of price and of within nest correlation are remarkably different between OLS and 2SLS results. In 2SLS models, the coefficient of price is statistically significant at 1% level and is negative as theoretically expected in chain shops, discounters and medium markets-groceries. For non-chain shops and “other” shops, the price coefficients are not statistically significant with 2SLS method.

[7] For this test, the “ivhettest, ivsq all” command of Stata is run.

The coefficient of the within nest correlation is significant and it is between zero and one as theoretically expected in all shop types, except in discounters. This means that, modeling diet and normal cola products in different nests is not suitable for the demand patterns of consumers in discounters. As the coefficient of within nest correlation is not statistically different from zero, the nested model for this shop type reduces to the *simple logit* model. It can be seen that the price coefficient in the *simple logit* model is closer to the one in *nested logit* model: -4.645 and -4.554, respectively.

Table 5.14. Results of the *nested logit* models for Chain Shops

Models	OLS	2SLS[8]	2SLS HAC Robust[9]	2SLS (2)[10]	2SLS Cluster Robust[11]
Parameters	1	2	3	4	5
Price	-0.36***	-4.122***	-4.122***	-2.249***	-4.122***
	(0.0765)	(0.5919)	(0.7476)	(0.3357)	(0.9195)
Within nest correlation	0.867***	0.418***	0.418***	0.316***	0.418***
	(0.0061)	(0.0654)	(0.0751)	(0.0635)	(0.0833)
N	11694	11364	11364	10707	11364
Log-likelihood	-9454	-11809	-11809	-11462	-11809
AIC	19024	23899	23645	23037	23645
BIC	19451	24934	23748	23452	23748
Sargan statistic		0.665	0.460	12.725	0.356
P-value of Sargan test		0.4147	0.4975	0.0017	0.5510
F-statistics in the reduced form equation					
for price		116.79	48.31	338.42	32.81
for within nest market share		59.97	47.14	47.1	51.75

Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

[8] **2SLS:** Two-stage least square estimation with instrumental variables “deflated hourly wage index of cold drink industry”, “deflated price index of electricity”, “average pack size of other firms’ products in the same nest/market/time”.

[9] **2SLS HAC Robust**: Two-stage least square estimation with Heteroscedasticity and Autocorrelation Robust Standard Errors. Instruments are same as in previous footnote.

[10] **2SLS (2):** Two-stage least square estimation with instrumental variables “deflated hourly wage index of cold drink industry”, “deflated price index of electricity”, “average pack size of other firms’ products in the same nest/market/time” and “average of the prices of the product ‘j’ in other cities in the same shop type/time”.

[11] **2SLS Cluster Robust**: Two-stage least square estimation with same instrumental variables as in **“2SLS”** and it is assumed that errors of the products belonging to the same firm are correlated (clustering on manufacturers).

Table 5.15. Results of the *nested logit* models for Discounter Shops

Models	OLS	2SLS	2SLS HAC Robust	2SLS (2)	2SLS Cluster Robust
Parameters					
Price	-0.198	-4.554***	-4.554***	-5.013***	-4.554***
	(0.1823)	(1.1461)	(1.3979)	(1.3256)	(1.7612)
Within nest correlation	0.812***	0.025	0.025	0.051	0.025
	(0.0106)	(0.105)	(0.1083)	(0.1013)	(0.1176)
N	5530	5253	5253	4648	5253
Log-likelihood	-5443	-7080	-7080	-6113	-7080
AIC	10996	14407	14189	12254	14189
BIC	11360	15214	14281	12344	14281
Sargan statistic		1.009	0.786	1.866	0.478
P-value of Sargan test		0.3152	0.3753	0.3935	0.4894
F-statistics in the reduced form equation					
for price		95.13	54.36	139.78	36.34
for within nest market share		39.19	35.73	34.27	41.02

Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.16. Results of the *nested logit* models for Medium Markets and Grocery Shops

Models	OLS	2SLS	2SLS HAC Robust	2SLS(2)	2SLS(3)[12]	2SLS(3) HAC Robust[13]	2SLS Cluster Robust	2SLS (3) Cluster Robust[14]
Parameters								
Price	-0.056	-2.35***	-2.35**	-0.88***	-2.34***	-2.34***	-2.35***	-2.34***
	(0.0396)	(0.4113)	(0.6033)	(0.1874)	(0.3904)	(0.5545)	(0.6725)	(0.6371)
Within nest correlation	0.924***	0.62***	0.62***	0.55***	0.65***	0.65***	0.62***	0.65***
	(0.0033)	(0.0406)	(0.0463)	(0.0368)	(0.0405)	(0.046)	(0.0651)	(0.0649)
N	20139	20107	20107	19325	20101	20107	20107	20107
Log-likelihood	-11049	-15496	-15496	-15368	-15104	-15106	-15496	-15106
AIC	22217	31284	31020	30853	30324	30239	31020	30239
BIC	22683	32438	31130	31309	30783	30350	31130	30350
Sargan statistic		9.389	5.227	28.754	0.479	0.248	2.626	0.141
P-value of Sargan test		0.0022	0.0222	0.0000	0.4891	0.6183	0.1052	0.7076
F-statistics in the reduced form equation								
for price		119.97	62.5	531.89	131.87	89.84	46.1	63.86
for within nest market share		86.84	53.85	68.31	86.11	52.93	50.52	47.35

Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

[12] **2SLS (3)** : Two-stage least square estimation with instrumental variables “deflated hourly wage index of **beverage** industry”, “deflated price index of electricity”, “average pack size of other firms’ products in the same nest/market/time”.

[13] **2SLS (3) HAC Robust**: Two-stage least square estimation with Heteroscedasticity and Autocorrelation Robust Standard Errors. Instruments are same as in previous footnote.

[14] **2SLS (3) Cluster Robust**: It is assumed that errors of the products belonging to the same firm are correlated (clustering on manufacturers). Instruments are same as in the previous footnote.

Table 5.17. Results of the *nested logit* models for Non-Chain Shops

Models	OLS	2SLS	2SLS HAC Robust	2SLS (2)	2SLS Cluster Robust
Parameters					
Price	0.072	0.121	0.121	-0.484	0.121
	(0.0719)	(0.8648)	(1.0836)	(0.9423)	(1.3815)
Within nest correlation	0.871***	0.478***	0.478***	0.536***	0.478***
	(0.0073)	(0.0521)	(0.0579)	(0.0519)	(0.0802)
N	9778	9521	9521	8818	9521
Log-likelihood	-8429	-9357	-9357	-8395	-9357
AIC	16975	18988	18742	16906	18742
BIC	17399	19969	18843	17317	18843
Sargan statistic		6.205	4.448	7.712	2.367
P-value of Sargan test		0.0127	0.0349	0.0212	0.1239
F-statistics in the reduced form equation					
for price		39.37	17.01	27.87	15.12
for within nest market share		118.5	82.74	91.03	86.86

Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.18. Results of the *nested logit* models Other Shops

Models	OLS	2SLS	2SLS-HAC Robust	2SLS (2)	2SLS (3)	2SLS (3) HAC Robust	2SLS Cluster Robust	2SLS (3) Cluster Robust
Parameters								
Price	0.095	-1.47	-1.47	0.248	-2.27*	-2.27*	-1.47	-2.27
	(0.134)	(1.1456)	(1.2874)	(1.0235)	(1.198)	(1.3451)	(1.7156)	(1.7355)
Within nest correlation	0.827***	0.567***	0.567***	0.558***	0.575***	0.575***	0.567**	0.575***
	(0.0125)	(0.0649)	(0.0687)	(0.0671)	(0.066)	(0.0693)	(0.1034)	(0.1034)
N	6496	5871	5871	5298	5857	5871	5871	5871
Log-likelihood	-8029	-7336	-7336	-6579	-7393	-7403.44	-7336	-7403
AIC	16171	14934	14700	13264	14892	14834.88	14700	14835
BIC	16558	15809	14794	13612	15245	14928.37	14794	14928
Sargan statistic		9.636	7.911	11.280	1.238	0.9846	4.5612	0.471
P-value of Sargan test		0.0019	0.0049	0.0036	0.2658	0.3211	0.0327	0.4927
F-statistics in the reduced form equation								
for price		29.99	18.79	32.8	28.43	*20.36*	22.67	19.05
for within nest market share		89.48	74.7	61.81	89.61	*75.07*	65.07	65.76

Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

The instrumental variables are valid in equations for chain shops and discounters. However, the Sargan test shows that at least one of the instruments in the equation for medium markets-groceries is invalid. When the deflated hourly wage index in beverage industry is used instead of that of cold drink industry *(see columns named as "2SLS (3)")* , the result of the Sargan test indicates that the set of instruments are valid in that equation (p-value of Sargan test becomes 0.489) and the magnitude of the coefficients of price and of within nest correlation does not change significantly. The coefficient of price changes from -2.353 to -2.348.

When "the average of the prices of product "j" in other cities" is used as an additional instrument *(see columns labeled "2SLS (2)"),* the Sargan test yields that the set of instruments are invalid in chain shops, discounters, whereas they were valid without this additional instrument. This result implies that the average of the prices of products over other cities may be correlated with the error terms of the relevant equations. One explanation of this situation can be the fact that national advertising is very influential in cola industry and may cause demand shocks to be correlated across cities. Therefore, the average prices in other cities as an instrument will be correlated with the error term of products in a particular city. Taking into account this possibility, the average prices in other cities are excluded from the set of instruments. On the other hand, in estimations it is possible to take the correlation of error terms across cities into account by clustering products on manufacturers in a given time (month). This type of clustering assumes that at a given time, any firm-level demand shock, which might be caused by a national advertising campaign, can affect demand shocks in all cities. In this case, demand shocks (or error terms) of products belonging to the same manufacturer will be correlated across cities in a certain month. When this type of clustering is taken into account, (without using the prices in other cities as instruments), the estimation results show that the standard errors of the coefficients of price and within nest correlation parameter becomes higher but this does not affect the statistical significance of coefficients in none of the equations (*see columns labeled "2SLS (2) Cluster Robust" or " 2SLS (3) Cluster Robust")*.

The results of diagnostic tests showed that error terms in every model are heteroscedastic and autocorrelated. Therefore, coefficients of each equation for shop types have been re-estimated with "heteroscedasticity and autocorrelation robust (HAC)" standard errors *(see columns labeled "2SLS HAC Robust" or "2SLS (3) HAC Robust")*. The numbers of lags for autocorrelated errors are indicated in the tables below. The standard errors of the estimated coefficients of price are higher in robust estimations, however, they still remain statistically significant in equations for chain shops, discounters and medium markets-groceries. The robust estimates does not change the situation for the coefficients of the within nest correlation. They are still significant and between zero and one in all shop types, but not in discounters as seen in non-robust 2SLS model. The values of the model selection criteria such as Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are smaller in HAC-robust models than in models non-robust models. This implies that the fit of HAC-robust models are better.

Having considered the results summarized above, the models estimated by 2SLS method with "heteroscedasticity-autocorrelation robust standard errors" will be used in interpreting the estimates of coefficients across types of shops and in calculating demand elasticities. (The coefficients of city and month fixed-effects are shown in Appendix F).

Table 5.19. Results from the *nested logit* models with 2SLS – Heteroscedasticity and Autocorrelation (HAC) Robust standard errors for every type of shops.

	(1) Chain Shops	(2) Discounters	(3) Medium Markets-Grocery	(4) Non-Chain Shops	(5) Other Shops
Parameters					
Price	-4.122***	-4.554***	-2.348***	0.121	-2.270*
	(0.7476)	(1.3979)	(0.5545)	(1.0836)	(1.3451)
Within nest correlation	0.418***	0.025	0.650***	0.478***	0.575***
	(0.0751)	(0.1083)	(0.0460)	(0.0579)	(0.0693)
ab	-1.094***	0.194	0.505***	-0.812***	-0.150
	(0.3309)	(0.6864)	(0.1760)	(0.2552)	(0.5278)
c1	-0.728**	-0.756	-1.078***	-0.782***	1.872***
	(0.3282)	(0.6806)	(0.1743)	(0.2441)	(0.5520)
c2	0.844**	2.953***	1.022***	0.593	3.996***
	(0.3879)	(0.8447)	(0.2169)	(0.3792)	(0.6937)
agehh	-0.156	0.566	0.003	-0.156	0.171
	(0.2827)	(0.6691)	(0.1698)	(0.2641)	(0.4417)
sq_agehh	0.000	-0.006	-0.001	0.002	-0.003
	(0.0033)	(0.0075)	(0.0020)	(0.0030)	(0.0051)
ageps	-0.675***	-0.160	-0.106	-0.340***	0.790***
	(0.1610)	(0.2932)	(0.0722)	(0.1200)	(0.2228)
sq_ageps	0.009***	0.001	0.002	0.005***	-0.010***
	(0.0022)	(0.0039)	(0.0010)	(0.0016)	(0.0030)
size1	-1.524***	1.727	0.692***	-0.306	-0.053
	(0.5497)	(1.3155)	(0.2580)	(0.4258)	(0.8873)
size2	-1.662***	-2.522***	-0.569***	-0.416	0.923*
	(0.3392)	(0.6429)	(0.1626)	(0.2661)	(0.5438)
urban	1.580***	2.483***	1.268***	0.816***	0.253
	(0.1818)	(0.4307)	(0.0970)	(0.1772)	(0.2670)
holiday	-0.588***	-0.555**	-0.431***	-0.408***	0.015
	(0.1362)	(0.2628)	(0.0739)	(0.1468)	(0.2299)
temp	0.006	0.009	0.009***	0.000	0.014*
	(0.0043)	(0.0085)	(0.0023)	(0.0038)	(0.0074)
Observations	11364	5253	20107	9521	5871
R-squared	0.431	0.038	0.705	0.491	0.368

Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

According to the results of the estimations of the *nested logit* models for cola products with 2SLS method and HAC robust standard errors, it is seen that the price coefficients are negative and significant at 1% level in chain shops, discounters and medium markets-groceries. It is negative and significant only at 10% level in "other shops". In non-chain shops, the price coefficient is not statistically significant. In medium markets-groceries and in "other" shops, the magnitudes of the price coefficients are almost half of those in chain shops and discounter shops. The within nest correlation parameter is significant and between zero and one as theoretically expected in all shop types except discounters. In this latter, it is statistically insignificant and the *nested logit* model reduces to the *simple logit* model. In the light of these findings, it will be focused on chain shops and medium markets-groceries in the rest of the analysis of coefficients and in the calculations of the elasticities. These two types constitute more that 75% of the observations in the sample.

The relations between the mean utility levels of cola products and other explanatory variables (i.e. demographic variables, holidays, temperature) in the nested logit models are very similar to those found in the simple logit models.

In the following section the price elasticities of demand for cola products will be calculated using the demand parameters estimated in the *simple logit* and *nested logit* models, prices and market shares in chain shops and medium markets groceries.

5.7. Price Elasticities of Demand

The price elasticities of demand of each product have been calculated for every point of observation (city/month pair) in chain shops and medium markets groceries.

5.7.1. Elasticities from the *simple logit* models

Using the results of the *simple logit* models, the own price elasticity of demand for the product j can be computed using the formula below (Filistrucchi, 2009):

$$e_{jj} = -\alpha . p_j .(1 - s_j) \tag{5.31}$$

The subscripts of time and market are temporarily omitted. The cross price elasticity of demand for the product “k” with respect to the price of “j” is:

$$e_{kj} = \alpha . p_j . s_j \tag{5.32}$$

where $\alpha > 0$.

As can be understood from these formulas, the *simple logit* model imposes strong restrictions on the substitution patterns of products. For any product other than "k", the *simple logit* model yields equal cross-price elasticities : $e_{kj} = e_{hj}, \quad k \neq h$.

5.7.2. Elasticities from the *nested logit* models

The own and cross price elasticity of demand can be computed using the estimates of the *nested logit* models with the formulas given in Slade (2004: 139) :

The own-price elasticity of product "j" is;

$$\eta_{jj} = \alpha_j p_j [s_j - \frac{1}{1-\sigma} + \frac{\sigma}{1-\sigma} s_{j/g}] \qquad (5.33)$$

The cross-price elasticity of demand between products "k" and "j" will depend on whether "k" and "j" are in the same nest or not. If they are in different nests, then the cross-price elasticity of demand for "k" with respect to the price of "j" is ;

$$\eta_{kj} = \alpha_j p_j [s_j + \frac{\sigma}{1-\sigma} s_{j/g}] \qquad (5.34)$$

On the other hand, if products "k" and "j" are in the same nest, then the cross-price elasticity of demand for "k" with respect to the price of "j" is ;

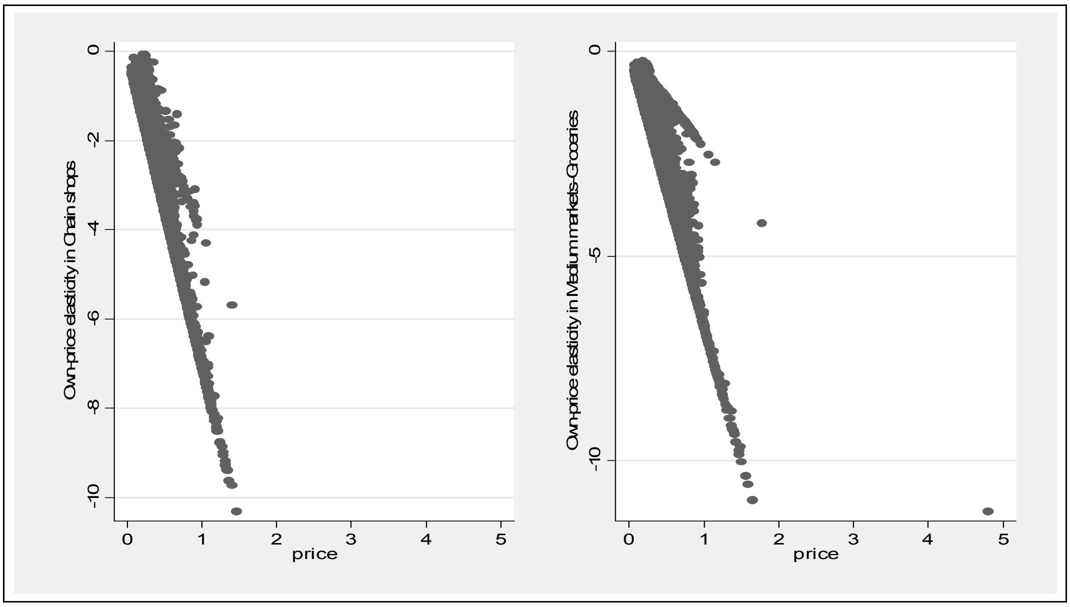
$$\eta_{kj} = \alpha . p_j . s_j \qquad (5.35)$$

where $\alpha > 0$.

5.7.3. Analysis of elasticities

Elasticities of demand for cola products have been calculated for every point of observation in the data set. A point observation is the combination of a particular city, shop type and month. However, the presentation of elasticities at such a detailed level is practically not tractable because of the large number of products and point of observations. Therefore, the average values of elasticities over pack sizes, shop types, product types or manufacturer will be presented.

There is an inverse relation between own-price elasticities and price levels. This can be seen from the graphics below in which elasticities in chain shops and medium markets-groceries are plotted versus price levels. This relation is the result of the negatively estimated price parameters in econometric models and the formula of elasticity described in the previous sub-section. The extreme values of elasticities are observed where price levels are relatively high.



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Graph 5.4. Relation between own-price elasticities and price levels
Author's own calculations using Ipsos/KGM and TURKSTAT data.

The mean, minimum and maximum values of the p-values of the estimates of elasticities obtained from the *simple logit* and *nested logit* models are presented in the tables below in order to assess the statistical significance of elasticities.

Table 5.20. Statistical significance (P-values) of elasticities in Logit models

Model	Type of elasticity	Variable	Obs	Mean	Std. Dev.	Min	Max
Logit	Own	Chain shops	11785	0.0001	0	0.0001	0.0001
		Discounters	5732	0.0000	0	0.0000	0.0000
		Medium markets-grocery	20144	0.1520	0	0.1520	0.1520
		Non-chain shops	9910	0.0001	0	0.0001	0.0001
		Other shops	6975	0.9065	0	0.9065	0.9065
	Cross	Chain shops	11785	0.0001	0.0000	0.0001	0.0001
		Discounters	5732	0.0000	0.0000	0.0000	0.0000
		Medium markets-grocery	20144	0.1520	0.0000	0.1520	0.1520
		Non-chain shops	9910	0.0001	0.0000	0.0001	0.0001
		Other shops	6975	0.9065	0.0000	0.9065	0.9065

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.21. Statistical significance (P-values) of elasticities in *Nested logit* models

Model	Type of elasticity	Variable	Obs	Mean	Std. Dev.	Min	Max
Nested logit	Own	Chain shops	11785	0.0000	0.0000	0.0000	0.0001
		Discounters	5732	0.0018	0.0003	0.0011	0.0021
		Medium markets-grocery	20144	0.0013	0.0003	0.0000	0.0014
		Non-chain shops	9910	0.9107	0.0001	0.9106	0.9112
		Other shops	6975	0.1219	0.0086	0.0915	0.1260
	Cross within nest	Chain shops	11785	0.0019	0.0033	0.0001	0.0118
		Discounters	5732	0.1087	0.2192	0.0021	0.8127
		Medium markets-grocery	20144	0.0024	0.0012	0.0014	0.0065
		Non-chain shops	9910	0.9104	0.0002	0.9100	0.9106
		Other shops	6975	0.1345	0.0088	0.1260	0.1644
	Cross outside nest	Chain shops	11785	0.0000	0.0000	0.0000	0.0000
		Discounters	5732	0.0011	0.0000	0.0011	0.0011
		Medium markets-grocery	20144	0.0000	0.0000	0.0000	0.0000
		Non-chain shops	9910	0.9112	0.0000	0.9112	0.9112
		Other shops	6975	0.0915	0.0000	0.0915	0.0915

Author's own calculations using Ipsos/KGM and TURKSTAT data.

By examining the minimum and maximum values of the p-values given above it can be said that, in the *simple logit* models the own and cross price elasticities are not statistically significant in medium markets-groceries and “other shops”. In other shop types they are significant. In the *nested logit* models, the all three types of price elasticities are significant at 1 % level in chain shops and medium markets-groceries. The significance of elasticities in discounters depends on the point of observation. The elasticities in non-chain shops and “other shops” are insignificant at 5 % level. In “other shops”, in some of the points of observations elasticities can be accepted as significant at 10 % level.

The table below can be analyzed in order to see the range of the own-price elasticities.

Table 5.22. Descriptive statistics of the own-price elasticities (averaged over cities and time)

Shop types and Models	Obs	Mean	Std. Dev.	Min	Max
Chain shops - *Simple logit*	11785	-1.007	0.612	-4.409	-0.027
Chain shops - *Nested logit*	11785	-2.245	1.430	-10.322	-0.059
Discounters - *Simple logit*	5732	-1.233	0.819	-7.261	-1.19E-07
Discounters - *Nested logit*	5732	-1.235	0.824	-7.296	-1.2E-07
Medium markets-Grocery – *Simple logit* *	20144	0.336	0.200	0.047	4.525
Medium markets-Grocery – *Nested logit*	20144	-2.266	1.403	-11.242	-0.225
Non-Chain shops- *Simple logit* *	9910	1.231	0.809	0.078	20.356
Non-Chain shops- *Nested logit* *	9910	0.065	0.045	0.003	1.119
Other shops- *Simple logit* *	6975	0.055	0.039	6.88E-09	0.283
Other shops- *Nested logit* **	6975	-1.651	1.221	-8.593	-2.21E-07

*Not statistically significant; ** Statistically significant at 10% only in some cases.
Author’s own calculations using Ipsos/KGM and TURKSTAT data.

From the table above, it is seen that in shop types for which own-price elasticities are statistically significant, the maximum value are very close to zero. In chain shops, they take the minimum values of -4.4 and -10 in the *simple logit* and *nested logit* models, respectively, In discounters, the values of own-price elasticities in the *simple* *logit* and *nested logit* models are very similar due to the insignificant parameter of within nest correlation in the *nested logit* estimation. The minimum value is about -7.2 . For medium markets-groceries, the own-price elasticities are only significant in the *nested logit* model and the minimum value is -11.24, which is close to that of chain shops. In "other shops", again the results from the *nested logit* model are significant and the minimum value is -8.59.

A comparison of elasticities between the *simple logit* and the *nested logit* model can be done using the results of estimations for "chain shops" since the elasticities calculated for this shop type are significant in both models. The elasticities of normal cola products that are averaged over cities, time and firms are presented below.

Table 5.23. Comparison of the average elasticities of "normal cola" products between the *Simple logit* and the *Nested logit* models (in Chain shops)

	Simple logit		***Nested logit***		
Pack size (ml)	Own	Cross	Own	Cross within nest	Cross outside nest
200	-2.192	0.007	-5.131	0.021	0.010
250	-2.206	0.015	-5.157	0.045	0.020
300	-2.052	0.003	-4.805	0.008	0.004
330	-1.909	0.022	-4.452	0.073	0.030
500	-1.565	0.014	-3.653	0.045	0.019
600	-1.417	0.011	-3.313	0.032	0.015
1000	-0.940	0.041	-2.175	0.125	0.056
1250	-0.977	0.008	-2.283	0.025	0.011
1500	-0.558	0.008	-1.301	0.024	0.011
1750	-0.600	0.005	-1.401	0.016	0.007
2000	-0.811	0.028	-1.881	0.084	0.038
2250	-0.685	0.007	-1.597	0.024	0.010
2500	-0.491	0.122	-1.075	0.360	0.166
3000	-0.458	0.052	-1.048	0.147	0.070

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The first important observation is that the own-price elasticities of the products whose pack sizes are higher than 600ml are lower than one (in absolute value) according to the results of the *simple logit* model. The table above also shows that, in the *nested logit* models, the own-price elasticities are more inelastic as the pack size of products increases. In the *nested logit* models, they range from -5.131 to -1.048 for the smallest and the largest pack (200 ml to 3000 ml). The reason of this can be the fact that smaller packs are more expensive than larger packs and the own-price elasticities (in absolute value) are inversely related to price levels.

It is seen that own-price and cross-price elasticities are higher (in absolute value) in the *nested logit* models than in the *simple logit* models. In average, the difference of the own-price elasticities between the *simple logit* and the *nested logit* models is nearly twice. The difference of cross-price elasticities is even higher than two times and close to third times. It is also observed that, in the *nested logit* models, the cross-price elasticities of the products belonging to the same nest are larger than those calculated for products outside nest. This final finding confirms that the products in the same nest are closer substitutes for each other than the products in other nest.

Similar pack sizes have similar own-price elasticities, for example pairs of packs of 200 ml and 250 ml, 300 ml and 330 ml, 500 ml and 600 ml, 1000 ml and 1250 ml, 1500 ml and 1750 ml, 2500 ml and 3000 ml have similar own-price elasticities.

The mean values and the standard deviations of the own-price elasticities of normal cola products with different pack sizes are presented below for three shop types.

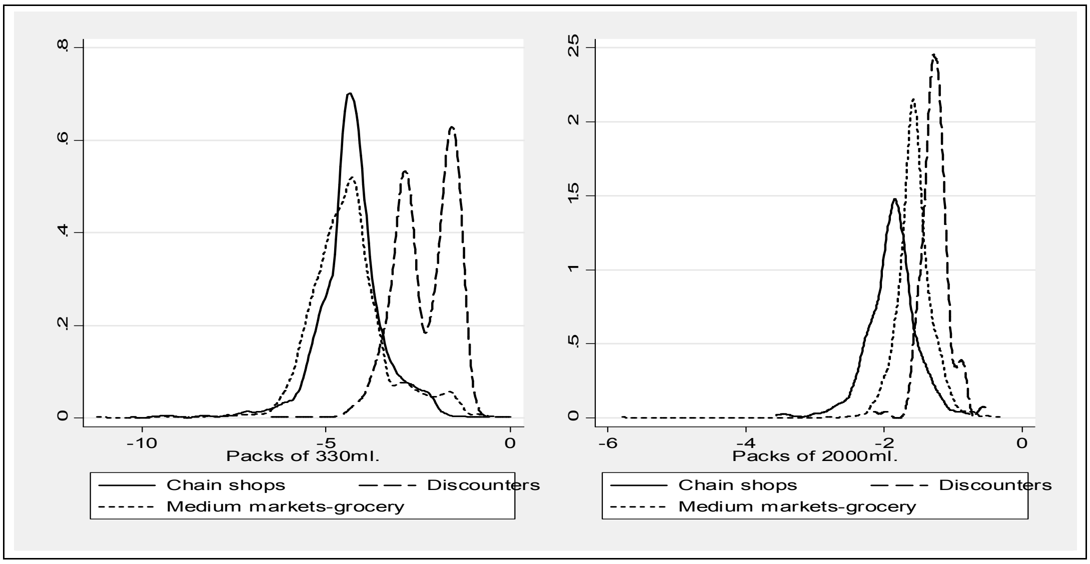
Table 5.24. Descriptive statistics of own-elasticities of normal cola products by packs and shop types

	Chain Shops		Discounters		Medium Markets-Grocery	
Pack size	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
200	-5.131	1.616	-3.204	1.274	-4.439	1.122
250	-5.157	1.446	-3.477	1.509	-3.211	1.555
300	-4.805	0.912	-4.250	1.750	-4.438	1.356
330	-4.452	0.866	-2.369	0.765	-4.543	0.903
500	-3.653	0.587	-2.605	0.470	-3.503	0.780
600	-3.313	0.653	-2.186	0.416	-3.263	0.518
1000	-2.175	0.586	-1.229	0.394	-2.333	0.575
1500	-1.301	0.551	-0.814	0.170	-1.642	0.494
2000	-1.881	0.364	-1.264	0.209	-1.557	0.276
2500	-1.075	0.330	-0.665	0.256	-1.178	0.337
3000	-1.048	0.171	-0.700	0.087	-1.102	0.127

Author's own calculations using Ipsos/KGM and TURKSTAT data.

In general, standard deviations of normal cola products tend to be smaller as the pack size becomes larger. In average, normal cola products are more inelastic in discounters than they are in two other shop types. Their standard deviations also are smaller in discounters compared to other shops.

The distributions own-price elasticities of products in 330 ml and of 2000 ml packs by shop types are presented in the graphs below.



Graph 5.5. Distribution of own-price elasticities of packs of 330 ml and of 2000 ml in different shop types.
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Most of the own-price elasticities in discounters are smaller (in absolute value) than in two other shop types.

The own and cross price elasticities (averaged over cities and time) of normal and diet cola products are presented in the table below by supplier and shop types.

Table 5.25. Average Elasticities of 330 ml normal cola products (by manufacturer and shop types)

Pack / Type		Chain Shops			Medium markets-Groceries		
300 ml Normal Cola	Firm	Own	Cross within nest	Cross outside nest	Own	Cross within nest	Cross outside nest
	Coca Cola	-4.574	0.083	0.036	-4.716	0.035	0.009
	Pepsi	-4.401	0.061	0.022	-4.819	0.021	0.006
	Cola Turca	-4.023	0.057	0.025	-4.071	0.013	0.003
	Kristal	-4.108	0.021	0.011	-3.482	0.01	0.002
	Other	-3.904	0.022	0.009	-3.233	0.004	0.001
	Private Label	-2.904	0.023	0.011	-2.63	0.005	0.001

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.26. Average Elasticities of 1000 ml normal cola products (by manufacturer and shop types)

Pack / Type		Chain Shops			Medium markets-Groceries		
1000 ml Normal Cola	Firm	Own	Cross within nest	Cross outside nest	Own	Cross within nest	Cross outside nest
	Coca Cola	-2.253	0.178	0.08	-2.444	0.064	0.018
	Pepsi	-2.123	0.064	0.029	-2.36	0.022	0.006
	Cola Turca	-1.943	0.064	0.03	-2.109	0.019	0.005
	Kristal	-2.149	0.006	0.003	-1.699	0.014	0.004
	Other	-2.432	0.016	0.007	-2.753	0.013	0.004
	Private Label	-1.784	0.024	0.01	-1.423	0.007	0.002

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.27. Average Elasticities of 2000 ml normal cola products (by manufacturer and shop types)

Pack / Type		Chain Shops			Medium markets-Groceries		
2000 ml Normal Cola	Firm	Own	Cross within nest	Cross outside nest	Own	Cross within nest	Cross outside nest
	Coca Cola	-1.941	0.098	0.043	-1.497	0.295	0.081
	Pepsi	-1.920	0.070	0.033	-1.652	0.111	0.031
	Cola Turca	-1.618	0.073	0.033	-1.551	0.061	0.017
	Kristal	-1.335	0.050	0.026	-1.37	0.018	0.005
	Other	-2.613	0.021	0.010	-1.798	0.025	0.007

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.28. Average Elasticities of 2500 ml normal cola products (by manufacturer and shop types)

Pack / Type		Chain Shops			Medium markets-Groceries		
2500 ml Normal Cola	Firm	Own	Cross within nest	Cross outside nest	Own	Cross within nest	Cross outside nest
	Coca Cola	-0.946	0.689	0.317	-1.009	0.671	0.183
	Pepsi	-1.294	0.258	0.119	-1.348	0.243	0.069
	Cola Turca	-1.195	0.226	0.107	-1.332	0.118	0.032
	Kristal	-1.107	0.043	0.02	-1.153	0.045	0.012
	Other	-0.915	0.047	0.022	-1.089	0.018	0.005
	Private Label	-0.91	0.102	0.046	-0.98	0.021	0.005

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.29. Average Elasticities of 330 ml diet cola products (by manufacturer and shop types)

Pack / Type		Chain Shops			Medium markets-Groceries		
330 ml Diet Cola	Firm	Own	Cross within nest	Cross outside nest	Own	Cross within nest	Cross outside nest
	Coca Cola	-4.065	0.554	0.037	-3.878	1.08	0.003
	Pepsi	-4.186	0.336	0.016	-3.801	0.985	0.003
	Cola Turca	-3.845	0.352	0.017	-3.295	1.224	0.002
	Kristal	-0.633	0.358	0.010	-2.259	0.95	0.003
	Other	-3.479	0.147	0.009	-3.012	2.25	0.003
	Private Label	-2.860	0.017	0.001	-1.765	0.501	0.001

Author’s own calculations using Ipsos/KGM and TURKSTAT data.

Table 5.30.Average Elasticities of 1000 ml diet cola products (by manufacturer and shop types)

Pack / Type		Chain Shops			Medium markets-Groceries		
1000 ml Diet Cola	Firm	Own	Cross within nest	Cross outside nest	Own	Cross within nest	Cross outside nest
	Coca Cola	-1.797	0.657	0.049	-1.25	1.311	0.008
	Pepsi	-1.929	0.377	0.022	-1.743	0.755	0.004
	Cola Turca	-1.817	0.251	0.011	-1.293	0.722	0.003
	Other	-2.437	0.315	0.02	-1.943	0.02	0
	Private Label	-1.396	0.22	0.02	-1.088	0.292	0.002

Author’s own calculations using Ipsos/KGM and TURKSTAT data.

A general conclusion from the elasticities is that, in most of the cases, the own-price elasticities are remarkably higher than one (in absolute value) for all brands and for all types of products, whereas the within nest cross-price elasticities are inelastic. The outside nest cross-price elasticities are even smaller. For example, while the own-price elasticity of Coca Cola's 330 ml pack normal cola product is lower than -4, the within nest cross-price elasticity is 0.083 in chain shops. This is smaller in medium markets-groceries.

The within nest cross-price elasticities for every classification above are generally below one. Those which are higher than one are for diet cola products in medium markets-groceries. A price increase of 1% in Coca Cola's 330 ml diet cola product causes the demand for other diet cola products to increase by 1.08%. The within nest cross-price elasticity of Cola Turca's 330 ml diet cola is also above one: 1.22. The highest within nest cross-price elasticity belongs to "other firms" in 330 ml packs of diet products. Coca Cola's within nest cross-price elasticity is larger than those of other firms for most of the product types both in chain shops and medium markets-groceries.

Concerning the normal cola products sold in medium markets-groceries, producers whose demand is the most elastic are Pepsi for 330 ml and 2500 ml packs, "other firms" for 1000 ml and 2000 ml packs. For diet products, the most elastic demand is that of Coca Cola's 330 ml pack and that of "other" firms' 1000ml pack.

In the "Data" section of this chapter, it was shown that the pack of 2500 ml is the most frequently sold pack among normal cola products. The own-price elasticities of Coca Cola for this pack is below one (in absolute value) -0.946 in chain shops and slightly above one,

-1.009, in medium markets-groceries. In this pack, the most elastic own-price elasticity is that of Pepsi with -1.294 and -1.348 in chain shops and medium markets-groceries. The demand for "other firms" and Private Label products are below one in chain shops (-0.915 and -0.91).

The low values of the outside nest cross-price elasticities imply that consumers do not shift their demand significantly from normal cola to diet cola or vice versa as a response to a price increase in the relevant type.

The elasticities presented above were the averaged values of elasticities of the single-pack and multi-pack products of the same size. In the table below, the elasticities of single and multi pack products in medium markets-groceries are presented separately. (They are averaged cities and time).

Table 5.31. Elasticities (averaged over cities and time) of normal cola products in Medium markets-Groceries

Products	Own	Cross within nest	Cross outside nest	Products	Own	Cross within nest	Cross outside nest
Coca Cola_Multi_1000	-2.501	0.035	0.01	Cola Turca_Multi_1000	-1.475	0.025	0.006
Coca Cola_Multi_1500	-1.451	0.034	0.008	Cola Turca_Multi_330	-2.921	0.027	0.008
Coca Cola_Multi_1750	-0.846	0.04	0.012	Cola Turca_Single_1000	-2.114	0.018	0.005
Coca Cola_Multi_250	-6.389	0.009	0.002	Cola Turca_Single_200	-4.674	0.007	0.002
Coca Cola_Multi_2500	-2.514	0.048	0.013	Cola Turca_Single_2000	-1.551	0.061	0.017
Coca Cola_Multi_330	-3.963	0.018	0.005	Cola Turca_Single_250	-4.204	0.035	0.005
Coca Cola_Single_1000	-2.441	0.066	0.018	Cola Turca_Single_2500	-1.332	0.118	0.032
Coca Cola_Single_1500	-2.322	0.013	0.003	Cola Turca_Single_3000	-1.101	0.116	0.032
Coca Cola_Single_200	-4.845	0.012	0.003	Cola Turca_Single_330	-4.086	0.013	0.003
Coca Cola_Single_2000	-1.497	0.295	0.081	Kristal_Single_1000	-1.699	0.014	0.004
Coca Cola_Single_250	-5.46	0.008	0.002	Kristal_Single_1500	-1.334	0.015	0.004
Coca Cola_Single_2500	-1.004	0.672	0.183	Kristal_Single_200	-4.029	0.006	0.002
Coca Cola_Single_330	-4.742	0.036	0.01	Kristal_Single_2000	-1.37	0.018	0.005
Coca Cola_Single_500	-3.744	0.018	0.005	Kristal_Single_250	-2.523	0.008	0.002
Pepsi_Multi_1000	-1.837	0.026	0.008	Kristal_Single_2500	-1.153	0.045	0.012
Pepsi_Multi_2500	-1.265	0.072	0.02	Kristal_Single_330	-3.482	0.01	0.002
Pepsi_Multi_330	-4.339	0.011	0.003	Kristal_Single_500	-2.558	0.007	0.002
Pepsi_Single_1000	-2.371	0.022	0.006	Other_Single_1000	-2.753	0.013	0.004
Pepsi_Single_1250	-2.25	0.008	0.002	Other_Single_1500	-1.761	0.015	0.004
Pepsi_Single_1500	-1.63	0.019	0.005	Other_Single_200	-2.626	0.005	0.001
Pepsi_Single_200	-4.826	0.006	0.002	Other_Single_2000	-1.798	0.025	0.007
Pepsi_Single_2000	-1.652	0.111	0.031	Other_Single_250	-1.929	0.007	0.002
Pepsi_Single_2250	-2.25	0.011	0.003	Other_Single_2500	-1.089	0.018	0.005
Pepsi_Single_250	-5.463	0.01	0.003	Other_Single_300	-1.717	0.001	0
Pepsi_Single_2500	-1.349	0.244	0.069	Other_Single_3000	-1.193	0.013	0.004

Table 5.32. (Continued)

Products	Own	Cross within nest	Cross outside nest	Products	Own	Cross within nest	Cross outside nest
Pepsi_Single_300	-4.608	0.006	0.002	Other_Single_330	-3.233	0.004	0.001
Pepsi_Single_330	-4.824	0.021	0.006	Other_Single_500	-2.371	0.005	0.001
Pepsi_Single_500	-3.257	0.009	0.003	Private Label_Single_1000	-1.423	0.007	0.002
Pepsi_Single_600	-3.263	0.026	0.007	Private Label_Single_1500	-0.924	0.001	0
				Private Label_Single_2500	-0.98	0.021	0.005
				Private Label_Single_330	-2.63	0.005	0.001
				Private Label_Single_500	-3.808	0.006	0.002

Author's own calculations using Ipsos/KGM and TURKSTAT data.

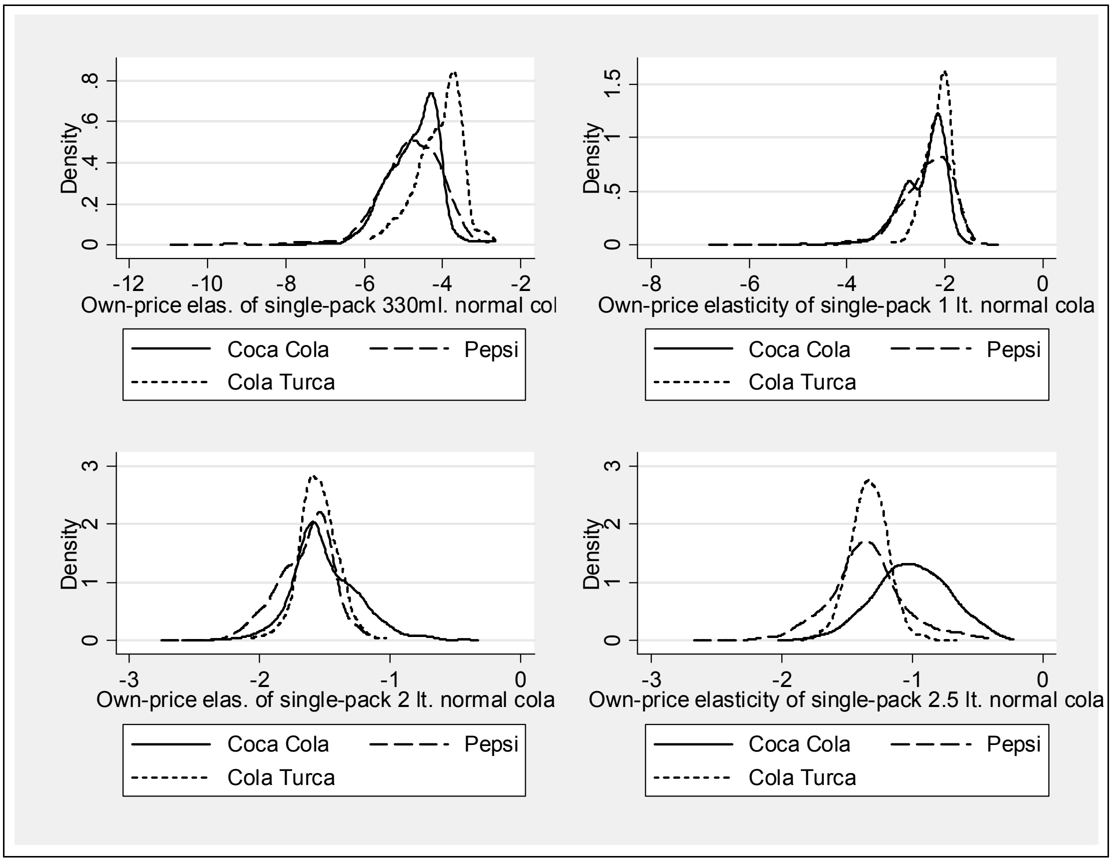
The own-price elasticity of the multi-pack 2500 ml product of Coca Cola is -2.514, whereas it is -1.004 for the single pack item of the same size. The multi-pack 2500 ml product of Pepsi has own-price elasticity as -1.265 which is nearly half of that of Coca Cola. Unlike Coca Cola, Pepsi's single pack of 2500 ml has a similar own-price elasticity (-1.349) to that of its multi pack item of the same size.

Table 5.32. Elasticities (averaged over cities and time) of every diet cola products in Medium markets-Groceries

Products	Own	Within nest cross	Outside nest cross	Products	Own	Within nest cross	Outside nest cross
Coca Cola Multi_1000	-1.822	0.523	0.006	Cola Turca Single_1000	-1.293	0.722	0.003
Coca Cola Multi_330	-4.022	1.019	0.009	Cola Turca Single_250	-2.422	1.703	0.003
Coca Cola Single_1000	-1.234	1.333	0.009	Cola Turca Single_330	-3.295	1.224	0.002
Coca Cola Single_2000	-1.634	0.484	0.004	Kristal Single_330	-2.259	0.95	0.003
Coca Cola Single_250	-5.734	0.543	0.002	Other Single_1000	-1.943	0.02	0
Coca Cola Single_330	-3.87	1.083	0.003	Other Single_1500	-0.843	0.631	0.002
Coca Cola Single_500	-3.118	0.588	0.002	Other Single_2500	-0.538	0.372	0.002
Pepsi Multi_1000	-0.852	0.785	0.01	Other Single_330	-3.012	2.25	0.003
Pepsi Multi_330	-1.672	0.866	0.002	Other Single_500	-2.513	4.667	0.002
Pepsi Single_1000	-1.753	0.755	0.004	Private Label Single_1000	-1.088	0.292	0.002
Pepsi Single_1500	-1.616	0.168	0.001	Private Label Single_330	-1.765	0.501	0.001
Pepsi Single_2000	-1.947	0.056	0				
Pepsi Single_250	-6.189	0.039	0				
Pepsi Single_330	-3.855	0.988	0.003				
Pepsi Single_500	-2.053	1.304	0.002				
Pepsi Single_600	-3.087	0.508	0.003				

Author's own calculations using Ipsos/KGM and TURKSTAT data.

In the graphs below, the densities of the own-price elasticities of the single-pack normal cola products of the three main suppliers are shown for different pack sizes sold in medium markets-groceries.



Graph 5.6. Densities own-price elasticities for three main suppliers (in medium markets-groceries)
Author's own calculations using Ipsos/KGM and TURKSTAT data.

From the graphs above, it is seen that the variance of the own-price elasticities of Coca Cola is larger than that of the other firms in all of the four pack sizes. The inverse can be said for Cola Turca.. The mode values of own-price elasticities of the three suppliers are close to each other in packs of 1 lt and 2 lt

The city-averages of the own-price elasticities of the single-pack 2500 ml normal cola products are presented in the table below.

Table 5.33. Own-price elasticities of single-pack 2500 ml normal cola product in cities (averaged over time).

Cities	Coca Cola	Pepsi	Cola Turca	Private Label	Other
ADANA	-1.5	-0.78	-1.352	-1.043	-1.204
ANKARA	-0.874	-1.529	-1.347	-1.055	-1.213
ANTALYA	-0.695	-1.545	-1.368	-0.887	-1.234
BALIKESIR	-0.851	-1.335	-1.322	-	-0.723
BOLU	-0.646	-1.165	-1.177	-	-
BURSA	-1.005	-1.496	-1.307	-0.966	-1.088
CANKIRI	-0.913	-1.281	-1.304	-0.894	-0.905
CORUM	-1.23	-1.039	-0.925	-	-
DENIZLI	-0.736	-1.307	-1.316	-0.873	-0.929
DIYARBAKIR	-0.776	-1.374	-1.391	-1.039	-1.115
ERZURUM	-0.873	-1.481	-1.342	-0.932	-0.935
ESKISEHIR	-1.003	-1.299	-1.37	-0.849	-1.045
GAZIANTEP	-1.09	-1.129	-1.307	-1.046	-0.864
HATAY	-1.092	-0.724	-1.031	-	-
ISTANBUL	-1.098	-1.531	-1.353	-1.095	-1.284
IZMIR	-1.055	-1.593	-1.349	-0.98	-1.313
KAYSERI	-1.019	-1.376	-1.245	-0.909	-1.011
KOCAELI	-0.927	-1.558	-1.347	-0.98	-0.9
KONYA	-1.178	-1.316	-1.354	-0.868	-1.059
KUTAHYA	-1.094	-1.155	-1.181	-	-
MALATYA	-1.029	-1.223	-1.289	-	-0.962
MARDIN	-1.032	-1.316	-1.249	-	-
MERSIN	-1.227	-0.882	-1.41	-0.999	-0.919
MUGLA	-1.036	-1.454	-1.368	-0.9	-1.45
NIGDE	-0.795	-1.21	-0.958	-	-0.605
ORDU	-1.025	-1.377	-1.36	-0.838	-0.727
OSMANIYE	-1.174	-1.227	-1.296	-0.753	-0.819
SAMSUN	-0.933	-1.496	-1.361	-0.971	-0.723
TEKIRDAG	-1.211	-1.266	-1.417	-0.888	-1.027
TRABZON	-0.772	-1.357	-1.259	-	-
USAK	-0.732	-1.464	-1.376	-	-0.913
VAN	-0.876	-1.009	-1.275	-	-0.707
YALOVA	-1.068	-1.386	-1.292	-0.763	
ZONGULDAK	-0.904	-1.457	-1.291	-0.992	-1.167

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The most elastic and inelastic own-price elasticity value for Coca Cola's product in this category is in Adana (-1.5) and Bolu (0.646), respectively. The most elastic own-price elasticity of Pepsi and Cola Turca for the product specified above are in İzmir

(-1.593 and -1.376). The most inelastic values are in Hatay for these two firms (-0.724 and -.925).

5.8. Conclusion for Chapter 5

The cola industry in Turkey has an oligopolistic structure. Coca Cola is the market leader with market shares between 61% and 75% for the period between 2000 and 2006. By 2006, the market shares of Pepsi and Cola Turca were 18% and 12 %, respectively. The rest of the market is shared by other firms and private labels.

Cola products are differentiated by calorie content and packaging. Even though firms in a market with differentiated products do not coordinate their strategic behaviors, it can be expected that they might exercise market power. Market power can be defined as the ability of pricing above marginal costs. The presence or the extent of market power can be investigated by estimating elasticities of demand for products in the relevant industry. In this chapter, the price elasticities of demand for cola products sold in Turkey have been estimated in order to measure the price-cost margins in the next chapter.

For this purpose, the *simple logit* and the *nested logit* models that were developed by Berry (1994) have been used. These models allow estimating demand parameters for large number of products with aggregate data. The methodology developed by Berry also permits using linear instrumental variable techniques in discrete-choice models in order to deal with the problems caused by endogenous regressors. On the other hand, these models impose some restrictions on the substitution patterns of consumers. The *simple logit* model is derived under the assumption of Independence of Irrelevant Alternatives, which causes cross-price elasticities of all other products being equal with respect to prices of a particular product. This restriction of the *simple logit* model is relaxed in the *nested logit* model by assuming that utilities given by some products are correlated. In this case, an a priori segmentation among products is imposed and similar products are assumed to be in the same group. This allows obtaining more flexible substitution patterns among products in such a way that cross-price elasticities of products in different groups are allowed to differ from those in the same group. On the other hand, the cross-price elasticities of products within the same group are equal with respect to prices of a particular product that is in the same nest. The level of correlation of products within the same group can also be estimated. In this chapter, cola products have been grouped into two nests according to their calorie content. In other words, diet and normal cola products have been placed in different groups.

In the empirical work in this chapter, the estimations have been run for five different shop types. Data on hourly wages and packaging characteristics of products have been used as instrumental variables.

The results showed that the signs of the estimated elasticities are as theoretically expected. The own-price elasticities obtained from the *simple logit* model are lower than one (in absolute value) for pack larger than 600 ml This may imply that suppliers may increase their profits in these products by increasing their prices. It has been found that elasticities in the *nested logit* model are larger than those obtained in the *simple logit* model. It has been estimated that the demand for cola product are more elastic in smaller packs than in large packs. In average, they range from -5.131 to -1.048 for the smallest and the largest pack (200ml to 3000 ml) respectively. The reason of this finding can be explained by the fact that the average prices of smaller packs are higher than those of larger packs. Since the elasticities are evaluated at the current price levels, the elasticities of smaller packs are expected to be higher than those of larger packs.

The results from the *nested logit* models showed that, the cross-price elasticities within the same nest are significantly larger than the cross-price elasticities of products in the other nest. This result implies that products in the same group are closer substitutes than products in other groups. The coefficient of the within nest correlation have also been estimated as between zero and one. These findings supported the idea that cola products can be grouped as assumed in this chapter for estimating a *nested logit* model.

For normal cola of the 2500 ml, which is the most frequently sold pack, Coca Cola's own-price elasticity is slightly below one in absolute value (-0.946) in chain shops and slightly above one (-1.009) in medium markets-groceries. In this pack, Pepsi has the most elastic demand elasticity values: -1.294 and -1.348 in chain shops and medium markets-groceries. The demand for other firms and Private Label products are below one in chain shops (-0.915 and -0.91). In this pack, the variance of the own-price elasticities of Coca Cola is larger than the variance of other firms. For 330 ml pack, which is the most frequently sold pack among other small-sized packs, the own-price elasticities of the three national firms are lower than -4. For this pack in average, the most elastic product is that of Cola Cola's 330 ml pack in chain shops (-4.5) and that of Pepsi in medium markets (-4.8).

In general, the demand for normal cola products is more elastic than the demand for diet products. For example, in average, the own-price elasticities of 1000 ml pack normal cola are -2.25 and -2.12 for Coca Cola and Pepsi, whereas they are -1.80 and -1.93, respectively, for the diet product in the same size.

The demand for cola products in discounter shops is more inelastic than those in chain shops and medium markets-groceries. The elasticities in these two last shop types are similar to each other in average for most of the pack sizes.

In Chapter 4, the own-price elasticity of demand for cola at market was estimated as -1.45. The elasticities that have been estimated at product level in the current chapter are larger than the market demand elasticity in general. This result shows that the two specifications in Chapter 4 and 5 for demand for cola products at different levels are consistent with each other.

The results obtained in the present chapter will be used in measuring the market power and in predicting welfare effects of a hypothetical merger in cola industry in the next chapter.

CHAPTER 6

MEASURING THE DEGREE OF MARKET POWER AND PREDICTING THE EFFECTS OF A HYPOTHETICAL MERGER IN TURKISH COLA INDUSTRY

6.1. Introduction

This chapter aims to measure the degree of market power of multi-product firms in Turkish cola industry and to predict the effects of a hypothetical merger between Pepsi and Cola Turca. The empirical work for both of these aims will make use of the demand parameters and elasticities of demand that have been estimated by the nested logit models for chain shops and medium markets-groceries in the previous chapter.

The concept of market power in Industrial Organization is defined as the ability of pricing above the competitive level. Market power can be exercised either by unilateral conduct of a single firm or coordinated behaviors of players in the market. The analysis in this chapter is restricted to measuring unilateral effects. In this chapter, first, the price-cost margins of the different products produced by the three largest cola suppliers will be calculated in order to measure the market power in this industry. One of the sources of market power is product differentiation. Cola suppliers produce and sell multiple products and differentiate their products by their taste, calorie content and packaging. In order to assess the effect of the product differentiation on the market power of a particular cola supplier, the price-cost margins calculated under different scenarios will be compared. For this, it will be assumed that normal and diet cola products of each firm are produced by independent units. Then, the price-cost margins of every product in this scenario will be compared with the price-cost margins that are obtained by assuming that both normal and diet products are produced by the same firm.

As the second empirical analysis in this chapter, the welfare effects of the hypothetical merger between Pepsi and Cola Turca will be predicted by implementing a merger simulation technique. A horizontal merger between suppliers of products that are close substitute for each other suppresses or eliminates the competitive pressure that those products have been imposing on each other before the merger. Therefore, prices are expected to rise after a horizontal merger. The magnitude of price increase depends on the market shares, the own and cross-price elasticities of merging products. After predicting the change in prices after the merger, the change in the consumer surplus will be calculated to show how the merger may affect the welfare. Finally, the percentage of the reductions in marginal costs necessary to keep prices unchanged after the merger will be calculated.

6.2. The price-cost margins

As said above, the market power in this chapter will be measured by *price-cost margin* which is also known as the Lerner Index $L = \frac{p-c}{p}$. Firms will be assumed to play a “Bertrand-game with differentiated products”. Under this assumption, if each firm produces and sells a single-product, the Lerner indices of cola products would be equal to the inverse of the own-price elasticity as the result of first-order conditions of the profit maximization for every single product:

$$L_i = \frac{p_j - c_j}{p_j} = -\frac{1}{\eta_j}. \qquad (6.1)$$

On the other hand, the equilibrium price-cost margins of multi-product firms can be calculated by solving a system of equations that is obtained from the first-order conditions of multi-product firms. An example for this is explained below for 5 imaginary firms. Firms 1, 3, 4 and 5 are single-product firms and produce products A, D, E, F. Firm 2 is a multi-product firm and produces products B and C. The profit functions and the first-order conditions of Firm1 and Firm 2 are as follows. (Those of other firms are similar to that of Firm 1).

Firm 1:

$$\pi_A = (p_A - c_A).q_A(p_A, p_{-A}) \tag{6.2}$$

$$\frac{\partial \pi_A}{\partial p_A} = q_A + (p_A - c_A)\frac{\partial q_A}{\partial p_A} = 0 \tag{6.3}$$

Firm 2:

$$\pi_{B+C} = (p_B - c_B).q_B(p_B, p_{-B}) + (p_C - c_C).q_C(p_C, p_{-C}) \tag{6.4}$$

$$\frac{\partial \pi_{B+C}}{\partial p_B} = q_B + (p_B - c_B)\frac{\partial q_B}{\partial p_B} + (p_C - c_C).\frac{\partial q_C}{\partial p_B} = 0 \tag{6.5}$$

$$\frac{\partial \pi_{B+C}}{\partial p_C} = q_C + (p_C - c_C)\frac{\partial q_C}{\partial p_C} + (p_B - c_B).\frac{\partial q_B}{\partial p_C} = 0 \tag{6.6}$$

The equations above can be re-written as follows:

$$\frac{\partial \pi_A}{\partial p_A} = s_A + m_A \eta_{AA} s_A = 0 \tag{6.7}$$

$$\frac{\partial \pi_{B+C}}{\partial p_B} = s_B + m_B \eta_{BB} s_B + m_C \eta_{CB} s_C = 0 \tag{6.8}$$

$$\frac{\partial \pi_{B+C}}{\partial p_C} = s_C + m_C \eta_{CC} s_C + m_B \eta_{BC} s_B = 0 \tag{6.9}$$

where the meanings of expressions are;

s_i : revenue market share of product i.

m_i : price-cost margin of product i.

η_{ij} : price elasticity of demand for product i with respect of price of j.

The system of equations above can be expressed in matrix notation as;

$$s + E'.diag(S).m = 0 \tag{6.10}$$

$$\begin{bmatrix} s_A \\ s_B \\ s_C \\ s_D \\ s_E \\ s_F \end{bmatrix} + \begin{bmatrix} \varepsilon_{AA} & 0 & 0 & 0 & 0 & 0 \\ 0 & \varepsilon_{BB} & \varepsilon_{CB} & 0 & 0 & 0 \\ 0 & \varepsilon_{BC} & \varepsilon_{CC} & 0 & 0 & 0 \\ 0 & 0 & 0 & \varepsilon_{DD} & 0 & 0 \\ 0 & 0 & 0 & 0 & \varepsilon_{EE} & 0 \\ 0 & 0 & 0 & 0 & 0 & \varepsilon_{FF} \end{bmatrix} . \begin{bmatrix} s_A & 0 & 0 & 0 & 0 & 0 \\ 0 & s_B & 0 & 0 & 0 & 0 \\ 0 & 0 & s_C & 0 & 0 & 0 \\ 0 & 0 & 0 & s_D & 0 & 0 \\ 0 & 0 & 0 & 0 & s_E & 0 \\ 0 & 0 & 0 & 0 & 0 & s_F \end{bmatrix} . \begin{bmatrix} m_A \\ m_B \\ m_C \\ m_D \\ m_E \\ m_F \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} \tag{6.11}$$

E' , is the transpose of the matrix of elasticities, *s* and *S* are the vector and the matrix of revenue market shares, *m* is the vector of price-cost margins. Given the revenue market shares and elasticities, the price-cost margins of every product can be calculated.

In this chapter, a subset of products of the three largest cola suppliers (Coca Cola, Pepsi and Cola Turca) has been included in calculations. For each supplier, the products in pack of 2 lt and the products whose pack size is larger than 2 lt have been grouped into one category named “2 lt +”. Only normal cola products have been chosen for the size “2 lt +”. Other product types that are taken into account are normal and diet cola products in packs of 330 ml and 1 lt. Only single-pack products have been chosen. In sum, 15 different products (five for each supplier) have been included in the calculations. Prices have been weighted by their revenue shares in every city/month in order to compute the average values. Every calculation has been done for products sold in chain shops and medium markets-groceries separately. The details of how elasticities and price-cost margins have been calculated are explained in the next subsection 6.3.1

The own-price elasticities, revenue market shares and price-cost margins that are calculated for multi-product firms are shown in the tables below.

Table 6.1. Price-cost margins in medium markets and groceries

Firm	Type	Pack	Exp. Market Share	Own-price elasticity	Price-cost margin
Coca Cola	Normal	330 ml	0.031	-4.390	0.390
Coca Cola	Normal	1 lt	0.049	-2.194	0.763
Coca Cola	Normal	2 lt +	0.454	-1.098	0.979
Coca Cola	Diet	330 ml	0.003	-4.344	0.364
Coca Cola	Diet	1 lt	0.010	-1.739	0.715
Cola Turca	Normal	330 ml	0.014	-3.814	0.307
Cola Turca	Normal	1 lt	0.018	-2.004	0.579
Cola Turca	Normal	2 lt +	0.120	-1.181	0.865
Cola Turca	Diet	330 ml	0.001	-4.561	0.255
Cola Turca	Diet	1 lt	0.004	-1.800	0.586
Pepsi	Normal	330 ml	0.031	-4.425	0.300
Pepsi	Normal	1 lt	0.034	-1.929	0.678
Pepsi	Normal	2 lt +	0.219	-1.164	0.902
Pepsi	Diet	330 ml	0.005	-4.015	0.341
Pepsi	Diet	1 lt	0.007	-1.713	0.691

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The cola market in medium markets and groceries is dominated by the “2 lt +” products of Coca Cola. Their market share is 45%. Large size products of other suppliers have also significant market shares (22% for Pepsi and %12 for Cola Turca). The demand for the large size products is relatively inelastic; the own-price elasticities of these products are slightly above one (in absolute value). Consequently, the price-cost margins of these products are very high. It is above 90% for Coca Cola and Pepsi, and 86% for Cola Turca. Price-cost margins of 1 lt diet and normal products range between 58% and 76.3%. For packs of normal 330 ml, the price-cost margins are between 30% and 39%. The price-cost margins of normal 330 ml products of Coca Cola and Cola Turca are higher than their diet counterpart by 2.5% and 5%. On the other hand, diet products in 1 lt pack of Pepsi and Cola Turca have larger price-cost margins than their normal products of the same size.

Table 6.2. Price-cost margins in chain shops

Firm	Type	Pack	Exp. Market Share	Own-price elasticity	Price-cost margin
Coca Cola	Normal	330 ml	0.025	-4.74	0.335
Coca Cola	Normal	1 lt	0.090	-2.29	0.662
Coca Cola	Normal	2 lt +	0.381	-1.19	0.925
Coca Cola	Diet	330 ml	0.002	-4.59	0.338
Coca Cola	Diet	1 lt	0.008	-2.04	0.643
Cola Turca	Normal	330 ml	0.016	-4.29	0.288
Cola Turca	Normal	1 lt	0.046	-2.00	0.601
Cola Turca	Normal	2 lt +	0.154	-1.16	0.901
Cola Turca	Diet	330 ml	0.001	-4.11	0.297
Cola Turca	Diet	1 lt	0.004	-1.90	0.592
Pepsi	Normal	330 ml	0.025	-4.49	0.280
Pepsi	Normal	1 lt	0.046	-2.18	0.564
Pepsi	Normal	2 lt +	0.197	-1.33	0.787
Pepsi	Diet	330 ml	0.002	-4.65	0.270
Pepsi	Diet	1 lt	0.005	-2.25	0.509

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The price-cost margins of products of Coca Cola and Pepsi are generally lower in chain shops than their values in medium markets. The difference is higher than 10% in 1 lt and larger packs. In chain shops, the price cost-margins of 1 lt packs are between 50 % and 66%. For normal cola items in 330 ml pack, the price-cost margins are between 27% and 33.5%. In chain shops, the price-cost margins of normal 330 ml products are close to those of their diet counterpart. For products in 1 lt pack, the difference in price-cost margins between diet and normal cola is small for Pepsi and Coca Cola. On the other hand, the price-cost margin of the 1 lt diet product of Cola Turca is larger than that of its normal product of the same size by 5.5%. In chain shops, the price-cost margin of the large size products of Coca Cola is 92.5% and it is lower than its value in medium markets-groceries by 5.4 %. Similarly, for Pepsi the margin of the large size product is 78.7% in chain shops and it is significantly lower than its value in medium markets (90.2%). On the other hand, for

Cola Turca the price-cost margin of this size is higher in chain shops (90.1%) compared to its value in medium markets (86.5 %).

In order to see how differentiating products by their calorie content affects the market power of a particular firm, the price-cost margins summarized above will be compared with price-cost margins that are calculated by assuming that normal and diet products are produced by independent units. This amounts to assuming that there are six independent production units rather than three suppliers. The production units which produce diet products are assumed not to produce normal cola and vice versa. Each production unit is assumed to maximize its profits in Bertrand-price competition with differentiated products. The pack sizes of products are the same as they are in the case of three suppliers. The comparison of price-cost margins is shown in Table 6.3.

Table 6.3. Contribution of the product differentiation by calorie content to the market power

			Medium markets-Groceries PCM			Chain Shops PCM		
Firm	Type	Pack	Multi prod.	Normal or Diet	Change in PCM (%)	Multi prod.	Normal or Diet	Change in PCM (%)
Coca Cola	Normal	330 ml	0.390	0.389	0.3	0.335	0.334	0.4
Coca Cola	Normal	1 lt	0.763	0.761	0.3	0.662	0.660	0.4
Coca Cola	Normal	2 lt +	0.979	0.976	0.3	0.925	0.921	0.4
Coca Cola	Diet	330 ml	0.364	0.308	18.1	0.338	0.265	27.4
Coca Cola	Diet	1 lt	0.715	0.606	18.1	0.643	0.505	27.4
Cola Turca	Normal	330 ml	0.307	0.306	0.1	0.288	0.288	0.1
Cola Turca	Normal	1 lt	0.579	0.578	0.1	0.601	0.600	0.2
Cola Turca	Normal	2 lt +	0.865	0.865	0.1	0.901	0.899	0.2
Cola Turca	Diet	330 ml	0.255	0.244	4.3	0.297	0.267	11.1
Cola Turca	Diet	1 lt	0.586	0.561	4.3	0.592	0.533	11.1
Pepsi	Normal	330 ml	0.300	0.299	0.3	0.280	0.280	0.2
Pepsi	Normal	1 lt	0.678	0.676	0.3	0.564	0.563	0.2
Pepsi	Normal	2 lt +	0.902	0.900	0.2	0.787	0.785	0.2
Pepsi	Diet	330 ml	0.341	0.315	8.4	0.270	0.241	12.2
Pepsi	Diet	1 lt	0.691	0.637	8.4	0.509	0.454	12.2

Author's own calculations using Ipsos/KGM and TURKSTAT data.

According to Table 6.3, in medium markets-groceries, the price-cost margins of normal cola producers increase by 0.1%-0.3% when these producers decide to produce also diet products. In chain shops, the contribution of diet products to the price-cost margins of normal cola producers is between 0.1% and 0.4%. On the other hand, the increase in price-cost margins of diet cola producers is more significant. For example, if the diet cola producer of Coca Cola decides to produce normal cola along with its diet products, the price-cost margins of its diet products increase by 18% in medium markets. For a similar decision, the increase in the price-cost margins of Pepsi and Cola Turca's diet cola production units is 8.4 % and 4.3 %, respectively. The contributions of normal cola products to the price-cost margins of diet cola producers are even more significant in chain shops. For example, if diet cola producer of Coca Cola adds normal cola products to its portfolio, then the price-cost margins of its diet products increase by 27.4%. The same decision will increase the price-cost margins of diet products of Pepsi and Cola Turca by 12.2 % and 11.1%.

6.3. Merger Simulation

6.3.1. The technique and the scope of the merger simulation

In this section a merger simulation will be implemented in order to predict the change in prices after a hypothetical merger between Pepsi and Cola Turca. The unilateral effects of a merger can be predicted by solving the system of equations that is composed of the first-order conditions of the merging and non-merging firms in the market. The profit functions and the first-order conditions of the merged firm will be different from their structure before the merger. The simple example given for the five imaginary firms above, can be developed for a merger case as follows: If Firm1 merges with Firm 2; the elements of the elasticity matrix will take the form shown in equation (6.12) below. The parameters with the sign (^) show the post-merger values of the relevant variable. In maximizing its total profit, the merged firm will take into account all the cross-price elasticities among its products.

$$\begin{bmatrix} \hat{s}_A \\ \hat{s}_B \\ \hat{s}_C \\ \hat{s}_D \\ \hat{s}_E \\ \hat{s}_F \end{bmatrix} + \begin{bmatrix} \hat{\varepsilon}_{AA} & \hat{\varepsilon}_{BA} & \hat{\varepsilon}_{CA} & 0 & 0 & 0 \\ \hat{\varepsilon}_{AB} & \hat{\varepsilon}_{BB} & \hat{\varepsilon}_{CB} & 0 & 0 & 0 \\ \hat{\varepsilon}_{AC} & \hat{\varepsilon}_{BC} & \hat{\varepsilon}_{CC} & 0 & 0 & 0 \\ 0 & 0 & 0 & \hat{\varepsilon}_{DD} & 0 & 0 \\ 0 & 0 & 0 & 0 & \hat{\varepsilon}_{EE} & 0 \\ 0 & 0 & 0 & 0 & 0 & \hat{\varepsilon}_{FF} \end{bmatrix} \cdot \begin{bmatrix} \hat{s}_A & 0 & 0 & 0 & 0 & 0 \\ 0 & \hat{s}_B & 0 & 0 & 0 & 0 \\ 0 & 0 & \hat{s}_C & 0 & 0 & 0 \\ 0 & 0 & 0 & \hat{s}_D & 0 & 0 \\ 0 & 0 & 0 & 0 & \hat{s}_E & 0 \\ 0 & 0 & 0 & 0 & 0 & \hat{s}_F \end{bmatrix} \cdot \begin{bmatrix} \hat{m}_A \\ \hat{m}_B \\ \hat{m}_C \\ \hat{m}_D \\ \hat{m}_E \\ \hat{m}_F \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} \quad (6.12)$$

This situation will provide the merged firm an additional ability to raise its prices since the merger eliminates the competitive pressure among rival products.

The system of equation can be solved for the price-cost margins or for the prices by using non-linear solution techniques. For this purpose, the "fsolve" function of Matlab has been used. The steps that have been followed in solving for the post-merger equilibrium are as follows:

1) Firms are assumed to compete in prices with differentiated products,
2) The value of $\hat{\xi}_{jct}$ is calculated using the estimated demand parameters of the nested logit model

$$\ln s_{jcst} - \ln s_{ocst} = -\alpha p_{jcst} + \sigma \ln s_{j/g} + \xi_{jcst} \quad (5.23),$$

$$\xi_{jcst} = demog_{ct}\gamma + F\varphi + product_j + city_c + month_m + u_{jcst} \quad (5.12),$$

given the pre-merger prices, the within nest market shares and the predicted dependent variable $\hat{y}$, where $y = (\ln s_{jcst} - \ln s_{ocst})$,

3) The weighted averages of $\hat{\xi}_{jct}$ and of p_{jct} in a region ($\hat{\xi}_{jr}$ and p_{jr}) are calculated using the expenditure on product j in a given city/month pair for every geographic region separately,
4) The mean utility level of every product in region *r* is calculated using $\hat{\delta}_{jr} = -\hat{\alpha} p_{jr} + \hat{\xi}_{jr}$,

5) $\hat{\xi}_{jr}$, which is the value of the other components of the mean utility except the price, is assumed not to be affected by the merger,

6) The (volume) market share, s_{jr}, and the within-nest market share, $s_{(j/g)r}$, of every product in region *r* are predicted using the predicted average mean utility levels found in step 4,

7) The own-price and cross-price elasticities are calculated using the estimated demand parameters, average prices and predicted (volume) market shares calculated in step 6,

8) Revenue market shares are computed using the predicted volume market shares and prices,

9) Given the predicted elasticities and predicted market shares, the pre-merger price-cost margins are computed by solving the first-order conditions of multi-product firms as shown by matrices in (6.11),

10) Post-merger elasticity matrix is constructed as shown in equation (6.12),

11) The entries of the post-merger elasticity matrix are defined as the functions of post-merger mean utility levels and market shares, holding the demand parameters constant. This results in a non-linear system of equation since the market shares are non-linear functions of mean utility levels,

12) Initial values of the post-merger price-cost margins are calculated by solving the post-merger system of equations shown in (6.12) at pre-merger levels of elasticities and market shares,

13) Holding marginal costs constant, initial post-merger prices are computed using the pre-merger price-cost margins (found in step 9) and the initial post-merger price-cost margins found in step 12,

14) New mean utility levels, market shares and elasticities are computed using new prices in step 13 and $\hat{\xi}_{jr}$ (weighted average) in step 3,

15) The new post-merger system of non-linear equations in step 10 is solved iteratively for newer price-cost margins until a convergence for prices is reached. The tolerance level for convergence is taken as 0.000001.

The effects of the merger between Pepsi and Cola Turca have been simulated for seven different geographical regions of Turkey separately. Only transactions in medium markets-groceries and chain shops in year 2005 are taken into account in order to lessen the problems of aggregation. The set of products that are included in the merger simulation is same as in section 6.2 above. In the full set of products, there are 15 different products. However, in some regions some of the products are not sold. In these cases, they are excluded from simulations.

In some regions for some products, the pre-merger price-cost margins have been predicted as being higher than one. The reason of this unexpected result is the fact that the estimated own-price elasticities for those products are not sufficiently elastic. In most of the cases, the estimated values of the own-price elasticities for those products are below 1 (in absolute value). In order to obtain price-cost margins that are between zero and one, those own-price elasticities have been corrected by replacing their values with slightly larger elasticity values. For this correction the following approach has been used. First, the inelastic elasticities have been replaced by elasticities that are calculated using the *market shares in data* rather than elasticities that are calculated using the *predicted market shares* in step 6 above. In cases where this replacement still yielded unreasonable price-cost margins, then a search procedure has been implemented in order to find a particular value of the own-price elasticity that yields a price-cost margin between zero and one. The value of the own-price elasticity has been lowered by 0.05 in each step of the search procedure until a reasonable price-cost margin is reached. A list of the corrected elasticities is shown in Appendix G.

6.3.2. Results of the merger simulation

In this subsection, the results of the simulation that computes the effects of the merger between Pepsi and Cola Turca will be presented. First, the effects of the merger on prices will be presented. Then, the evolution of market shares will be mentioned. After this, the change in the consumer surplus will be calculated. Finally, the percentage of the reduction in marginal cost that is necessary to keep consumer surplus unchanged after the merger will be computed.

For presentation purposes, only results for Marmara region are shown in the text below. Results for other regions can be seen in Appendix G. The revenue market shares, the own-price elasticities and the prices of the products before and after the merger are presented in Table 6.4 and Table 6.5 below. In addition, the differences between prices of cola suppliers before and after the merger are shown in Table 6.6 and 6.7.

The prices of products of the merging parties increase after the merger as expected from a horizontal merger in an oligopolistic market. Coca Cola, which is not a party to merger, increases also its prices. The highest rate of increase in prices is observed for the large size (2 lt +) normal cola products. According to Table 6.4, in the chain markets in Marmara region, the prices of Pepsi and of Cola Turca for this product increase by 16.9% and by 19.2%, respectively. The change of the price of Cola Turca in medium markets is even higher (38%). Coca Cola's price in this pack increases also significantly by 19.5% in both types of shops.

Table 6.4. Results of merger simulation in Marmara Region (chain shops in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		Price-Cost Margin		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.044	0.045	-4.339	-4.413	0.369	0.381	0.620	0.632	1.9
Coca Cola	Normal	1 lt	0.085	0.090	-2.004	-2.067	0.767	0.776	0.298	0.310	4.0
Coca Cola	Normal	2 lt +	0.398	0.396	-1.150	-1.169	0.975	0.979	0.206	0.246	19.5
Coca Cola	Diet	330 ml	0.020	0.020	-3.735	-3.778	0.397	0.407	0.556	0.565	1.7
Coca Cola	Diet	1 lt	0.032	0.033	-1.799	-1.823	0.736	0.744	0.299	0.309	3.1
Cola Turca	Normal	330 ml	0.023	0.021	-4.024	-4.264	0.289	0.329	0.572	0.606	5.9
Cola Turca	Normal	1 lt	0.027	0.027	-1.976	-2.214	0.582	0.627	0.284	0.318	12.0
Cola Turca	Normal	2 lt +	0.114	0.118	-1.110	-1.327	0.932	0.943	0.177	0.211	19.2
Cola Turca	Diet	330 ml	0.014	0.012	-3.933	-4.251	0.286	0.336	0.575	0.619	7.5
Cola Turca	Diet	1 lt	0.010	0.009	-1.934	-2.242	0.573	0.629	0.288	0.331	15.1
Pepsi	Normal	330 ml	0.050	0.046	-4.047	-4.276	0.287	0.325	0.580	0.613	5.6
Pepsi	Normal	1 lt	0.034	0.033	-1.937	-2.164	0.596	0.638	0.280	0.312	11.7
Pepsi	Normal	2 lt +	0.114	0.117	-1.225	-1.434	0.861	0.881	0.194	0.226	16.9
Pepsi	Diet	330 ml	0.008	0.007	-4.455	-4.669	0.278	0.310	0.640	0.671	4.7
Pepsi	Diet	1 lt	0.026	0.025	-1.713	-1.913	0.637	0.673	0.279	0.309	10.8

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 6.5. Results of merger simulation in Marmara Region (medium markets-groceries in 2005)

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		Price-Cost Margin		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.029	0.030	-4.443	-4.565	0.386	0.403	0.669	0.689	2.9
Coca Cola	Normal	1 lt	0.054	0.057	-2.228	-2.340	0.751	0.764	0.344	0.364	5.7
Coca Cola	Normal	2 lt +	0.461	0.460	-1.100	-1.116	0.981	0.984	0.236	0.283	19.5
Coca Cola	Diet	330 ml	0.003	0.003	-4.125	-4.214	0.415	0.429	0.644	0.660	2.5
Coca Cola	Diet	1 lt	0.012	0.012	-1.660	-1.683	0.755	0.766	0.354	0.370	4.5
Cola Turca	Normal	330 ml	0.018	0.014	-3.725	-4.240	0.298	0.383	0.560	0.636	13.7
Cola Turca	Normal	1 lt	0.014	0.012	-2.016	-2.530	0.549	0.640	0.304	0.381	25.2
Cola Turca	Normal	2 lt +	0.083	0.078	-1.230	-1.732	0.829	0.876	0.202	0.278	38.0
Cola Turca	Diet	1 lt	0.003	0.002	-1.760	-2.259	0.584	0.668	0.286	0.358	25.3
Pepsi	Normal	330 ml	0.024	0.022	-4.377	-4.603	0.318	0.352	0.658	0.693	5.2
Pepsi	Normal	1 lt	0.018	0.018	-2.048	-2.273	0.677	0.709	0.309	0.344	11.1
Pepsi	Normal	2 lt +	0.272	0.283	-1.085	-1.229	0.949	0.956	0.221	0.255	15.5
Pepsi	Diet	330 ml	0.003	0.003	-4.359	-4.537	0.312	0.339	0.679	0.706	4.0
Pepsi	Diet	1 lt	0.007	0.007	-1.798	-1.952	0.643	0.670	0.330	0.357	8.3

Author's own calculations using Ipsos/KGM and TURKSTAT data.

The effect of the merger can also be understood by analyzing the differences in price levels as shown in Table 6.6 and Table 6.7. In the pre-merger situation, the price of Coca Cola for large size cola product is higher than that of Cola Turca by 0.028 TL and higher than that of Pepsi by 0.012 TL in chain shops. After the merger, despite merging parties increase their prices, this difference widens and becomes 0.034TL for Cola Turca and 0.020 TL for Pepsi. The reason of this is the fact that Coca Cola also increases its price significantly after the merger. In medium markets, before and after the merger the price differential is still positive in favor of Coca Cola, however, the price of Cola Turca becomes very close to that of Coca Cola after the merger.

Table 6.6. Price differential between Coca Cola and merging firms before and after the merger (chain shops)

		Coca Cola v. Cola Turca		Coca Cola v. Pepsi	
		Pre-merger	Post-merger	Pre-merger	Post-merger
Normal	330 ml	0.048	0.026	0.040	0.019
Normal	1 lt	0.014	-0.008	0.019	-0.002
Normal	2 lt +	0.028	0.034	0.012	0.020
Diet	330 ml	-0.020	-0.054	-0.085	-0.105
Diet	1 lt	0.012	-0.022	0.020	-0.001

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 6.7. Price differential between Coca Cola and merging firms before and after the merger (medium markets-groceries)

		Coca Cola v. Cola Turca		Coca Cola v. Pepsi	
		Pre-merger	Post-merger	Pre-merger	Post-merger
Normal	330 ml	0.110	0.052	0.011	-0.004
Normal	1 lt	0.040	-0.017	0.035	0.020
Normal	2 lt +	0.035	0.004	0.016	0.028
Diet	330 ml			-0.035	-0.047
Diet	1 lt	0.068	0.012	0.024	0.013

Author's own calculations using Ipsos/KGM and TURKSTAT data.

For normal cola products in 330 ml pack., in chain shops, the merging parties increase their prices by 5.6% (Pepsi) and 5.9% (Cola Turca). As a response to this increase, Coca Cola increase its price only by 1.9%. Again, the price of Coca Cola remains higher than those of Pepsi and Cola Turca after the merger. This situation is the inverse in case of diet cola products of the same size. The prices of the merging parties in this product are higher than that of Coca Cola and the merger enforces this difference in favor of merging parties. After the merger, the price of diet 330 ml product of Pepsi increase by 4.7% and becomes higher than that of Coca Cola by 0.105 TL in chain shops. The price of Cola Turca increases by 7.5 % and widens the gap between the price of Coca Cola from 0.02 TL to 0.54 TL.

In chain shops, for the normal 1 lt packs, the prices of the merging parties are lower than that of Coca Cola before the merger and they become higher than it after the merger. In chain shops, for the normal 1 lt pack, the prices of Pepsi and of Cola Turca increase by 11.7% and 12%, while the price of Coca Cola increases only by 4%. In medium markets, a similar situation has been observed in the relation between prices of Cola Turca and Coca Cola. However, Coca Cola's price for this pack is higher than that of Pepsi before and after the merger.

For 1 lt diet products, the price of Coca Cola is higher before the merger in both types of shops. The difference between the price Coca Cola and those of merging parties becomes smaller after the merger in medium markets, but still the price of Coca Cola remains higher. On the contrary, the prices of the merging parties become higher than that of Coca Cola in chain shops after the merger. In chain shops for diet 1 lt product, the prices of Pepsi and Cola Turca increase by 10.8% and 15.1 %, whereas the price of Coca Cola increases only by 3.1% after the merger.

A general rate of change in cola prices has been calculated by weighting the rates of increase of every product by their expenditure shares. It is shown in Table 6.8 for each geographic region of Turkey separately. In addition, a weighted average for Turkey has also been calculated. The second column in Table 6.8 shows the average of the rate of increase of the prices of the merging parties. By adding the changes in prices of Coca Cola, the weighted average of the rate of increase in the market prices has been obtained and presented in the third column of Table 6.8.

Table 6.8. Rates of increase in prices after the merger between Pepsi and Cola Turca

	Chain shops		Medium markets-groceries	
	Avg. Price Increase (%)		Avg. Price Increase (%)	
Regions	Merging parties	Market	Merging parties	Market
Marmara	14.11	14.16	18.86	17.71
Aegean	14.87	15.89	17.80	21.98
Central Anatolia	17.08	15.78	20.89	22.64
Black Sea	20.53	23.82	14.81	9.09
Mediterranean	17.92	18.83	23.60	28.00
Eastern Anatolia	40.81	29.02	39.76	28.74
Southeastern Anatolia	11.09	22.86	23.88	26.98
Turkey (Regions' avg.)	15.64	16.21	21.02	21.79

Author's own calculations using Ipsos/KGM and TURKSTAT data.

According to Table 6.8, in Marmara region, the prices of the merging parties increase by 14.11% in average in chain shops. The rate of increase in the market is similar. the rate of increase is 18.86 % for the merging parties in medium markets. The highest rate of increase in prices of the merging parties is seen in Eastern Anatolia region (40.8%). In this region, the total of the market shares of the merging parties (%55-%67) is higher than the share of Coca Cola. As the average of Turkey, the merging parties increase their prices by 15.64 % and 21.02% in chain shops and medium markets, respectively. After the merger, the general market price in medium markets increases by 21.79 % in average in Turkey.

Ivaldi and Verboven (2004, 677) reports the formula that can be used to compute the consumer surplus (CS) using the estimated parameters of the nested logit model as follows:

$$CS = \frac{1}{\alpha} \ln\left(1 + \sum_{g=1}^{G} D_g^{1-\sigma}\right) \tag{6.13}$$

The meanings of the parameters in the formula above are same as given in equations (5.13)-(5.23) in Chapter 5. The levels of the consumer surplus have been calculated using the demand parameters estimated in Chapter 5 and the prices calculated in the current chapter for the pre- and post-merger situations. The change in consumer surplus before and after the merger is presented in Table 6.9 below:

Table 6.9. Consumer surplus before and after the merger

	Chain shops			Medium markets-groceries		
	Consumer Surplus		Change in CS (%)	Consumer Surplus		Change in CS (%)
	Pre-merger	Post-merger		Pre-merger	Post-merger	
Marmara	0.276	0.264	-4.17	0.531	0.513	-3.39
Aegean	0.281	0.268	-4.59	0.555	0.529	-4.54
Central Anatolia	0.296	0.281	-4.77	0.526	0.503	-4.34
Black Sea	0.426	0.391	-8.25	0.541	0.515	-4.95
Mediterranean	0.346	0.323	-6.48	0.617	0.582	-5.72
Eastern Anatolia	0.430	0.390	-9.21	0.547	0.519	-5.24
Southeastern Anatolia	0.341	0.315	-7.65	0.608	0.575	-5.49
Turkey (Regions' avg.)	0.297	0.282	-4.97	0.559	0.534	-4.46

Author's own calculations using Ipsos/KGM and TURKSTAT data.

After the merger, the fall in the consumer surplus in Marmara, Aegean and Central Anatolian regions is between 3.39% and 4.77% in both shop types. In medium markets in other regions the consumer surplus falls in a range between 5%-6%. In chain shops, the largest fall in consumer surplus is in Eastern Anatolian region (9.21%). As an average over all regions, the consumer surplus decreases by 4.97 % and 4.46% in chain shops and medium markets after the merger.

The aggregate revenue market shares of the cola suppliers are shown in Table 6.10.

Table 6.10. Revenue market shares before and after the merger (chain shops)

	Coca Cola		Cola Turca		Pepsi	
	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger
Marmara	0.579	0.584	0.189	0.187	0.232	0.229
Aegean	0.646	0.642	0.156	0.159	0.185	0.187
Central Anatolia	0.572	0.577	0.217	0.215	0.211	0.208
Black Sea	0.630	0.618	0.149	0.145	0.222	0.237
Mediterranean	0.591	0.592	0.201	0.199	0.208	0.209
Eastern Anatolia	0.441	0.471	0.294	0.273	0.265	0.256
Southeastern Anatolia	0.725	0.703	0.105	0.115	0.170	0.182

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 6.11. Sum of the revenue market shares of the merging parties before and after the merger

	Cola Turca+Pepsi	
	Pre-merger	Post-merger
Marmara	0.421	0.415
Aegean	0.341	0.346
Central Anatolia	0.428	0.423
Black Sea	0.370	0.382
Mediterranean	0.409	0.408
Eastern Anatolia	0.559	0.529
Southeastern Anatolia	0.275	0.297
Art. avg. over regions	0.40	0.40

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table 6.12. Percentage change in revenue market shares before and after the merger

	Coca Cola	Cola Turca	Pepsi
Marmara	0.5	-0.2	-0.4
Aegean	-0.4	0.3	0.2
Central	0.5	-0.2	-0.3
Black Sea	-1.1	-0.3	1.5
Mediterranean	0.8	-0.2	0.1
Eastern	2.9	-2.1	-0.9
Southeastern	-2.2	1.0	1.2

Author's own calculations using Ipsos/KGM and TURKSTAT data.

From Table 6.10 - 6.12 it is seen that in Marmara, Central Anatolia and Eastern Anatolia, the shares of both Pepsi and Cola Turca fall slightly below their pre-merger level. The rate of increase in the revenue market shares of the merging parties is most

1.5% for Pepsi in Black Sea region and 1% for Cola Turca in Southeastern region. In overall, it can be concluded that the revenue market shares of the merging parties does not change significantly after the merger.

A final analysis on the hypothetical merger between Pepsi and Cola Turca is related to the concept known as “efficiency defense”. When a merger is suspected to increase the prices in the market and to decrease the consumer surplus significantly, merging parties sometimes argue that the merger will create efficiencies and ask competition authority to assess these efficiencies in deciding on the merger. If efficiencies generated by the merger are likely to enhance the ability and incentive of the new entity to act pro-competitively for the benefit of consumers, the possibility that the merger can be cleared increases. Efficiencies in the form of marginal cost reductions may reduce the merged firm's incentive to elevate price. However, competition authority requires merging parties to quantify or justify the efficiencies that will be generated by the merger.

Regarding the hypothetical merger between Pepsi and Cola Turca that is analyzed in this chapter, the rates of the reduction in marginal costs have been calculated by assuming that any price increase is not allowed. In this case, the post-merger levels of marginal costs for each product have been calculated by using the post-merger price-cost margins and pre-merger prices.

$$c^{post} = p^{pre}(1 - m^{post}) \tag{6.14}$$

Then, the ratios between the pre-merger marginal cost and post-merger marginal cost have been calculated for every product. These ratios have been weighted by the revenue market shares of the relevant products of Pepsi and Cola Turca in order to obtain the weighted average cost reduction ratio for merging parties. This calculation is done for each geographic region and shop types separately. Finally, the reduction rates at region level have been weighted by the total cola expenditure shares of regions (in a particular shop type) in order to calculate the reduction rate for Turkey.

The rates of reductions in marginal costs are shown in tables below:,

Table 6.13. Reduction rates (%) in marginal costs required for unchanged consumer surplus after the merger

	Reduction in marginal cost (%)		Region's Cola Expenditure Share	
	Chain shops	Medium markets-groceries	Chain shops	Medium markets-groceries
Marmara	-12.19	-15.38	0.353	0.377
Aegean	-12.56	-14.84	0.261	0.100
Central Anatolia	-14.43	-17.09	0.175	0.132
Black Sea	-16.76	-12.82	0.015	0.049
Mediterranean	-14.96	-18.89	0.147	0.187
Eastern Anatolia	-28.58	-28.03	0.010	0.033
Southeastern Anatolia	-9.49	-19.11	0.038	0.123
Turkey (Regions' avg.)	-13.22	-16.96		

Author's own calculations using Ipsos/KGM and TURKSTAT data.

According to the table above, under the constraint that the prices are not allowed to increase after the merger, Pepsi and Cola Turca need to reduce their marginal cost in average by 13.22 % and 16.96 % in chain shops and medium markets, respectively, for reaching the same levels of price-cost margin that could be obtained in an unconstrained situation after the merger. If the marginal cost can be reduced by the rates given above as the result of the synergy created by the merger, the merging firms will have no incentive to raise their prices after the merger and the consumer surplus will not decrease.

6.4. Conclusion for Chapter 6

This chapter consists of two empirical studies that make use of the findings of Chapter 5. In the first empirical work, the concept of *price-cost margin* has been used in measuring the market power of cola products in Turkish market. In the second empirical study, the effects of a hypothetical merger between Pepsi and Cola Turca have been predicted by using a merger simulation technique.

The same data that has been used in Chapter 5 has been employed in this chapter. The analyses in this chapter are restricted to the products of the three largest cola suppliers; Coca Cola, Pepsi and Cola Turca. The set of products that has been considered included diet and normal cola products in packs of 330 ml and 1 lt, and normal cola products with pack size of 2 lt or larger. Only sales in chain shops and medium markets-groceries have been taken into account. In calculating the price-cost margins in the first subsection, the whole sample period (2000-2006) has been used. On the other hand, in simulating the effects of the merger only data in 2005 has been employed. Cola suppliers have been assumed to compete in prices in a Bertrand type game with differentiated products.

In calculating the price-cost margins, the first-order conditions of the multi-product suppliers have been solved. In solving these conditions, the predicted price elasticities of demand and predicted revenue market shares of each product have been used as inputs. For calculating the demand elasticities, the market shares that are predicted by the nested logit model in Chapter 5 have been used instead of market shares observed in the original data. In addition, average prices and other estimated demand parameters have been employed in calculating the demand elasticities. The calculations showed that the price-cost margins of products of Coca Cola and Pepsi are generally lower in chain shops than their values in medium markets. In chain shops, the price cost-margins of 1 lt packs are between 50 % and 66%. For normal cola items in 330 ml pack, the price-cost margins are between 27% and 33.5%. In chain shops, the price-cost margins of normal and diet products in 330 ml pack are similar. In chain shops, the price-cost margin of the large size products of Coca Cola and Pepsi are 92.5% and 78.7% respectively. These are lower than their values in medium markets-groceries. On the other hand, for Cola Turca the price-cost margin of large size products is higher in chain shops (90.1%) compared to its value in medium markets (86.5 %).

In order to see how differentiating products by their calorie content affects the market power of a particular firm, the price-cost margins have been re-calculated by assuming that normal and diet products are produced by independent units. It has been calculated that the price-cost margins of normal cola producers increase by 0.1%-0.4% when these producers decide to produce also diet products. On the other hand, if the diet cola producers decide to produce normal cola along with its diet products, the price-cost margins of its diet products increase in the range between 4.3% and 27.4% depending on the producer and shop type. For example, if diet cola producer of Coca Cola adds normal cola products to its portfolio, then the price-cost margins of its diet products increase by 27.4%. The same decision increases the price-cost margins of diet products of Pepsi and Cola Turca by 12.2 % and 11.1%.

The potential effects of the hypothetical merger between Pepsi and Cola Turca have been predicted by implementing a merger simulation for seven geographic regions of Turkey and for sales in chain shops and medium markets. For this, the first-order conditions of the post-merger market structure in each market have been solved for post-merger prices. The results of the merger simulation showed that, prices of the merging parties will increase in average by 15.64 % in chain shops and by 21.02 % in medium markets. Coca Cola will also increase its prices. As the result, the market price will increase in average by 16.64 % in chain shops and 21.79% in medium markets. This will cause consumer surplus to decrease by 4.97 % and 4.46 % in chain shops and medium markets, respectively. The revenue market shares of the merging parties will not change significantly in average after the merger.

The final analysis of the chapter focuses on the concept of “efficiency defense”. The merging parties can be expected not to have incentives to raise prices after the merger only if the merger generates efficiencies. Therefore, in case the competition authority does not tolerate any price increase after the merger, it has been calculated that the merging firms need to show that their marginal costs will be reduced by 13.22 % in chain shops and 16.98 % in medium markets after the merger. Only in these conditions, they will obtain the same levels of price-cost margin that they could obtain if the merger was unconditionally allowed.

CHAPTER 7

CONCLUSION

Competition law and policy is related to economics from many aspects. This dissertation aimed to contribute to the field of economics of competition policy by analyzing the demand structure and the market power in the Turkish beverage industry and in the cola market in particular. In the first empirical part of the dissertation, a demand structure for the beverage products has been estimated by using a multi-stage linearized Almost Ideal Demand System (AIDS). Then, as the second econometric work, the demand elasticities of cola products at brand and package level have been estimated by the simple and nested logit models. Finally, the estimated demand elasticities of cola products have been used in measuring the degree of market power and in predicting the effects of a hypothetical merger between cola suppliers by using a merger simulation technique.

Household Consumption Panel Database of *Ipsos/KMG Turkey* has been used in all empirical parts of the dissertation. This data is at household level and consists of information on the expenditures on fast-moving consumer goods of households participated in the panel. Participants report the price, quantity, brand, package and type of the product that they have purchased. In addition, data includes information on the demographics of participants such as age, socio-economic status, household size and location. It covers the period between January 2000 and May 2006. The number of households and cities included in the data increase each year and by 2006 it includes information on more than 6000 households living in 34 cities of Turkey. There is also information on the shop types in which the relevant product has been sold. Although the original data is at household level, it has been aggregated over consumers to be used in the econometric models estimated in the dissertation. The aggregation was necessary to overcome the problem of unobserved prices for some observation points. Data on input costs supplied by TURKSTAT have also been used as instrumental variables.

The choice of the cola market as the focus of the dissertation has been motivated by two facts. The first is the fact that the cola market has an oligopolistic structure. Since competition law and policy generally deals with conducts of firms operating in imperfectly competitive markets, the cola market has been considered as a suitable choice for the aim of the dissertation. The second motivation has been related to the discussions between the leader cola supplier and the Turkish Competition Authority on the boundaries of the relevant market related to cola and other commercial beverages. The relevant market definition is one of the important preliminary steps in any sophisticated analysis of market power. The relevant market definition for homogenous products is relatively easier compared to differentiated products. However, beverage products are highly differentiated and the analysis of differentiated products in defining the relevant market necessitates taking into account the properties of the demand-side. The demand is affected by the different product characteristics. Although the Turkish Competition Authority used some empirical methods in defining the relevant market related to beverage products, these methods did not take into account the demand-side properties of the market. In this dissertation, the state-of-the-art methodology known as SSNIP[15]-test has been applied in defining the relevant market related to cola products.

The SSNIP-test takes into account the properties of demand structure and patterns of substitution between alternative products. Therefore, a proper implementation of the SSNIP-test necessitates having information on the demand elasticities of the products included in the analysis. For this purpose, in this dissertation a demand system for beverage products has been specified and estimated using the linearized version of the AIDS model. In the basic specification of the AIDS model, the expenditure share of a particular product in the budget of a household is regressed on the log of prices of the products and on the total expenditure of the household deflated by a particular price index. The AIDS model has several advantages compared to other demand

[15] SSNIP: Small but Significant Non-transitory Increase in Prices

models like Rotterdam model and translog model (Deaton and Muellbauer, 1980:312). First, the AIDS model is derived from a particular cost function that can be regarded as a local second-order approximation to the underlying cost function. Second, the equations to be estimated contain sufficient parameters to be considered as a local first-order approximation to any demand system.

Another advantage of the AIDS model is that it allows aggregation over consumers. In addition, it allows imposing and testing theoretical restrictions of homogeneity and symmetry. On the other hand, the theoretical restriction of concavity of cost function cannot be directly restated into a condition on the matrix of the coefficients of the model (Erdil, 2003:37). Another disadvantage is that the original AIDS model must be estimated using non-linear estimation techniques. This problem has been overcome in literature by replacing the original price index that deflates the total expenditure variable by the Stone price index that is constructed prior to estimation. In this way, the model can be estimated by linear estimation methods. However, Buse (1994: 783) shows that the use of any Stone-like index to linearize the AIDS model yields inconsistent estimates. On the other hand, Buse and Chan (2000) shows that the bias caused by linearization is lessened if the Tornqvist price index is used instead of the Stone index. Depending on this result, in this dissertation the Tornqvist price index has been used in estimating the linear AIDS model. The Tornqvist index is also used in constructing the price indices of every product for which the demand parameters have been estimated.

In the dissertation, a system-wide approach has been preferred in estimating the demand for beverage products in order to take into account the correlation between the error terms of each demand equation and to obtain more efficient estimates.

One disadvantage of the AIDS-like models is that they do not allow including large number of products in the model because of the problem of the degrees-of-freedom. Therefore, in this dissertation a two-stage budgeting approach has been adopted in order to diminish the number of parameters to be estimated. In the first stage of the demand system, the demand for the aggregate expenditure groups, such as food, beverages, cleaning products, personal care products has been placed. In the second stage of the demand system, the expenditure shares of the product groups in the beverage category have been estimated. The second-stage products consisted of cola, flavored carbonated soft drinks (CSD), clear CSD, fruit juices, mineral water, bottled water, tea, instant coffee, Turkish coffee, beer and rakı. The equations both in the first-stage and the second-stage have been estimated simultaneously in the same system.

The sample used for the estimation of this demand system covered the observations in 12 big cities of Turkey and the period May 2000 and May 2006. The estimation has been done by the three-stage least squares (3SLS) method to address the endogeneity of the price indices and of the total expenditure variables. The 3SLS method allows using instrumental variables in the estimation of a system of equations. The instrumental variables have been tested for their relevance and validity. The tests did not reject the relevance and the validity of the instruments. The restrictions of homogeneity and symmetry have been tested equation-by equation. Only 12 of the 65 restrictions have been rejected. Then, the restrictions have been also tested by using the likelihood ratio (LR) test which compared the restricted model versus the unrestricted model. The LR test did not reject the restrictions. Since no formula of elasticity that takes into account the Tornqvist index in the AIDS model could be found in the demand literature, a particular formula to be used in calculating the price elasticities of demand has been derived by the author of this dissertation. Elasticities have been evaluated at the mean levels of prices and of expenditure shares of products.

The results showed that the demand for beverage products is inelastic with own-price elasticity -0.684. The own-price elasticities of cola, clear CSD, tea, beer and rakı are negative and statistically significant at 5% level. The own-price elasticities of flavored CSD, fruit juices, mineral water, bottled water are insignificant. It has been found that the substitutability between flavored CSD and clear CSD is strong. The cross-price elasticities between them are 3.323 and 1.917. However, a price increase in both of these products does not affect the demand for cola. Similarly, the demand for flavored or for clear CSD does not change after an increase in the price of cola. The own-price elasticity of cola is -1.45 and significant. These findings imply that cola itself constitutes a separate relevant product market instead of being in the same product market with flavored and clear CSD products. Taking into account the positive cross elasticity and the similarity in product characteristics between flavored and clear carbonated soft drinks, it can be argued that these two CSD types can be considered being in the same product market.

In order to decide on whether the market for cola constitutes a distinct relevant product market or cola should be considered as a member of a larger relevant market, the SSNIP test has been implemented using the own-price elasticity of cola. In implementing the SSNIP test, the competitive price level has been taken into account rather than using current price levels since the cases investigated by the Turkish Competition Authority about the market leader in the past were related to abuse of dominance rather than being assessment of a merger. The result of the SSNIP test showed that a hypothetical monopolist of cola products can profitably increase its price by 5-10% and therefore, cola is a distinct relevant product market.

After stating that cola products constitute a relevant product market, the dissertation focused on measuring the degree of market power and on predicting the effects of a hypothetical merger in the cola market.

For this purpose, the elasticities of demand for cola products have been estimated at brand and package level by using a version of the simple logit and the nested logit models that were developed by Berry (1994). These models allow estimating demand parameters for large number of products with aggregate data. The methodology developed by Berry also permits using linear instrumental variable techniques in discrete-choice models in order to deal with the problem of endogeneity of regressors. On the other hand, these models impose some restrictions on cross-price elasticities. The simple logit model assumes that the cross-price elasticities of all other products being equal with respect to price of a particular product. This restriction is relaxed in the nested logit model by assuming an a priori segmentation among products. Similar products are assumed to be in the same group. This allows obtaining more flexible substitution patterns among products in such a way that cross-price elasticities of products in different groups are allowed to differ from those in the same group. On the other hand, the cross-price elasticities of products within the same group are equal with respect to prices of a particular product that is in the same nest. In this dissertation, diet and normal cola products have been assumed to be in different nests. As a technical requirement, a category of "outside products" has been defined and placed in the third nest. "Outside goods" consisted of "carbonated soft drinks other than cola".

The estimations have been done for five different shop types separately. The dependent variable of each equation has been specified as the log of the relative market share of a particular product. Each different pack of a cola brand has been accepted as distinct product. Small suppliers have been considered as a single supplier. The same consideration has been done for private labels. In sum, 93 different products have been included in the demand models. The two-stage least squares (2SLS) method has been used in estimating the demand equations which included average price, demographic variables, dummy variables for each product and month, and other demand shifters as explanatory variables. In the nested logit model, an additional explanatory variable was the within-nest market share of the products. The coefficient of this variable shows the utility correlation of products within the same nest. The diagnostic tests indicated that errors are heteroscedastic and autocorrelated. Therefore, robust estimation techniques have been used.

The coefficients of price and of within-nest correlation in the models specified for chain shops and medium markets-groceries have been found to be statistically significant with signs that are theoretically expected. In the nested logit model specified for sales in discounter shops, the within nest correlation has been found to be insignificant. In addition, the price coefficient in the model specified for non-chain shops has also been found to be insignificant. This implied that the nested logit model is inappropriate for these types of shops.

It has been found that elasticities from the nested logit model are larger than those obtained from the simple logit model. The results showed that the demand for cola product is more elastic in smaller packs than in large packs. In average, they range from -5.131 to -1.048 for the smallest and the largest pack (200ml to 3000 ml) respectively. The results from the nested logit models showed that, the cross-price elasticities within the same nest are significantly larger than the cross-price elasticities of products in the other nest. This result implies that products in the same group are closer substitutes than products in other groups as expected.

Normal cola products in 2.5 lt pack are the most frequently sold item. For this type of product, Coca Cola's own-price elasticity is slightly below one in absolute value (-0.946) in chain shops and slightly above one (-1.009) in medium markets-groceries. In this pack, the most elastic demand elasticity belongs to Pepsi: -1.294 and -1.348 in chain shops and medium markets-groceries. In chain shops, the demand for other firms and private labels are below 1 in absolute value (-0.915 and -0.91). For 330 ml pack, which is the most frequently sold pack among other small-sized packs, the own-price elasticities of the three national firms are lower than -4. For this pack in average, the demand for Cola Cola's product is more elastic than those of other brands in chain shops (-4.5). In in medium markets, Pepsi's 330 ml pack has the most elastic demand (-4.8). In general, the demand for normal cola products is more elastic than the demand for diet products. For example, in average, the own-price elasticities of 1000 ml pack normal cola are -2.25 and -2.12 for Coca Cola and Pepsi, whereas for the diet product in the same size they are -1.80 and -1.93, respectively.

The elasticities that have been estimated by the nested logit model have been used in measuring the degree of market power and in predicting the effects of a hypothetical merger between Pepsi and Cola Turca whose total market shares amount to nearly 30-35%. The concept of *price-cost margin* has been adopted as a measure of market power. In calculating the price-cost margins cola suppliers have been assumed to compete in price in Bertrand type game with differentiated products and the first-order conditions of the multi-product suppliers have been solved. In chain shops, the price cost-margins of 1 lt packs are between 50 % and 66%. For normal cola items in 330 ml pack, the price-cost margins are between 27% and 33.5%. In chain shops, the price-cost margins of normal and diet products in 330 ml pack are similar. In chain shops, the price-cost margin of the large size products of Coca Cola and Pepsi are 92.5% and 78.7% respectively. These are lower than their values in medium markets-groceries. On the other hand, for Cola Turca the price-cost margin of large size products is higher in chain shops (90.1%) compared to its value in medium markets (86.5 %).

In order to see how differentiating products by their calorie content affects the market power of a particular firm, the price-cost margins have been re-calculated by assuming that normal and diet products are produced by independent units. The result showed that the price-cost margins of normal cola producers increase by 0.1%-0.4% when these producers decide to produce also diet products. On the other hand, if the diet cola producers decide to produce normal cola along with its diet products, the price-cost margins of its diet products increase in the range between 4.3% and 27.4% depending on the producer and shop type.

In predicting the potential effects of the hypothetical merger between Pepsi and Cola Turca, the first-order conditions of the post-merger market structure in each market have been solved for post-merger prices. The results of the merger simulation showed that, prices of the merging parties will increase in average by 15.64 % in chain shops and by 21.02 % in medium markets. Coca Cola will also increase its prices. In average, the market price will increase by 16.64 % in chain shops and 21.79% in medium markets. This will cause consumer surplus to decrease by 4.97 % and 4.46 % in chain shops and medium markets, respectively. The revenue market shares of the merging parties will not change significantly in average after the merger.

Assuming that competition authority does not tolerate any price increase after the merger and the merging parties argue that the merger will generate some efficiencies in the form of reduction in marginal costs, it has been calculated that the merging firms need to show that their marginal costs will be reduced by 13.22 % in chain shops and 16.98 % in medium markets after the merger. Only in these conditions, they will obtain the same levels of price-cost margin that they could obtain after the merger by increasing their prices without reducing their marginal cost.

A final word should be expressed for the policy implications of the analyses done in this dissertation. The results showed that even a merger between suppliers whose total market shares sum up to only 30% in an oligopolistic market can cause prices to increase significantly. The traditional merger control policy, which relies on the dominance criterion may not be sufficient to control the increase in market power after such a merger. However, as shown in this dissertation, even mergers between non-dominant firms have the potential to increase the market power and need to be controlled by a policy instrument stricter than dominance. It is known that the draft law to amend the Turkish competition law is expected to widen the scope of the criteria for merger control in parallel with the developments in the competition policy of EU. The draft does not exclude the dominance criterion but additionally empowers the Authority to prohibit mergers that lessen the competition significantly. In economic terms, this means that mergers that may cause prices to rise or to reduce consumer surplus significantly may be challenged even if the parties of the merger do not create a dominant position. If the new law is enacted as such, the Authority and the merging parties will need to make use of the economic analysis in competition law cases more frequently. This calls for efforts in capacity building in both knowledge and data availability in academic institutions, in the Competition Authority and in courts.

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APPENDICES

APPENDIX A

List of products

Table A. 1. Products used in the first-stage of the demand system (LAIDS)

Food Products	**Cleaning Products**
Open Food Products	Fabric Detergents
Spices	Bath-Kitchen Cleaners
Bakliyat	Whitening Liquids
Honey	Granulated Whitening Cleaners
Baby Food	Dishwashing Detergents (Hand Wash)
Biscuits	Dishwashing Detergents (Machine Wash)
Bouillon	Glass Cleaners
Snacks	Bleachers
Chocolate Coating	Extreme Foaming Cleaners
Chocolate	Air Fresheners
Soups	Additives For Household Cleaners
Frozen Food	Non-Chemical Household Cleaners
Meats	General Household Cleaners
Gift Chocolates	Carpet Cleaners
Halvahs	Limestone Reliefs
SEMOLİNA(İrmik)	TOİLET CLEANERS
Cakes	Softeners
Ketchup	
Canned Food	
Pasta	**Personal Care Products**
Margarines	Baby Wipes
Yeast	Baby Diapers
Mayonnaise	Deodorants
Fruit Yoghurt	Toothbrushes
Corn Flakes	Toothpaste
Ice Cream	Hygienic Pads
Cheese	Paper Products
Rice Flours	Cologne
Jams	C. Cosmetics
Yoghurt	Ear Cleaner Stick
Tomato Pastes	Personal Wash
Sugar	Hair Dyes
Liquid Oils	Hair Gels
Spread Chocolate	Hair Conditioners
Milk	Shampoos
Butter	Skin Care Products
Puddings	Shaving Blades
Dessert	Shaving Creams And Gels
Flours	Wax & Depilatory Creams

APPENDIX B

Results from the restricted OLS, 2SLS, SUR and 3SLS models

Meanings of the abbreviations

Price Indices

Price_BEV	: Price index of beverage products
Price_FOOD	: Price index of food
Price_CLEANING	: Price index of cleaning products
Price_PERCARE	: Price index of personal care products
Price_OTHER	: Price index of “other” products
Price_KGI	: Price index of cola products
Price_MGI	: Price index of flavored carbonated soft drinks
Price_SGI	: Price index of clear carbonated soft drinks
Price_MES	: Price index of fruit juices
Price_MAS	: Price index of mineral water
Price_SU	: Price index of bottled water
Price_CAY	: Price index of tea
Price_COF	: Price index of instant coffee
Price_TKAH	: Price index of Turkish coffee
Price_BEER	: Price index of beer
Price_RAKI	: Price index of rakı

Total expenditures

Income1	: Deflated representative total expenditure on fast-moving consumer goods
Income2:	: Deflated representative total expenditure on beverages

Demographic variables

ab	: The percentage of households being in AB socio-economic group in a city/time pair
c1	: The percentage of households being in C1 socio-economic group in a city/time pair
c2	: The percentage of households being in C2 socio-economic group in a city/time pair
agehh	: The average age of head of households in a city/time pair
sq_agehh	: The squared “agehh”
ageps	: The average age of head of households in a city/time pair
sq_ageps	: The squared “sq_ageps”
urban	: The percentage of households living in urban area in city/time pair
holiday	: The percentage of holidays in a month
temp	: The average temperature in a month

Cities		*Months*	
city1	: Adana	m1	: January
city2	: Ankara	m2	: February
city3	: Antalya	m3	: March
city4	: Bursa	m4	: April
city5	: Gaziantep	m5	: May
city6	: Istanbul	m6	: June
city7	: Izmir	m7	: July
city8	: Kayseri	m8	: August
city9	: Kocaeli	m9	: September
city10	: Konya	m10	: October
city11	: Osmaniye	m11	: November

Dependent variables

wBEV	:Expenditure share of beverage products	MESw	:Expenditure share of fruit juices
wFOOD	:Expenditure share of food products	MASw	:Expenditure share of mineral water
wCLEANING	:Expenditure share of cleaning products	SUw	:Expenditure share of bottled water
wPERCARE	:Expenditure share of personal care products	CAYw	:Expenditure share of tea
wOTHER	:Expenditure share of "other" products	COFw	:Expenditure share of coffee
KGIw	:Expenditure share of cola	TKAHw	:Expenditure share of Turkish coffee
MGIw	:Expenditure share of flavored CSD	BEERw	:Expenditure share of beer
SGIw	:Expenditure share of clear CSD	RAKIw	:Expenditure share of rakı

Table B. 1. Results of the restricted OLS model for the first-stage products

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
Price_BEV	0.0719***	-0.0330***	-0.0036	-0.0290***
	(0.00685)	(0.00571)	(0.00353)	(0.00407)
Price_FOOD	-0.0330***	0.0992***	-0.0395***	-0.0347***
	(0.00571)	(0.00681)	(0.00347)	(0.00393)
Price_CLEANING	-0.0036	-0.0395***	0.0368***	0.0085**
	(0.00353)	(0.00347)	(0.00356)	(0.00342)
Price_PERCARE	-0.0290***	-0.0347***	0.0085**	0.0556***
	(0.00407)	(0.00393)	(0.00342)	(0.00477)
Price_OTHER	-0.0064***	0.0079**	-0.0023	-0.0005
	(0.00190)	(0.00313)	(0.00142)	(0.00149)
Income1	0.0002**	-0.0003**	-0.0002***	0.0003***
	(0.00007)	(0.00012)	(0.00005)	(0.00006)
ab	-0.0124*	0.0212*	-0.0023	-0.0076
	(0.00669)	(0.01134)	(0.00501)	(0.00525)
c1	-0.0275***	0.0319**	0.0013	-0.0083
	(0.00958)	(0.01603)	(0.00726)	(0.00755)
c2	0.0226**	-0.0428**	0.0131*	0.0039
	(0.01017)	(0.01685)	(0.00783)	(0.00803)
agehh	0.0112	0.0013	-0.0068	-0.0029
	(0.01101)	(0.01873)	(0.00823)	(0.00863)
sq_agehh	-0.0002	0.0000	0.0001	0.0000
	(0.00013)	(0.00021)	(0.00009)	(0.00010)
ageps	-0.0118**	0.0248**	-0.0095**	-0.0055
	(0.00587)	(0.00998)	(0.00438)	(0.00460)
sq_ageps	0.0002**	-0.0004***	0.0001**	0.0001
	(0.00008)	(0.00013)	(0.00006)	(0.00006)
urban	-0.0106***	0.0158***	-0.0052**	-0.0015
	(0.00327)	(0.00545)	(0.00250)	(0.00259)
holiday	0.0532***	-0.1024***	0.0190***	0.0279***
	(0.00865)	(0.01472)	(0.00647)	(0.00679)
temp	0.0007***	-0.0011***	0.0004**	0.0001
	(0.00025)	(0.00043)	(0.00019)	(0.00020)
city1	0.0106***	0.0036	-0.0215***	0.0086***
	(0.00273)	(0.00460)	(0.00205)	(0.00215)
city2	0.0140***	0.0039	-0.0209***	0.0047***
	(0.00227)	(0.00383)	(0.00169)	(0.00178)
city3	0.0372***	-0.0353***	-0.0216***	0.0202***
	(0.00287)	(0.00476)	(0.00211)	(0.00223)
city4	0.0142***	-0.0023	-0.0191***	0.0081***
	(0.00244)	(0.00410)	(0.00182)	(0.00191)
city5	0.0105***	0.0189***	-0.0259***	-0.0016
	(0.00273)	(0.00459)	(0.00205)	(0.00217)
city6	0.0420***	-0.0140***	-0.0224***	-0.0038**
	(0.00228)	(0.00370)	(0.00165)	(0.00175)
city7	0.0352***	-0.0203***	-0.0215***	0.0071***
	(0.00239)	(0.00402)	(0.00178)	(0.00186)
city8	0.0374***	-0.0481***	-0.0068***	0.0196***
	(0.00312)	(0.00516)	(0.00229)	(0.00242)

Table B.1. (Continued)

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
city9	0.0149***	-0.0073*	-0.0145***	0.0083***
	(0.00274)	(0.00430)	(0.00195)	(0.00208)
city10	0.0212***	-0.0055	-0.0229***	0.0094***
	(0.00268)	(0.00444)	(0.00198)	(0.00209)
city11	-0.0016	-0.0012	-0.0189***	0.0226***
	(0.00251)	(0.00411)	(0.00185)	(0.00198)
m1	0.0039*	-0.0147***	0.0063***	0.0039**
	(0.00218)	(0.00370)	(0.00164)	(0.00171)
m2	0.0079***	-0.0292***	0.0097***	0.0112***
	(0.00219)	(0.00372)	(0.00164)	(0.00172)
m3	0.0105***	-0.0312***	0.0083***	0.0118***
	(0.00232)	(0.00393)	(0.00173)	(0.00182)
m4	0.0043	-0.0160***	0.0062***	0.0048**
	(0.00277)	(0.00472)	(0.00207)	(0.00218)
m5	0.0073**	-0.0130**	0.0035	0.0006
	(0.00362)	(0.00616)	(0.00270)	(0.00284)
m6	0.0077	-0.0137*	0.0010	0.0014
	(0.00468)	(0.00796)	(0.00350)	(0.00367)
m7	0.0093*	-0.0141	-0.0024	0.0022
	(0.00548)	(0.00934)	(0.00410)	(0.00430)
m8	0.0060	-0.0090	-0.0029	0.0020
	(0.00534)	(0.00908)	(0.00399)	(0.00418)
m9	-0.0007	-0.0071	0.0013	0.0037
	(0.00441)	(0.00751)	(0.00330)	(0.00346)
m10	-0.0086***	0.0133**	0.0003	-0.0064**
	(0.00333)	(0.00567)	(0.00249)	(0.00261)
m11	-0.0097***	0.0188***	-0.0033*	-0.0060***
	(0.00242)	(0.00412)	(0.00181)	(0.00190)
Constant	0.0378	0.2570	0.4381***	0.2407
	(0.19127)	(0.32521)	(0.14304)	(0.14996)
Observations	876	876	876	876
R-squared	0.685	0.634	0.675	0.639

Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1)
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table B. 2. Results of the restricted 2SLS model for the first-stage products

	(1)	(2)	(3)	(4)
VARIABLES	wBEV	wFOOD	wCLEANING	wPERCARE
Price_BEV	0.0236	0.0335***	0.0330***	-0.0654***
	(0.01737)	(0.01293)	(0.00890)	(0.01062)
Price_FOOD	0.0335***	0.0090	-0.0595***	-0.0020
	(0.01293)	(0.01387)	(0.00758)	(0.00854)
Price_CLEANING	0.0330***	-0.0595***	0.0513***	0.0069
	(0.00890)	(0.00758)	(0.00919)	(0.00876)
Price_PERCARE	-0.0654***	-0.0020	0.0069	0.0540***
	(0.01062)	(0.00854)	(0.00876)	(0.01298)
Price_OTHER	-0.0248*	0.0190	-0.0318***	0.0064
	(0.01286)	(0.01439)	(0.01058)	(0.01070)
Income1	-0.0004*	0.0011***	-0.0004***	-0.0000
	(0.00019)	(0.00030)	(0.00016)	(0.00015)
ab	-0.0142*	0.0277**	-0.0043	-0.0094
	(0.00808)	(0.01293)	(0.00658)	(0.00626)
c1	-0.0267**	0.0355*	0.0023	-0.0099
	(0.01246)	(0.01965)	(0.01001)	(0.00961)
c2	0.0120	-0.0306	0.0066	0.0028
	(0.01298)	(0.02024)	(0.01066)	(0.01029)
agehh	0.0107	0.0007	-0.0059	-0.0027
	(0.01313)	(0.02111)	(0.01073)	(0.01021)
sq_agehh	-0.0001	0.0001	0.0001	0.0000
	(0.00015)	(0.00024)	(0.00012)	(0.00012)
ageps	-0.0071	0.0222**	-0.0103*	-0.0050
	(0.00703)	(0.01126)	(0.00575)	(0.00547)
sq_ageps	0.0001	-0.0004**	0.0002**	0.0001
	(0.00009)	(0.00015)	(0.00008)	(0.00007)
urban	-0.0122***	0.0195***	-0.0108***	-0.0007
	(0.00417)	(0.00658)	(0.00343)	(0.00325)
holiday	0.0438***	-0.0980***	0.0081	0.0307***
	(0.01122)	(0.01714)	(0.00924)	(0.00874)
temp	0.0007**	-0.0013***	0.0004*	0.0002
	(0.00030)	(0.00048)	(0.00025)	(0.00024)
city1	0.0017	0.0278***	-0.0195***	0.0022
	(0.00507)	(0.00698)	(0.00428)	(0.00410)
city2	0.0047	0.0180***	-0.0208***	0.0014
	(0.00307)	(0.00476)	(0.00245)	(0.00240)
city3	0.0244***	-0.0045	-0.0129**	0.0093*
	(0.00696)	(0.00815)	(0.00539)	(0.00546)
city4	0.0048	0.0220***	-0.0162***	0.0005
	(0.00476)	(0.00642)	(0.00381)	(0.00363)
city5	-0.0073	0.0564***	-0.0293***	-0.0097**
	(0.00542)	(0.00828)	(0.00445)	(0.00430)
city6	0.0355***	-0.0050	-0.0146***	-0.0089***
	(0.00383)	(0.00466)	(0.00269)	(0.00280)
city7	0.0305***	-0.0104**	-0.0169***	0.0033
	(0.00352)	(0.00486)	(0.00277)	(0.00268)
city8	0.0102	0.0029	-0.0087*	0.0065
	(0.00662)	(0.00990)	(0.00511)	(0.00500)

Table B.2. (Continued)

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
city9	-0.0109**	0.0333***	-0.0129***	-0.0029
	(0.00529)	(0.00721)	(0.00375)	(0.00386)
city10	0.0108	0.0214***	-0.0132**	-0.0009
	(0.00689)	(0.00787)	(0.00535)	(0.00543)
city11	-0.0173***	0.0217***	-0.0158***	0.0161***
	(0.00395)	(0.00535)	(0.00291)	(0.00310)
m1	-0.0021	-0.0067	0.0022	0.0030
	(0.00298)	(0.00458)	(0.00249)	(0.00236)
m2	0.0046	-0.0225***	0.0061***	0.0105***
	(0.00284)	(0.00449)	(0.00232)	(0.00224)
m3	0.0113***	-0.0322***	0.0067***	0.0125***
	(0.00277)	(0.00440)	(0.00226)	(0.00217)
m4	0.0049	-0.0156***	0.0056**	0.0048*
	(0.00329)	(0.00527)	(0.00269)	(0.00258)
m5	0.0061	-0.0106	0.0035	0.0008
	(0.00439)	(0.00701)	(0.00359)	(0.00344)
m6	0.0067	-0.0107	0.0002	0.0006
	(0.00557)	(0.00893)	(0.00455)	(0.00435)
m7	0.0071	-0.0109	-0.0055	0.0024
	(0.00664)	(0.01057)	(0.00541)	(0.00519)
m8	0.0043	-0.0066	-0.0064	0.0024
	(0.00649)	(0.01030)	(0.00528)	(0.00508)
m9	-0.0029	-0.0054	-0.0032	0.0047
	(0.00555)	(0.00865)	(0.00451)	(0.00435)
m10	-0.0102**	0.0146**	-0.0008	-0.0066**
	(0.00405)	(0.00642)	(0.00331)	(0.00319)
m11	-0.0135***	0.0249***	-0.0039	-0.0076***
	(0.00294)	(0.00470)	(0.00239)	(0.00229)
Constant	0.0157	0.1974	0.4511**	0.2540
	(0.22869)	(0.36685)	(0.18720)	(0.17786)
Observations	864	864	864	864
R-squared	0.601	0.554	0.485	0.596

Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1)
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table B. 3. Results of the restricted SUR model for the first-stage products

	(1)	(2)	(3)	(4)
VARIABLES	wBEV	wFOOD	wCLEANING	wPERCARE
Price_BEV	0.0762***	-0.0386***	-0.0075**	-0.0289***
	(0.00666)	(0.00620)	(0.00324)	(0.00372)
Price_FOOD	-0.0386***	0.1080***	-0.0342***	-0.0364***
	(0.00620)	(0.00899)	(0.00370)	(0.00413)
Price_CLEANING	-0.0075**	-0.0342***	0.0337***	0.0081***
	(0.00324)	(0.00370)	(0.00311)	(0.00300)
Price_PERCARE	-0.0289***	-0.0364***	0.0081***	0.0578***
	(0.00372)	(0.00413)	(0.00300)	(0.00416)
Price_OTHER	-0.0013*	0.0011*	-0.0002	-0.0005
	(0.00071)	(0.00065)	(0.00052)	(0.00061)
Income1	0.0002**	-0.0002**	-0.0003***	0.0003***
	(0.00007)	(0.00011)	(0.00005)	(0.00005)
ab	-0.0128**	0.0223**	-0.0019	-0.0079
	(0.00655)	(0.01114)	(0.00490)	(0.00514)
c1	-0.0291***	0.0356**	0.0025	-0.0091
	(0.00941)	(0.01600)	(0.00711)	(0.00742)
c2	0.0223**	-0.0410**	0.0153**	0.0034
	(0.00998)	(0.01687)	(0.00763)	(0.00787)
agehh	0.0119	-0.0000	-0.0072	-0.0027
	(0.01077)	(0.01833)	(0.00805)	(0.00844)
sq_agehh	-0.0002	0.0001	0.0001	0.0000
	(0.00012)	(0.00021)	(0.00009)	(0.00010)
ageps	-0.0126**	0.0261***	-0.0093**	-0.0056
	(0.00574)	(0.00977)	(0.00429)	(0.00450)
sq_ageps	0.0002***	-0.0004***	0.0001**	0.0001
	(0.00008)	(0.00013)	(0.00006)	(0.00006)
urban	-0.0109***	0.0168***	-0.0043*	-0.0017
	(0.00324)	(0.00554)	(0.00246)	(0.00256)
holiday	0.0552***	-0.1053***	0.0199***	0.0280***
	(0.00844)	(0.01435)	(0.00631)	(0.00662)
temp	0.0006***	-0.0011***	0.0004**	0.0001
	(0.00025)	(0.00042)	(0.00019)	(0.00019)
city1	0.0095***	0.0053	-0.0232***	0.0090***
	(0.00266)	(0.00452)	(0.00199)	(0.00210)
city2	0.0142***	0.0037	-0.0215***	0.0049***
	(0.00222)	(0.00376)	(0.00165)	(0.00174)
city3	0.0358***	-0.0332***	-0.0238***	0.0207***
	(0.00275)	(0.00460)	(0.00202)	(0.00214)
city4	0.0136***	-0.0011	-0.0207***	0.0084***
	(0.00238)	(0.00401)	(0.00177)	(0.00186)
city5	0.0101***	0.0197***	-0.0277***	-0.0010
	(0.00267)	(0.00454)	(0.00200)	(0.00212)
city6	0.0421***	-0.0143***	-0.0234***	-0.0036**
	(0.00223)	(0.00367)	(0.00161)	(0.00170)
city7	0.0350***	-0.0199***	-0.0224***	0.0073***
	(0.00233)	(0.00396)	(0.00174)	(0.00182)
city8	0.0379***	-0.0484***	-0.0091***	0.0203***
	(0.00307)	(0.00513)	(0.00224)	(0.00238)

Table B.3. (Continued)

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
city9	0.0160***	-0.0086**	-0.0162***	0.0089***
	(0.00272)	(0.00434)	(0.00191)	(0.00204)
city10	0.0197***	-0.0032	-0.0250***	0.0098***
	(0.00255)	(0.00426)	(0.00188)	(0.00198)
city11	-0.0011	-0.0020	-0.0200***	0.0230***
	(0.00247)	(0.00412)	(0.00181)	(0.00193)
m1	0.0046**	-0.0154***	0.0065***	0.0039**
	(0.00212)	(0.00360)	(0.00159)	(0.00166)
m2	0.0081***	-0.0291***	0.0097***	0.0112***
	(0.00214)	(0.00364)	(0.00160)	(0.00168)
m3	0.0105***	-0.0311***	0.0086***	0.0117***
	(0.00227)	(0.00386)	(0.00169)	(0.00178)
m4	0.0043	-0.0158***	0.0062***	0.0047**
	(0.00271)	(0.00461)	(0.00203)	(0.00213)
m5	0.0075**	-0.0132**	0.0034	0.0006
	(0.00354)	(0.00602)	(0.00264)	(0.00277)
m6	0.0079*	-0.0140*	0.0008	0.0014
	(0.00457)	(0.00779)	(0.00342)	(0.00359)
m7	0.0099*	-0.0149	-0.0024	0.0023
	(0.00536)	(0.00912)	(0.00400)	(0.00420)
m8	0.0066	-0.0098	-0.0029	0.0020
	(0.00521)	(0.00887)	(0.00390)	(0.00409)
m9	0.0000	-0.0081	0.0015	0.0037
	(0.00430)	(0.00732)	(0.00322)	(0.00337)
m10	-0.0081**	0.0125**	0.0003	-0.0064**
	(0.00326)	(0.00554)	(0.00243)	(0.00255)
m11	-0.0093***	0.0183***	-0.0035**	-0.0060***
	(0.00237)	(0.00403)	(0.00177)	(0.00185)
Constant	0.0405	0.2577	0.4480***	0.2375
	(0.18698)	(0.31818)	(0.13980)	(0.14659)
Observations	876	876	876	876
R-squared	0.681	0.630	0.675	0.639

Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1)
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table B. 4. Results of the restricted 3SLS model for the first-stage products

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
Price_BEV	0.0366**	0.0226*	0.0134	-0.0586***
	(0.01576)	(0.01281)	(0.00863)	(0.00889)
Price_FOOD	0.0226*	0.0212	-0.0470***	-0.0086
	(0.01281)	(0.01546)	(0.00801)	(0.00796)
Price_CLEANING	0.0134	-0.0470***	0.0368***	0.0003
	(0.00863)	(0.00801)	(0.00904)	(0.00804)
Price_PERCARE	-0.0586***	-0.0086	0.0003	0.0611***
	(0.00889)	(0.00796)	(0.00804)	(0.00950)
Price_OTHER	-0.0140**	0.0119**	-0.0034	0.0059
	(0.00608)	(0.00469)	(0.00497)	(0.00497)
Income1	-0.0005***	0.0012***	-0.0005***	-0.0000
	(0.00018)	(0.00030)	(0.00016)	(0.00015)
Ab	-0.0141*	0.0280**	-0.0048	-0.0088
	(0.00786)	(0.01260)	(0.00642)	(0.00611)
c1	-0.0266**	0.0373**	-0.0019	-0.0083
	(0.01163)	(0.01848)	(0.00947)	(0.00905)
c2	0.0181	-0.0328*	0.0075	0.0063
	(0.01236)	(0.01949)	(0.01034)	(0.00968)
agehh	0.0111	-0.0000	-0.0058	-0.0030
	(0.01282)	(0.02061)	(0.01048)	(0.00997)
sq_agehh	-0.0002	0.0001	0.0001	0.0000
	(0.00015)	(0.00024)	(0.00012)	(0.00011)
ageps	-0.0092	0.0238**	-0.0113**	-0.0054
	(0.00684)	(0.01096)	(0.00558)	(0.00531)
sq_ageps	0.0002*	-0.0004***	0.0002**	0.0001
	(0.00009)	(0.00015)	(0.00008)	(0.00007)
urban	-0.0115***	0.0198***	-0.0082**	-0.0003
	(0.00408)	(0.00653)	(0.00336)	(0.00316)
holiday	0.0493***	-0.1017***	0.0186**	0.0312***
	(0.01037)	(0.01614)	(0.00853)	(0.00811)
Temp	0.0007**	-0.0012***	0.0004	0.0002
	(0.00029)	(0.00047)	(0.00024)	(0.00023)
city1	-0.0034	0.0301***	-0.0272***	0.0028
	(0.00457)	(0.00714)	(0.00386)	(0.00355)
city2	0.0050*	0.0173***	-0.0224***	0.0024
	(0.00299)	(0.00474)	(0.00241)	(0.00232)
city3	0.0198***	-0.0027	-0.0259***	0.0110***
	(0.00556)	(0.00777)	(0.00434)	(0.00408)
city4	0.0012	0.0235***	-0.0229***	0.0012
	(0.00446)	(0.00659)	(0.00363)	(0.00335)
city5	-0.0111**	0.0575***	-0.0341***	-0.0086**
	(0.00521)	(0.00850)	(0.00435)	(0.00411)
city6	0.0360***	-0.0059	-0.0203***	-0.0077***
	(0.00330)	(0.00445)	(0.00238)	(0.00231)
city7	0.0291***	-0.0100**	-0.0217***	0.0037
	(0.00323)	(0.00482)	(0.00256)	(0.00242)

Table B.4. (Continued)

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
city8	0.0085	0.0021	-0.0136***	0.0084*
	(0.00649)	(0.01010)	(0.00513)	(0.00487)
city9	-0.0091*	0.0305***	-0.0170***	-0.0004
	(0.00518)	(0.00748)	(0.00380)	(0.00369)
city10	0.0061	0.0234***	-0.0266***	0.0007
	(0.00528)	(0.00719)	(0.00411)	(0.00387)
city11	-0.0162***	0.0199***	-0.0201***	0.0179***
	(0.00372)	(0.00555)	(0.00284)	(0.00279)
m1	-0.0006	-0.0077*	0.0051**	0.0034
	(0.00266)	(0.00418)	(0.00220)	(0.00209)
m2	0.0046*	-0.0225***	0.0078***	0.0106***
	(0.00266)	(0.00426)	(0.00218)	(0.00208)
m3	0.0114***	-0.0321***	0.0080***	0.0123***
	(0.00269)	(0.00431)	(0.00219)	(0.00209)
m4	0.0045	-0.0153***	0.0059**	0.0046*
	(0.00321)	(0.00515)	(0.00263)	(0.00251)
m5	0.0054	-0.0102	0.0032	0.0005
	(0.00429)	(0.00685)	(0.00351)	(0.00335)
m6	0.0063	-0.0105	0.0005	0.0004
	(0.00542)	(0.00870)	(0.00443)	(0.00422)
m7	0.0075	-0.0114	-0.0029	0.0021
	(0.00635)	(0.01018)	(0.00519)	(0.00494)
m8	0.0047	-0.0069	-0.0036	0.0020
	(0.00619)	(0.00991)	(0.00505)	(0.00481)
m9	-0.0018	-0.0061	0.0008	0.0044
	(0.00515)	(0.00819)	(0.00420)	(0.00401)
m10	-0.0093**	0.0140**	0.0009	-0.0067**
	(0.00386)	(0.00619)	(0.00315)	(0.00301)
m11	-0.0131***	0.0244***	-0.0036	-0.0074***
	(0.00285)	(0.00456)	(0.00232)	(0.00221)
Constant	0.0570	0.1788	0.4809***	0.2648
	(0.22338)	(0.35876)	(0.18287)	(0.17364)
Observations	864	864	864	864
R-squared	0.626	0.558	0.653	0.604

100
Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1)

Table B. 5. Results of the restricted OLS model for the second-stage products

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
Price_KGI	-0.0398**	-0.0262***	0.0341***	0.0071	-0.0089**	-0.0224***	0.0028	-0.0115**	-0.0043	0.0738***
	(0.0190)	(0.0101)	(0.0059)	(0.0079)	(0.0043)	(0.0071)	(0.0097)	(0.0053)	(0.0042)	(0.0101)
Price_MGI	-0.0262***	0.0286***	0.0148***	-0.0062	-0.0040*	-0.0004	-0.0118***	0.0022	0.0065**	-0.0139***
	(0.0101)	(0.0096)	(0.0044)	(0.0048)	(0.0023)	(0.0037)	(0.0044)	(0.0028)	(0.0027)	(0.0028)
Price_SGI	0.0341***	0.0148***	0.0068*	-0.0122***	-0.0108***	-0.0042*	-0.0141***	-0.0033*	-0.0032*	-0.0198**
	(0.0059)	(0.0044)	(0.0040)	(0.0032)	(0.0016)	(0.0025)	(0.0030)	(0.0019)	(0.0018)	(0.0099)
Price_MES	0.0071	-0.0062	-0.0122***	0.0549***	0.0077***	0.0012	-0.0233***	-0.0004	-0.0031	-0.0172***
	(0.0079)	(0.0048)	(0.0032)	(0.0066)	(0.0025)	(0.0041)	(0.0053)	(0.0031)	(0.0025)	(0.0053)
Price_MAS	-0.0089**	-0.0040*	-0.0108***	0.0077***	0.0218***	-0.0006	-0.0058*	0.0015	0.0004	-0.0023
	(0.0043)	(0.0023)	(0.0016)	(0.0025)	(0.0020)	(0.0024)	(0.0032)	(0.0018)	(0.0013)	(0.0031)
Price_SU	-0.0224***	-0.0004	-0.0042*	0.0012	-0.0006	0.0393***	-0.0460***	0.0031	-0.0053**	0.0060
	(0.0071)	(0.0037)	(0.0025)	(0.0041)	(0.0024)	(0.0056)	(0.0056)	(0.0030)	(0.0021)	(0.0052)
Price_CAY	0.0028	-0.0118***	-0.0141***	-0.0233***	-0.0058*	-0.0460***	0.1105***	-0.0151***	-0.0055**	-0.0089
	(0.0097)	(0.0044)	(0.0030)	(0.0053)	(0.0032)	(0.0056)	(0.0113)	(0.0041)	(0.0027)	(0.0071)
Price_COF	-0.0115**	0.0022	-0.0033*	-0.0004	0.0015	0.0031	-0.0151***	0.0232***	0.0031*	0.0048
	(0.0053)	(0.0028)	(0.0019)	(0.0031)	(0.0018)	(0.0030)	(0.0041)	(0.0031)	(0.0016)	(0.0038)
Price_TKAH	-0.0043	0.0065**	-0.0032*	-0.0031	0.0004	-0.0053**	-0.0055**	0.0031*	0.0184***	-0.0095***
	(0.0042)	(0.0027)	(0.0018)	(0.0025)	(0.0013)	(0.0021)	(0.0027)	(0.0016)	(0.0019)	(0.0028)
Price_BEER	0.0738***	-0.0139***	-0.0139***	-0.0172***	-0.0023	0.0060	-0.0089	0.0048	-0.0095***	0.0230**
	(0.0101)	(0.0028)	(0.0028)	(0.0053)	(0.0031)	(0.0052)	(0.0071)	(0.0038)	(0.0028)	(0.0093)
Price_RAKI	-0.0047	0.0102***	0.0062***	-0.0084**	0.0010	0.0293***	0.0172**	-0.0077***	0.0025	-0.0361***
	(0.0076)	(0.0027)	(0.0019)	(0.0035)	(0.0023)	(0.0041)	(0.0071)	(0.0029)	(0.0018)	(0.0054)
Income2	-0.0074***	-0.0007*	-0.0014***	-0.0002	0.0003	0.0063***	-0.0194***	0.0006	-0.0005*	0.0071***
	(0.0011)	(0.0004)	(0.0003)	(0.0005)	(0.0003)	(0.0006)	(0.0011)	(0.0004)	(0.0003)	(0.0008)
ab	0.0103	-0.0090	0.0041	0.0085	0.0002	-0.0097	0.0026	-0.0115	0.0028	-0.0037
	(0.0207)	(0.0074)	(0.0050)	(0.0094)	(0.0063)	(0.0114)	(0.0209)	(0.0081)	(0.0046)	(0.0139)
c1	0.0732**	0.0113	0.0052	-0.0001	0.0114	-0.0366**	-0.1121***	-0.0165	-0.0074	0.0309
	(0.0300)	(0.0107)	(0.0073)	(0.0137)	(0.0091)	(0.0166)	(0.0300)	(0.0117)	(0.0067)	(0.0203)

Table B.5. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
c2	0.0971***	-0.0007	-0.0077	0.0253*	0.0149	-0.0237	-0.1481***	-0.0007	0.0008	0.0156
	(0.0325)	(0.0118)	(0.0079)	(0.0150)	(0.0100)	(0.0181)	(0.0326)	(0.0127)	(0.0073)	(0.0220)
agehh	-0.0469	-0.0005	-0.0046	-0.0016	-0.0006	0.0199	0.0556	-0.0236*	-0.0106	0.0008
	(0.0343)	(0.0123)	(0.0083)	(0.0156)	(0.0105)	(0.0190)	(0.0346)	(0.0134)	(0.0076)	(0.0231)
sq_agehh	0.0005	0.0000	0.0001	-0.0000	0.0000	-0.0003	-0.0006	0.0003*	0.0001	-0.0000
	(0.0004)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0004)	(0.0002)	(0.0001)	(0.0003)
ageps	0.0055	-0.0006	0.0068	-0.0062	0.0034	-0.0284***	0.0031	-0.0084	-0.0008	0.0059
	(0.0182)	(0.0065)	(0.0044)	(0.0083)	(0.0056)	(0.0101)	(0.0184)	(0.0071)	(0.0040)	(0.0122)
sq_ageps	-0.0001	-0.0000	-0.0001	0.0001	-0.0000	0.0004***	-0.0000	0.0001	0.0000	-0.0001
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0002)
urban	0.0204*	0.0087**	0.0019	-0.0023	0.0064**	-0.0166***	-0.0271**	-0.0025	-0.0016	0.0061
	(0.0106)	(0.0038)	(0.0026)	(0.0049)	(0.0032)	(0.0058)	(0.0105)	(0.0041)	(0.0024)	(0.0072)
holiday	0.2896***	0.0731***	0.0174***	-0.0735***	-0.0036	-0.0266*	-0.1552***	-0.0131	0.0050	-0.0280
	(0.0267)	(0.0096)	(0.0064)	(0.0122)	(0.0082)	(0.0148)	(0.0270)	(0.0104)	(0.0059)	(0.0180)
temp	0.0028***	0.0001	0.0003	0.0006	0.0006**	-0.0012***	-0.0026***	0.0000	-0.0002	-0.0003
	(0.0008)	(0.0003)	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0008)	(0.0003)	(0.0002)	(0.0005)
city1	0.0615***	-0.0303***	0.0214***	0.0197***	0.0062**	0.0054	-0.1139***	-0.0050	0.0287***	0.0298***
	(0.0085)	(0.0035)	(0.0023)	(0.0041)	(0.0028)	(0.0048)	(0.0084)	(0.0034)	(0.0021)	(0.0058)
city2	0.0177**	-0.0022	0.0097***	0.0220***	0.0145***	0.0066*	-0.0326***	-0.0113***	0.0015	0.0113**
	(0.0070)	(0.0027)	(0.0018)	(0.0033)	(0.0022)	(0.0040)	(0.0070)	(0.0028)	(0.0016)	(0.0048)
city3	-0.0090	-0.0294***	-0.0136***	0.0214***	0.0241***	0.0156***	-0.0656***	0.0012	0.0110***	0.0252***
	(0.0089)	(0.0038)	(0.0025)	(0.0045)	(0.0031)	(0.0050)	(0.0084)	(0.0036)	(0.0022)	(0.0061)
city4	-0.0352***	-0.0055	0.0479***	0.0054	-0.0032	0.0232***	-0.0288***	0.0064*	0.0216***	0.0038
	(0.0085)	(0.0036)	(0.0024)	(0.0042)	(0.0027)	(0.0046)	(0.0078)	(0.0033)	(0.0022)	(0.0064)
city5	0.0134	-0.0185***	-0.0189***	0.0380***	0.0329***	-0.0162***	-0.0518***	-0.0160***	0.0083***	0.0540***
	(0.0107)	(0.0051)	(0.0034)	(0.0058)	(0.0043)	(0.0062)	(0.0096)	(0.0044)	(0.0030)	(0.0077)
city6	-0.0189**	-0.0169***	0.0048**	0.0293***	0.0059**	0.1889***	-0.1074***	-0.0079***	0.0217***	-0.0198***
	(0.0074)	(0.0030)	(0.0020)	(0.0035)	(0.0023)	(0.0041)	(0.0072)	(0.0029)	(0.0019)	(0.0050)

Table B.5. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
city7	-0.0014	-0.0248***	0.0156***	0.0169***	0.0118***	0.0366***	-0.0850***	-0.0005	0.0083***	0.0373***
	(0.0075)	(0.0028)	(0.0019)	(0.0034)	(0.0023)	(0.0041)	(0.0075)	(0.0029)	(0.0017)	(0.0050)
city8	-0.0077	0.0069**	-0.0158***	0.0169***	0.0163***	-0.0249***	0.0477***	0.0052*	0.0101***	-0.0092*
	(0.0079)	(0.0030)	(0.0020)	(0.0037)	(0.0025)	(0.0044)	(0.0079)	(0.0031)	(0.0018)	(0.0054)
city9	-0.0023	0.0034	0.0128***	0.0061	0.0002	0.0666***	-0.0284***	-0.0040	0.0150***	-0.0020
	(0.0082)	(0.0035)	(0.0023)	(0.0042)	(0.0025)	(0.0045)	(0.0076)	(0.0033)	(0.0021)	(0.0056)
city10	0.0099	0.0062	-0.0075***	0.0485***	0.0130***	-0.0307***	-0.0207**	-0.0099***	0.0082***	0.0065
	(0.0088)	(0.0039)	(0.0027)	(0.0050)	(0.0028)	(0.0049)	(0.0081)	(0.0035)	(0.0024)	(0.0061)
city11	0.0449***	-0.0340***	-0.0183***	0.0359***	0.0298***	0.0206***	-0.0033	0.0068*	0.0164***	-0.0250***
	(0.0090)	(0.0038)	(0.0026)	(0.0045)	(0.0032)	(0.0050)	(0.0087)	(0.0036)	(0.0023)	(0.0063)
m1	-0.0260***	-0.0045*	-0.0020	0.0016	0.0034*	0.0078**	0.0139**	0.0065**	0.0015	0.0019
	(0.0067)	(0.0024)	(0.0016)	(0.0031)	(0.0021)	(0.0037)	(0.0068)	(0.0026)	(0.0015)	(0.0045)
m2	-0.0299***	-0.0041*	-0.0011	0.0028	0.0035*	0.0069*	0.0139**	0.0062**	0.0025	0.0035
	(0.0067)	(0.0024)	(0.0016)	(0.0031)	(0.0021)	(0.0037)	(0.0068)	(0.0026)	(0.0015)	(0.0045)
m3	-0.0421***	-0.0026	0.0005	0.0113***	0.0004	0.0085**	0.0249***	0.0033	0.0014	0.0033
	(0.0072)	(0.0026)	(0.0017)	(0.0033)	(0.0022)	(0.0040)	(0.0073)	(0.0028)	(0.0016)	(0.0048)
m4	-0.0536***	-0.0016	0.0019	0.0125***	-0.0009	0.0074	0.0281***	0.0025	0.0012	0.0107*
	(0.0086)	(0.0031)	(0.0021)	(0.0039)	(0.0026)	(0.0048)	(0.0087)	(0.0034)	(0.0019)	(0.0058)
m5	-0.0348***	0.0080**	0.0046*	0.0051	-0.0041	0.0167***	0.0157	-0.0038	0.0008	0.0120
	(0.0113)	(0.0040)	(0.0027)	(0.0051)	(0.0034)	(0.0062)	(0.0114)	(0.0044)	(0.0025)	(0.0076)
m6	-0.0196	0.0126**	0.0067*	-0.0152**	-0.0080*	0.0246***	0.0123	-0.0092	0.0027	0.0201**
	(0.0146)	(0.0052)	(0.0035)	(0.0066)	(0.0044)	(0.0081)	(0.0147)	(0.0057)	(0.0032)	(0.0098)
m7	-0.0025	0.0168***	0.0072*	-0.0279***	-0.0084	0.0308***	0.0068	-0.0120*	0.0009	0.0220*
	(0.0170)	(0.0061)	(0.0041)	(0.0077)	(0.0052)	(0.0094)	(0.0172)	(0.0066)	(0.0038)	(0.0114)
m8	-0.0175	0.0113*	0.0098**	-0.0268***	-0.0074	0.0341***	0.0138	-0.0117*	0.0017	0.0241**
	(0.0165)	(0.0059)	(0.0040)	(0.0075)	(0.0050)	(0.0092)	(0.0167)	(0.0065)	(0.0037)	(0.0111)
m9	-0.0390***	0.0011	0.0043	0.0017	-0.0053	0.0312***	0.0161	-0.0087	0.0008	0.0163*
	(0.0137)	(0.0049)	(0.0033)	(0.0062)	(0.0042)	(0.0076)	(0.0138)	(0.0054)	(0.0030)	(0.0092)

Table B.5. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
m10	-0.0188*	-0.0005	0.0048*	0.0127***	-0.0004	0.0237***	0.0071	-0.0021	0.0015	-0.0018
	(0.0104)	(0.0037)	(0.0025)	(0.0047)	(0.0032)	(0.0057)	(0.0105)	(0.0041)	(0.0023)	(0.0070)
m11	0.0080	0.0011	0.0024	0.0042	0.0055**	0.0188***	0.0032	0.0010	0.0027	-0.0159***
	(0.0076)	(0.0027)	(0.0018)	(0.0035)	(0.0023)	(0.0042)	(0.0077)	(0.0030)	(0.0017)	(0.0051)
Constant	1.0313*	0.0644	-0.0176	0.2519	-0.0326	0.1289	-0.7890	0.7321***	0.2699**	-0.0899
	(0.5956)	(0.2136)	(0.1437)	(0.2717)	(0.1820)	(0.3297)	(0.6009)	(0.2327)	(0.1324)	(0.4013)
Observations	876	876	876	876	876	876	876	876	876	876
R-squared	0.685	0.634	0.675	0.639	0.559	0.646	0.755	0.511	0.382	0.910

(Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1)
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table B. 6. Results of the restricted 2SLS model for the second-stage products

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
Price_KGI	-0.1344**	-0.0872*	-0.0144	0.0219	-0.0232*	0.0012	0.1113***	-0.0108	-0.0067	0.1472***
	(0.0556)	(0.0486)	(0.0165)	(0.0275)	(0.0127)	(0.0243)	(0.0257)	(0.0300)	(0.0116)	(0.0276)
Price_MGI	-0.0872*	0.0597	0.0940***	-0.0332	-0.0062	-0.0023	-0.0215	-0.0194	0.0226**	-0.0216**
	(0.0486)	(0.0576)	(0.0145)	(0.0267)	(0.0115)	(0.0163)	(0.0177)	(0.0316)	(0.0098)	(0.0102)
Price_SGI	-0.0144	0.0940***	0.0068	-0.0366***	-0.0134**	-0.0073	-0.0195**	-0.0112	0.0043	-0.0852***
	(0.0165)	(0.0145)	(0.0103)	(0.0127)	(0.0055)	(0.0099)	(0.0096)	(0.0138)	(0.0053)	(0.0258)
Price_MES	0.0219	-0.0332	-0.0366***	0.1098***	0.0045	0.0146	-0.0395**	-0.0016	-0.0194**	0.0039
	(0.0275)	(0.0267)	(0.0127)	(0.0292)	(0.0097)	(0.0170)	(0.0174)	(0.0261)	(0.0090)	(0.0187)
Price_MAS	-0.0232*	-0.0062	-0.0134**	0.0045	0.0319***	-0.0223***	0.0187**	0.0001	0.0057	0.0154*
	(0.0127)	(0.0115)	(0.0055)	(0.0097)	(0.0058)	(0.0085)	(0.0088)	(0.0115)	(0.0040)	(0.0091)
Price_SU	0.0012	-0.0023	-0.0073	0.0146	-0.0223***	0.0576**	-0.0808***	0.0198	0.0099	0.0209
	(0.0243)	(0.0163)	(0.0099)	(0.0170)	(0.0085)	(0.0268)	(0.0199)	(0.0172)	(0.0084)	(0.0207)
Price_CAY	0.1113***	-0.0215	-0.0195**	-0.0395**	0.0187**	-0.0808***	0.0096	-0.0081	-0.0173**	0.0235
	(0.0257)	(0.0177)	(0.0096)	(0.0174)	(0.0088)	(0.0199)	(0.0283)	(0.0198)	(0.0081)	(0.0204)
Price_COF	-0.0108	-0.0194	-0.0112	-0.0016	0.0001	0.0198	-0.0081	0.0736**	-0.0183*	0.0033
	(0.0300)	(0.0316)	(0.0138)	(0.0261)	(0.0115)	(0.0172)	(0.0198)	(0.0349)	(0.0098)	(0.0188)
Price_TKAH	-0.0067	0.0226**	0.0043	-0.0194**	0.0057	0.0099	-0.0173**	-0.0183*	0.0271***	-0.0209**
	(0.0116)	(0.0098)	(0.0053)	(0.0090)	(0.0040)	(0.0084)	(0.0081)	(0.0098)	(0.0057)	(0.0088)
Price_BEER	0.1472***	-0.0216**	-0.0216**	0.0039	0.0154*	0.0209	0.0235	0.0033	-0.0209**	-0.1069***
	(0.0276)	(0.0102)	(0.0102)	(0.0187)	(0.0091)	(0.0207)	(0.0204)	(0.0188)	(0.0088)	(0.0312)
Price_RAKI	-0.0048	0.0151	0.0188***	-0.0243*	-0.0112*	-0.0112	0.0236	-0.0274**	0.0128**	0.0205
	(0.0233)	(0.0120)	(0.0069)	(0.0131)	(0.0068)	(0.0177)	(0.0177)	(0.0131)	(0.0062)	(0.0185)
Income2	-0.0278***	0.0009	-0.0011	-0.0019	-0.0016	0.0221***	-0.0233***	0.0065**	0.0005	0.0094***
	(0.0053)	(0.0022)	(0.0013)	(0.0024)	(0.0014)	(0.0035)	(0.0041)	(0.0025)	(0.0012)	(0.0034)
ab	0.0091	-0.0105	0.0038	0.0050	-0.0017	0.0054	-0.0075	-0.0072	0.0035	-0.0039
	(0.0264)	(0.0091)	(0.0057)	(0.0103)	(0.0069)	(0.0173)	(0.0223)	(0.0108)	(0.0055)	(0.0158)
c1	0.0503	0.0023	0.0065	-0.0049	0.0063	0.0053	-0.1175***	-0.0158	-0.0060	0.0185
	(0.0407)	(0.0142)	(0.0090)	(0.0162)	(0.0107)	(0.0270)	(0.0345)	(0.0169)	(0.0086)	(0.0247)

Table B.6. (Continued)

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
c2	0.0506	-0.0166	0.0035	0.0136	-0.0078	-0.0329	-0.0898**	-0.0265	0.0047	0.0365
	(0.0430)	(0.0150)	(0.0094)	(0.0171)	(0.0113)	(0.0283)	(0.0364)	(0.0178)	(0.0091)	(0.0260)
agehh	0.0039	-0.0015	-0.0074	-0.0034	0.0069	-0.0290	0.0468	-0.0406**	-0.0105	0.0303
	(0.0453)	(0.0160)	(0.0101)	(0.0179)	(0.0118)	(0.0295)	(0.0379)	(0.0190)	(0.0095)	(0.0275)
sq_agehh	-0.0000	0.0000	0.0001	0.0000	-0.0001	0.0003	-0.0005	0.0005**	0.0001	-0.0004
	(0.0005)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0003)	(0.0004)	(0.0002)	(0.0001)	(0.0003)
ageps	-0.0126	0.0003	0.0086*	-0.0042	-0.0024	-0.0099	0.0035	-0.0014	0.0020	0.0020
	(0.0233)	(0.0083)	(0.0051)	(0.0092)	(0.0061)	(0.0154)	(0.0197)	(0.0096)	(0.0049)	(0.0140)
sq_ageps	0.0002	-0.0000	-0.0001*	0.0001	0.0000	0.0001	-0.0000	0.0000	-0.0000	-0.0000
	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0001)	(0.0001)	(0.0002)
urban	-0.0013	0.0072	0.0018	-0.0001	0.0006	0.0028	-0.0175	-0.0007	-0.0006	-0.0063
	(0.0147)	(0.0052)	(0.0034)	(0.0060)	(0.0039)	(0.0097)	(0.0124)	(0.0062)	(0.0031)	(0.0092)
holiday	0.2743***	0.0748***	0.0206***	-0.0795***	-0.0030	-0.0142	-0.1457***	-0.0083	0.0057	-0.0383*
	(0.0337)	(0.0121)	(0.0075)	(0.0136)	(0.0088)	(0.0220)	(0.0284)	(0.0143)	(0.0071)	(0.0203)
temp	0.0037***	-0.0000	0.0003	0.0006	0.0007**	-0.0020***	-0.0019**	-0.0002	-0.0004	-0.0007
	(0.0010)	(0.0004)	(0.0002)	(0.0004)	(0.0003)	(0.0007)	(0.0009)	(0.0005)	(0.0002)	(0.0006)
city1	-0.0118	-0.0208*	0.0310***	0.0136	0.0065	0.0231**	-0.0843***	-0.0034	0.0344***	0.0347***
	(0.0167)	(0.0121)	(0.0052)	(0.0093)	(0.0054)	(0.0113)	(0.0130)	(0.0104)	(0.0043)	(0.0106)
city2	0.0055	0.0108*	0.0147***	0.0116**	0.0213***	0.0030	-0.0333***	-0.0205***	0.0047*	0.0075
	(0.0105)	(0.0061)	(0.0031)	(0.0054)	(0.0032)	(0.0078)	(0.0085)	(0.0059)	(0.0028)	(0.0071)
city3	-0.0358**	-0.0344***	-0.0273***	0.0264**	0.0341***	0.0087	-0.0479***	0.0177*	0.0055	0.0442***
	(0.0165)	(0.0102)	(0.0058)	(0.0107)	(0.0059)	(0.0131)	(0.0129)	(0.0103)	(0.0050)	(0.0119)
city4	-0.0781***	0.0236*	0.0680***	-0.0227*	-0.0101*	0.0306**	-0.0561***	-0.0060	0.0274***	0.0299**
	(0.0191)	(0.0130)	(0.0064)	(0.0131)	(0.0061)	(0.0126)	(0.0138)	(0.0134)	(0.0057)	(0.0148)
city5	-0.0938***	0.0068	-0.0123	0.0221	0.0470***	-0.0191	0.0090	-0.0299	0.0260***	0.0632***
	(0.0311)	(0.0279)	(0.0124)	(0.0227)	(0.0127)	(0.0206)	(0.0222)	(0.0277)	(0.0092)	(0.0208)
city6	0.0118	-0.0060	0.0129***	0.0147**	0.0191***	0.1645***	-0.1154***	-0.0278***	0.0237***	-0.0244***
	(0.0133)	(0.0072)	(0.0038)	(0.0067)	(0.0037)	(0.0090)	(0.0105)	(0.0069)	(0.0038)	(0.0085)

Table B.6. (Continued)

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
city7	0.0257**	-0.0163***	0.0199***	0.0118**	0.0154***	0.0191**	-0.0967***	-0.0146**	0.0109***	0.0365***
	(0.0122)	(0.0055)	(0.0031)	(0.0054)	(0.0033)	(0.0080)	(0.0097)	(0.0059)	(0.0030)	(0.0074)
city8	-0.0564***	0.0105	-0.0184***	0.0149*	0.0140***	0.0108	0.0406***	0.0181*	0.0191***	0.0025
	(0.0170)	(0.0081)	(0.0046)	(0.0081)	(0.0049)	(0.0108)	(0.0132)	(0.0092)	(0.0040)	(0.0107)
city9	-0.0240	0.0215	0.0235**	-0.0214	-0.0076	0.0931***	-0.0558***	0.0132	0.0214***	0.0001
	(0.0223)	(0.0199)	(0.0094)	(0.0203)	(0.0080)	(0.0136)	(0.0152)	(0.0209)	(0.0066)	(0.0151)
city10	-0.0205	0.0169	-0.0082	0.0558***	0.0123**	0.0036	-0.0522***	-0.0203	0.0047	0.0130
	(0.0190)	(0.0133)	(0.0071)	(0.0145)	(0.0062)	(0.0149)	(0.0146)	(0.0135)	(0.0059)	(0.0141)
city11	-0.0340*	-0.0170	-0.0139**	0.0281**	0.0333***	0.0423***	0.0235	0.0146	0.0272***	-0.0260*
	(0.0198)	(0.0144)	(0.0066)	(0.0117)	(0.0072)	(0.0132)	(0.0156)	(0.0138)	(0.0053)	(0.0133)
m1	-0.0411***	-0.0053	-0.0020	-0.0000	0.0026	0.0182***	0.0139*	0.0117***	0.0013	0.0042
	(0.0093)	(0.0035)	(0.0022)	(0.0039)	(0.0025)	(0.0062)	(0.0078)	(0.0042)	(0.0020)	(0.0057)
m2	-0.0517***	-0.0032	0.0000	-0.0001	0.0027	0.0206***	0.0129	0.0116**	0.0027	0.0059
	(0.0101)	(0.0039)	(0.0024)	(0.0043)	(0.0027)	(0.0069)	(0.0083)	(0.0046)	(0.0022)	(0.0063)
m3	-0.0575***	-0.0012	0.0018	0.0080**	0.0003	0.0179***	0.0221***	0.0064	0.0023	0.0069
	(0.0098)	(0.0036)	(0.0023)	(0.0041)	(0.0026)	(0.0066)	(0.0082)	(0.0042)	(0.0021)	(0.0061)
m4	-0.0680***	0.0008	0.0027	0.0113**	-0.0005	0.0169**	0.0219**	0.0038	0.0026	0.0139*
	(0.0117)	(0.0045)	(0.0027)	(0.0049)	(0.0031)	(0.0078)	(0.0098)	(0.0051)	(0.0025)	(0.0071)
m5	-0.0598***	0.0087	0.0068**	0.0031	-0.0067*	0.0288***	0.0117	0.0014	0.0038	0.0217**
	(0.0151)	(0.0054)	(0.0034)	(0.0061)	(0.0040)	(0.0099)	(0.0127)	(0.0064)	(0.0032)	(0.0094)
m6	-0.0388**	0.0150**	0.0080*	-0.0163**	-0.0093*	0.0392***	-0.0001	-0.0061	0.0061	0.0293**
	(0.0192)	(0.0071)	(0.0043)	(0.0078)	(0.0051)	(0.0125)	(0.0161)	(0.0083)	(0.0041)	(0.0117)
m7	-0.0151	0.0195**	0.0083*	-0.0292***	-0.0088	0.0392***	-0.0030	-0.0104	0.0036	0.0292**
	(0.0217)	(0.0077)	(0.0048)	(0.0086)	(0.0057)	(0.0142)	(0.0183)	(0.0091)	(0.0046)	(0.0131)
m8	-0.0302	0.0135*	0.0109**	-0.0269***	-0.0086	0.0450***	0.0027	-0.0093	0.0044	0.0306**
	(0.0211)	(0.0075)	(0.0047)	(0.0084)	(0.0055)	(0.0138)	(0.0178)	(0.0089)	(0.0044)	(0.0128)
m9	-0.0587***	0.0040	0.0051	-0.0001	-0.0072	0.0452***	0.0059	-0.0033	0.0031	0.0239**
	(0.0179)	(0.0061)	(0.0039)	(0.0071)	(0.0047)	(0.0117)	(0.0150)	(0.0074)	(0.0038)	(0.0109)

Table B.6. (Continued)

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
m10	-0.0381***	0.0026	0.0055*	0.0105*	-0.0016	0.0392***	-0.0029	0.0036	0.0030	0.0023
	(0.0141)	(0.0049)	(0.0031)	(0.0056)	(0.0037)	(0.0093)	(0.0118)	(0.0059)	(0.0030)	(0.0086)
m11	-0.0143	0.0033	0.0031	0.0016	0.0043	0.0379***	-0.0054	0.0089*	0.0032	-0.0138*
	(0.0115)	(0.0044)	(0.0027)	(0.0049)	(0.0031)	(0.0077)	(0.0095)	(0.0052)	(0.0025)	(0.0072)
Constant	0.3961	0.0476	-0.0019	0.2687	-0.0751	0.7510	-0.5923	0.9539***	0.2071	-0.6491
	(0.7871)	(0.2885)	(0.1787)	(0.3181)	(0.2075)	(0.5181)	(0.6570)	(0.3396)	(0.1679)	(0.4828)
Observations	864	864	864	864	864	864	864	864	864	864
R-squared	0.601	0.554	0.485	0.596	0.341	0.560	0.662	0.437	0.257	0.823

(Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1)
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table B. 7. Results of the restricted SUR model for the second-stage products

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
Price_KGI	-0.0346*	-0.0271***	0.0246***	0.0071	-0.0077*	-0.0162**	-0.0018	-0.0087*	-0.0070*	0.0671***
	(0.0184)	(0.0088)	(0.0056)	(0.0076)	(0.0041)	(0.0071)	(0.0103)	(0.0051)	(0.0039)	(0.0096)
Price_MGI	-0.0271***	0.0337***	0.0179***	-0.0099**	-0.0066***	-0.0041	-0.0083**	0.0026	0.0056**	-0.0136***
	(0.0088)	(0.0081)	(0.0039)	(0.0043)	(0.0021)	(0.0033)	(0.0042)	(0.0025)	(0.0024)	(0.0027)
Price_SGI	0.0246***	0.0179***	0.0056	-0.0091***	-0.0097***	-0.0030	-0.0120***	-0.0037**	-0.0030*	-0.0177***
	(0.0056)	(0.0039)	(0.0038)	(0.0031)	(0.0015)	(0.0024)	(0.0029)	(0.0018)	(0.0018)	(0.0068)
Price_MES	0.0071	-0.0099**	-0.0091***	0.0535***	0.0062**	0.0012	-0.0242***	-0.0001	-0.0021	-0.0159***
	(0.0076)	(0.0043)	(0.0031)	(0.0064)	(0.0024)	(0.0040)	(0.0052)	(0.0030)	(0.0024)	(0.0052)
Price_MAS	-0.0077*	-0.0066***	-0.0097***	0.0062**	0.0211***	-0.0027	-0.0015	0.0005	0.0013	-0.0010
	(0.0041)	(0.0021)	(0.0015)	(0.0024)	(0.0020)	(0.0023)	(0.0032)	(0.0017)	(0.0013)	(0.0031)
Price_SU	-0.0162**	-0.0041	-0.0030	0.0012	-0.0027	0.0349***	-0.0442***	0.0008	-0.0056***	0.0118**
	(0.0071)	(0.0033)	(0.0024)	(0.0040)	(0.0023)	(0.0054)	(0.0056)	(0.0028)	(0.0020)	(0.0050)
Price_CAY	-0.0018	-0.0083**	-0.0120***	-0.0242***	-0.0015	-0.0442***	0.1181***	-0.0163***	-0.0049*	-0.0119*
	(0.0103)	(0.0042)	(0.0029)	(0.0052)	(0.0032)	(0.0056)	(0.0123)	(0.0040)	(0.0026)	(0.0070)
Price_COF	-0.0087*	0.0026	-0.0037**	-0.0001	0.0005	0.0008	-0.0163***	0.0228***	0.0029*	0.0044
	(0.0051)	(0.0025)	(0.0018)	(0.0030)	(0.0017)	(0.0028)	(0.0040)	(0.0030)	(0.0015)	(0.0037)
Price_TKAH	-0.0070*	0.0056**	-0.0030*	-0.0021	0.0013	-0.0056***	-0.0049*	0.0029*	0.0197***	-0.0081***
	(0.0039)	(0.0024)	(0.0018)	(0.0024)	(0.0013)	(0.0020)	(0.0026)	(0.0015)	(0.0018)	(0.0026)
Price_BEER	0.0671***	-0.0136***	-0.0136***	-0.0159***	-0.0010	0.0118**	-0.0119*	0.0044	-0.0081***	0.0133
	(0.0096)	(0.0027)	(0.0027)	(0.0052)	(0.0031)	(0.0050)	(0.0070)	(0.0037)	(0.0026)	(0.0092)
Price_RAKI	0.0042	0.0099***	0.0059***	-0.0065**	0.0001	0.0272***	0.0071	-0.0051**	0.0012	-0.0283***
	(0.0066)	(0.0025)	(0.0018)	(0.0033)	(0.0021)	(0.0036)	(0.0058)	(0.0026)	(0.0016)	(0.0051)
Income2	-0.0076***	-0.0007*	-0.0010***	-0.0004	0.0002	0.0047***	-0.0179***	0.0003	-0.0001	0.0068***
	(0.0011)	(0.0004)	(0.0003)	(0.0005)	(0.0003)	(0.0006)	(0.0011)	(0.0004)	(0.0002)	(0.0007)
ab	0.0120	-0.0094	0.0055	0.0089	0.0003	-0.0126	0.0016	-0.0113	0.0037	-0.0040
	(0.0202)	(0.0072)	(0.0048)	(0.0092)	(0.0061)	(0.0111)	(0.0203)	(0.0079)	(0.0045)	(0.0136)
c1	0.0760***	0.0124	0.0079	0.0015	0.0129	-0.0418***	-0.1187***	-0.0144	-0.0050	0.0262
	(0.0292)	(0.0104)	(0.0071)	(0.0134)	(0.0089)	(0.0161)	(0.0292)	(0.0114)	(0.0065)	(0.0199)

Table B.7. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
c2	0.1057***	0.0053	-0.0106	0.0291**	0.0165*	-0.0223	-0.1696***	0.0062	-0.0012	0.0114
	(0.0314)	(0.0114)	(0.0077)	(0.0146)	(0.0097)	(0.0175)	(0.0314)	(0.0124)	(0.0071)	(0.0214)
agehh	-0.0465	-0.0026	-0.0043	-0.0017	-0.0004	0.0219	0.0565*	-0.0241*	-0.0107	0.0052
	(0.0334)	(0.0120)	(0.0081)	(0.0152)	(0.0102)	(0.0185)	(0.0337)	(0.0130)	(0.0074)	(0.0225)
sq_agehh	0.0005	0.0000	0.0001	-0.0000	0.0000	-0.0003	-0.0006	0.0003*	0.0001	-0.0001
	(0.0004)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0004)	(0.0001)	(0.0001)	(0.0003)
ageps	0.0066	-0.0006	0.0073*	-0.0062	0.0027	-0.0303***	0.0026	-0.0084	-0.0006	0.0060
	(0.0177)	(0.0064)	(0.0043)	(0.0081)	(0.0054)	(0.0098)	(0.0179)	(0.0069)	(0.0039)	(0.0119)
sq_ageps	-0.0001	-0.0000	-0.0001*	0.0001	-0.0000	0.0005***	-0.0000	0.0001	0.0000	-0.0001
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0002)
urban	0.0220**	0.0101***	0.0022	-0.0011	0.0067**	-0.0179***	-0.0325***	-0.0009	-0.0013	0.0042
	(0.0102)	(0.0037)	(0.0025)	(0.0047)	(0.0032)	(0.0057)	(0.0102)	(0.0040)	(0.0023)	(0.0071)
holiday	0.2895***	0.0730***	0.0173***	-0.0735***	-0.0039	-0.0277*	-0.1548***	-0.0133	0.0053	-0.0287
	(0.0260)	(0.0093)	(0.0063)	(0.0119)	(0.0079)	(0.0144)	(0.0263)	(0.0102)	(0.0058)	(0.0175)
temp	0.0028***	0.0001	0.0002	0.0006*	0.0006***	-0.0011***	-0.0028***	0.0001	-0.0002	-0.0003
	(0.0008)	(0.0003)	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0008)	(0.0003)	(0.0002)	(0.0005)
city1	0.0617***	-0.0318***	0.0224***	0.0185***	0.0047*	0.0014	-0.1110***	-0.0054	0.0298***	0.0310***
	(0.0085)	(0.0033)	(0.0022)	(0.0040)	(0.0027)	(0.0047)	(0.0085)	(0.0033)	(0.0020)	(0.0057)
city2	0.0157**	-0.0020	0.0101***	0.0220***	0.0150***	0.0063	-0.0311***	-0.0113***	0.0021	0.0115**
	(0.0068)	(0.0026)	(0.0018)	(0.0032)	(0.0021)	(0.0038)	(0.0068)	(0.0027)	(0.0016)	(0.0046)
city3	-0.0092	-0.0323***	-0.0119***	0.0199***	0.0233***	0.0125**	-0.0603***	-0.0001	0.0125***	0.0264***
	(0.0087)	(0.0035)	(0.0025)	(0.0044)	(0.0031)	(0.0049)	(0.0082)	(0.0035)	(0.0022)	(0.0060)
city4	-0.0355***	-0.0030	0.0479***	0.0066*	-0.0028	0.0208***	-0.0309***	0.0077**	0.0216***	0.0078
	(0.0081)	(0.0034)	(0.0024)	(0.0040)	(0.0025)	(0.0044)	(0.0074)	(0.0032)	(0.0021)	(0.0058)
city5	0.0119	-0.0227***	-0.0168***	0.0357***	0.0313***	-0.0220***	-0.0432***	-0.0174***	0.0109***	0.0561***
	(0.0107)	(0.0046)	(0.0033)	(0.0056)	(0.0042)	(0.0060)	(0.0098)	(0.0043)	(0.0029)	(0.0075)
city6	-0.0212***	-0.0171***	0.0050**	0.0298***	0.0068***	0.1906***	-0.1069***	-0.0080***	0.0221***	-0.0184***
	(0.0072)	(0.0028)	(0.0020)	(0.0034)	(0.0022)	(0.0040)	(0.0070)	(0.0028)	(0.0018)	(0.0048)

Table B.7. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
city7	-0.0022	-0.0250***	0.0157***	0.0175***	0.0122***	0.0380***	-0.0858***	-0.0005	0.0082***	0.0393***
	(0.0073)	(0.0027)	(0.0018)	(0.0034)	(0.0022)	(0.0040)	(0.0073)	(0.0028)	(0.0017)	(0.0049)
city8	-0.0072	0.0045	-0.0140***	0.0156***	0.0155***	-0.0305***	0.0541***	0.0034	0.0118***	-0.0087*
	(0.0077)	(0.0029)	(0.0020)	(0.0036)	(0.0024)	(0.0043)	(0.0077)	(0.0030)	(0.0018)	(0.0052)
city9	-0.0006	0.0043	0.0132***	0.0075*	0.0002	0.0618***	-0.0284***	-0.0045	0.0156***	0.0008
	(0.0079)	(0.0032)	(0.0023)	(0.0041)	(0.0025)	(0.0044)	(0.0074)	(0.0032)	(0.0020)	(0.0054)
city10	0.0064	0.0059	-0.0054**	0.0485***	0.0132***	-0.0326***	-0.0199**	-0.0096***	0.0099***	0.0074
	(0.0085)	(0.0036)	(0.0026)	(0.0048)	(0.0027)	(0.0047)	(0.0078)	(0.0033)	(0.0023)	(0.0058)
city11	0.0446***	-0.0372***	-0.0159***	0.0343***	0.0281***	0.0141***	0.0037	0.0050	0.0186***	-0.0232***
	(0.0088)	(0.0035)	(0.0025)	(0.0044)	(0.0031)	(0.0049)	(0.0087)	(0.0035)	(0.0022)	(0.0061)
m1	-0.0257***	-0.0044*	-0.0016	0.0015	0.0034*	0.0064*	0.0143**	0.0065**	0.0018	0.0014
	(0.0065)	(0.0023)	(0.0016)	(0.0030)	(0.0020)	(0.0036)	(0.0066)	(0.0026)	(0.0015)	(0.0044)
m2	-0.0300***	-0.0037	-0.0007	0.0026	0.0036*	0.0053	0.0149**	0.0062**	0.0029**	0.0028
	(0.0066)	(0.0024)	(0.0016)	(0.0030)	(0.0020)	(0.0036)	(0.0066)	(0.0026)	(0.0015)	(0.0044)
m3	-0.0424***	-0.0024	0.0009	0.0110***	0.0004	0.0073*	0.0262***	0.0031	0.0018	0.0030
	(0.0070)	(0.0025)	(0.0017)	(0.0032)	(0.0021)	(0.0039)	(0.0071)	(0.0027)	(0.0016)	(0.0047)
m4	-0.0545***	-0.0016	0.0025	0.0121***	-0.0008	0.0064	0.0302***	0.0022	0.0017	0.0103*
	(0.0084)	(0.0030)	(0.0020)	(0.0038)	(0.0026)	(0.0047)	(0.0085)	(0.0033)	(0.0019)	(0.0057)
m5	-0.0352***	0.0080**	0.0053**	0.0046	-0.0041	0.0150**	0.0180	-0.0042	0.0013	0.0120
	(0.0110)	(0.0039)	(0.0026)	(0.0050)	(0.0033)	(0.0061)	(0.0111)	(0.0043)	(0.0024)	(0.0074)
m6	-0.0205	0.0124**	0.0075**	-0.0159**	-0.0080*	0.0227***	0.0157	-0.0099*	0.0033	0.0201**
	(0.0142)	(0.0051)	(0.0034)	(0.0065)	(0.0043)	(0.0079)	(0.0143)	(0.0055)	(0.0031)	(0.0096)
m7	-0.0034	0.0166***	0.0078*	-0.0284***	-0.0084*	0.0296***	0.0097	-0.0126*	0.0013	0.0222**
	(0.0166)	(0.0059)	(0.0040)	(0.0075)	(0.0051)	(0.0092)	(0.0167)	(0.0065)	(0.0037)	(0.0111)
m8	-0.0183	0.0110*	0.0105***	-0.0273***	-0.0075	0.0328***	0.0167	-0.0124**	0.0022	0.0244**
	(0.0161)	(0.0058)	(0.0039)	(0.0073)	(0.0049)	(0.0089)	(0.0163)	(0.0063)	(0.0036)	(0.0108)
m9	-0.0397***	0.0010	0.0050	0.0013	-0.0053	0.0294***	0.0189	-0.0092*	0.0013	0.0165*
	(0.0133)	(0.0048)	(0.0032)	(0.0061)	(0.0041)	(0.0074)	(0.0135)	(0.0052)	(0.0030)	(0.0090)

Table B.7. (Continued)

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
m10	-0.0196*	-0.0004	0.0055**	0.0123***	-0.0004	0.0220***	0.0097	-0.0027	0.0020	-0.0021
	(0.0101)	(0.0036)	(0.0024)	(0.0046)	(0.0031)	(0.0056)	(0.0102)	(0.0039)	(0.0022)	(0.0068)
m11	0.0072	0.0013	0.0030*	0.0038	0.0056**	0.0169***	0.0056	0.0005	0.0033**	-0.0166***
	(0.0074)	(0.0026)	(0.0018)	(0.0034)	(0.0023)	(0.0041)	(0.0075)	(0.0029)	(0.0016)	(0.0050)
Constant	1.0040*	0.1089	-0.0360	0.2529	-0.0270	0.1303	-0.8050	0.7441***	0.2678**	-0.1848
	(0.5802)	(0.2079)	(0.1399)	(0.2647)	(0.1772)	(0.3212)	(0.5856)	(0.2266)	(0.1289)	(0.3911)
Observations	876	876	876	876	876	876	876	876	876	876
R-squared	0.681	0.630	0.675	0.639	0.562	0.643	0.752	0.510	0.382	0.909

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table B. 8. Results of the restricted 3SLS model for the second-stage products (cities and months)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
Price_KGI	-0.1420***	-0.0703	-0.0200	0.0213	-0.0195	-0.0242	0.1366***	-0.0097	-0.0110	0.1185***
	(0.0543)	(0.0435)	(0.0162)	(0.0263)	(0.0123)	(0.0237)	(0.0262)	(0.0270)	(0.0112)	(0.0261)
Price_MGI	-0.0703	0.0350	0.0979***	-0.0273	-0.0096	-0.0016	-0.0162	-0.0266	0.0247***	-0.0157
	(0.0435)	(0.0504)	(0.0133)	(0.0242)	(0.0102)	(0.0149)	(0.0164)	(0.0279)	(0.0089)	(0.0100)
Price_SGI	-0.0200	0.0979***	0.0088	-0.0304**	-0.0139***	-0.0142	-0.0121	-0.0152	0.0026	-0.0573***
	(0.0162)	(0.0133)	(0.0098)	(0.0119)	(0.0050)	(0.0091)	(0.0091)	(0.0123)	(0.0050)	(0.0170)
Price_MES	0.0213	-0.0273	-0.0304**	0.1130***	0.0095	0.0204	-0.0621***	-0.0213	-0.0128	0.0036
	(0.0263)	(0.0242)	(0.0119)	(0.0276)	(0.0090)	(0.0155)	(0.0163)	(0.0233)	(0.0084)	(0.0176)
Price_MAS	-0.0195	-0.0096	-0.0139***	0.0095	0.0324***	-0.0285***	0.0243***	-0.0048	0.0068*	0.0160*
	(0.0123)	(0.0102)	(0.0050)	(0.0090)	(0.0054)	(0.0076)	(0.0085)	(0.0100)	(0.0037)	(0.0089)
Price_SU	-0.0242	-0.0016	-0.0142	0.0204	-0.0285***	0.0908***	-0.0922***	0.0351**	0.0072	0.0102
	(0.0237)	(0.0149)	(0.0091)	(0.0155)	(0.0076)	(0.0218)	(0.0173)	(0.0144)	(0.0076)	(0.0184)
Price_CAY	0.1366***	-0.0162	-0.0121	-0.0621***	0.0243***	-0.0922***	0.0027	-0.0038	-0.0149**	0.0318*
	(0.0262)	(0.0164)	(0.0091)	(0.0163)	(0.0085)	(0.0173)	(0.0280)	(0.0175)	(0.0076)	(0.0192)
Price_COF	-0.0097	-0.0266	-0.0152	-0.0213	-0.0048	0.0351**	-0.0038	0.0906***	-0.0165*	-0.0066
	(0.0270)	(0.0279)	(0.0123)	(0.0233)	(0.0100)	(0.0144)	(0.0175)	(0.0305)	(0.0086)	(0.0165)
Price_TKAH	-0.0110	0.0247***	0.0026	-0.0128	0.0068*	0.0072	-0.0149**	-0.0165*	0.0239***	-0.0233***
	(0.0112)	(0.0089)	(0.0050)	(0.0084)	(0.0037)	(0.0076)	(0.0076)	(0.0086)	(0.0053)	(0.0085)
Price_BEER	0.1185***	-0.0157	-0.0157	0.0036	0.0160*	0.0102	0.0318*	-0.0066	-0.0233***	-0.0849***
	(0.0261)	(0.0100)	(0.0100)	(0.0176)	(0.0089)	(0.0184)	(0.0192)	(0.0165)	(0.0085)	(0.0307)
Price_RAKI	0.0203	0.0098	0.0122*	-0.0139	-0.0127**	-0.0030	0.0059	-0.0212*	0.0135**	0.0077
	(0.0202)	(0.0112)	(0.0067)	(0.0123)	(0.0061)	(0.0144)	(0.0144)	(0.0114)	(0.0058)	(0.0173)
Income2	-0.0319***	0.0005	-0.0011	-0.0038*	-0.0020	0.0250***	-0.0210***	0.0083***	0.0002	0.0085**
	(0.0049)	(0.0020)	(0.0013)	(0.0022)	(0.0013)	(0.0031)	(0.0038)	(0.0023)	(0.0012)	(0.0033)
ab	0.0050	-0.0107	0.0035	0.0032	-0.0021	0.0122	-0.0106	-0.0034	0.0032	-0.0045
	(0.0257)	(0.0088)	(0.0056)	(0.0100)	(0.0067)	(0.0168)	(0.0217)	(0.0105)	(0.0053)	(0.0154)
c1	0.0428	0.0056	0.0091	-0.0089	0.0080	0.0123	-0.1260***	-0.0133	-0.0067	0.0206
	(0.0396)	(0.0138)	(0.0088)	(0.0157)	(0.0104)	(0.0261)	(0.0335)	(0.0163)	(0.0084)	(0.0240)

Table B.8. (Continued)

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
c2	0.0713*	-0.0147	0.0027	0.0170	-0.0064	-0.0398	-0.1020***	-0.0255	0.0039	0.0323
	(0.0415)	(0.0146)	(0.0092)	(0.0166)	(0.0109)	(0.0273)	(0.0350)	(0.0172)	(0.0088)	(0.0253)
agehh	0.0217	-0.0016	-0.0088	0.0020	0.0087	-0.0350	0.0390	-0.0434**	-0.0092	0.0281
	(0.0438)	(0.0154)	(0.0097)	(0.0173)	(0.0115)	(0.0284)	(0.0368)	(0.0182)	(0.0092)	(0.0267)
sq_agehh	-0.0003	0.0000	0.0001	-0.0000	-0.0001	0.0004	-0.0004	0.0005**	0.0001	-0.0003
	(0.0005)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0003)	(0.0004)	(0.0002)	(0.0001)	(0.0003)
ageps	-0.0211	-0.0009	0.0079	-0.0037	-0.0039	-0.0020	0.0032	0.0009	0.0016	0.0006
	(0.0227)	(0.0081)	(0.0050)	(0.0089)	(0.0059)	(0.0149)	(0.0192)	(0.0093)	(0.0048)	(0.0136)
sq_ageps	0.0003	0.0000	-0.0001*	0.0001	0.0001	0.0000	0.0000	-0.0000	-0.0000	-0.0000
	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0001)	(0.0001)	(0.0002)
urban	-0.0056	0.0082	0.0026	-0.0003	0.0006	0.0059	-0.0205*	-0.0004	-0.0010	-0.0047
	(0.0143)	(0.0051)	(0.0033)	(0.0058)	(0.0038)	(0.0093)	(0.0121)	(0.0060)	(0.0031)	(0.0089)
holiday	0.2693***	0.0728***	0.0193***	-0.0805***	-0.0044	-0.0128	-0.1397***	-0.0050	0.0046	-0.0398**
	(0.0327)	(0.0117)	(0.0073)	(0.0132)	(0.0086)	(0.0214)	(0.0276)	(0.0138)	(0.0069)	(0.0197)
temp	0.0040***	-0.0000	0.0002	0.0006	0.0007***	-0.0022***	-0.0020**	-0.0002	-0.0003	-0.0007
	(0.0010)	(0.0004)	(0.0002)	(0.0004)	(0.0003)	(0.0007)	(0.0008)	(0.0004)	(0.0002)	(0.0006)
city1	-0.0145	-0.0276**	0.0299***	0.0187**	0.0055	0.0235**	-0.0756***	-0.0067	0.0349***	0.0321***
	(0.0166)	(0.0108)	(0.0049)	(0.0087)	(0.0052)	(0.0104)	(0.0130)	(0.0093)	(0.0042)	(0.0105)
city2	0.0098	0.0100*	0.0156***	0.0138***	0.0225***	-0.0038	-0.0299***	-0.0237***	0.0045	0.0111
	(0.0103)	(0.0056)	(0.0031)	(0.0052)	(0.0031)	(0.0073)	(0.0083)	(0.0055)	(0.0028)	(0.0069)
city3	-0.0324**	-0.0374***	-0.0268***	0.0246**	0.0349***	0.0061	-0.0432***	0.0129	0.0086*	0.0450***
	(0.0165)	(0.0097)	(0.0056)	(0.0102)	(0.0058)	(0.0117)	(0.0123)	(0.0091)	(0.0047)	(0.0116)
city4	-0.0619***	0.0194	0.0661***	-0.0223*	-0.0102*	0.0334***	-0.0602***	-0.0003	0.0272***	0.0256*
	(0.0176)	(0.0119)	(0.0061)	(0.0122)	(0.0056)	(0.0110)	(0.0125)	(0.0118)	(0.0054)	(0.0136)
city5	-0.0962***	-0.0009	-0.0127	0.0383*	0.0480***	-0.0329*	0.0281	-0.0437*	0.0265***	0.0682***
	(0.0309)	(0.0249)	(0.0117)	(0.0211)	(0.0120)	(0.0192)	(0.0218)	(0.0246)	(0.0088)	(0.0206)
city6	0.0234*	-0.0069	0.0129***	0.0186***	0.0208***	0.1545***	-0.1152***	-0.0303***	0.0232***	-0.0225***
	(0.0127)	(0.0067)	(0.0037)	(0.0064)	(0.0036)	(0.0083)	(0.0102)	(0.0064)	(0.0037)	(0.0082)

Table B.8. (Continued)

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
city7	0.0321***	-0.0158***	0.0194***	0.0160***	0.0161***	0.0163**	-0.1009***	-0.0156***	0.0105***	0.0373***
	(0.0118)	(0.0052)	(0.0030)	(0.0052)	(0.0032)	(0.0074)	(0.0094)	(0.0055)	(0.0029)	(0.0072)
city8	-0.0728***	0.0095	-0.0196***	0.0155**	0.0128***	0.0201**	0.0473***	0.0216***	0.0180***	-0.0011
	(0.0162)	(0.0075)	(0.0044)	(0.0077)	(0.0048)	(0.0100)	(0.0127)	(0.0083)	(0.0038)	(0.0106)
city9	-0.0293	0.0174	0.0180**	-0.0271	-0.0120*	0.1103***	-0.0539***	0.0326*	0.0186***	-0.0068
	(0.0211)	(0.0179)	(0.0086)	(0.0188)	(0.0072)	(0.0125)	(0.0141)	(0.0186)	(0.0060)	(0.0139)
city10	-0.0200	0.0196	-0.0043	0.0570***	0.0160***	0.0048	-0.0603***	-0.0285**	0.0067	0.0138
	(0.0184)	(0.0122)	(0.0068)	(0.0140)	(0.0059)	(0.0134)	(0.0138)	(0.0121)	(0.0060)	(0.0135)
city11	-0.0458**	-0.0237*	-0.0153**	0.0349***	0.0316***	0.0457***	0.0356**	0.0119	0.0272***	-0.0243*
	(0.0195)	(0.0130)	(0.0063)	(0.0110)	(0.0069)	(0.0123)	(0.0154)	(0.0124)	(0.0051)	(0.0131)
m1	-0.0428***	-0.0060*	-0.0019	-0.0020	0.0024	0.0200***	0.0154**	0.0131***	0.0014	0.0034
	(0.0090)	(0.0033)	(0.0021)	(0.0037)	(0.0024)	(0.0059)	(0.0075)	(0.0039)	(0.0019)	(0.0055)
m2	-0.0537***	-0.0041	0.0004	-0.0025	0.0026	0.0220***	0.0155*	0.0127***	0.0027	0.0055
	(0.0097)	(0.0037)	(0.0023)	(0.0041)	(0.0026)	(0.0064)	(0.0080)	(0.0042)	(0.0021)	(0.0061)
m3	-0.0588***	-0.0017	0.0019	0.0065*	0.0003	0.0186***	0.0243***	0.0075*	0.0022	0.0064
	(0.0095)	(0.0034)	(0.0022)	(0.0039)	(0.0025)	(0.0063)	(0.0079)	(0.0040)	(0.0021)	(0.0059)
m4	-0.0699***	0.0009	0.0036	0.0104**	-0.0000	0.0169**	0.0235**	0.0031	0.0026	0.0147**
	(0.0113)	(0.0043)	(0.0026)	(0.0047)	(0.0030)	(0.0074)	(0.0094)	(0.0049)	(0.0025)	(0.0070)
m5	-0.0626***	0.0081	0.0070**	0.0020	-0.0068*	0.0321***	0.0127	0.0028	0.0038	0.0204**
	(0.0147)	(0.0052)	(0.0033)	(0.0059)	(0.0039)	(0.0096)	(0.0123)	(0.0062)	(0.0031)	(0.0092)
m6	-0.0430**	0.0151**	0.0087**	-0.0172**	-0.0090*	0.0417***	0.0014	-0.0056	0.0059	0.0288**
	(0.0186)	(0.0068)	(0.0042)	(0.0075)	(0.0049)	(0.0121)	(0.0156)	(0.0080)	(0.0040)	(0.0115)
m7	-0.0177	0.0196***	0.0089*	-0.0296***	-0.0085	0.0407***	-0.0020	-0.0103	0.0036	0.0293**
	(0.0210)	(0.0074)	(0.0047)	(0.0084)	(0.0055)	(0.0137)	(0.0178)	(0.0088)	(0.0044)	(0.0128)
m8	-0.0339*	0.0137*	0.0115**	-0.0274***	-0.0084	0.0476***	0.0034	-0.0090	0.0044	0.0305**
	(0.0205)	(0.0073)	(0.0045)	(0.0081)	(0.0054)	(0.0134)	(0.0173)	(0.0086)	(0.0043)	(0.0124)
m9	-0.0625***	0.0038	0.0054	-0.0018	-0.0073	0.0485***	0.0074	-0.0018	0.0030	0.0234**
	(0.0173)	(0.0059)	(0.0038)	(0.0069)	(0.0045)	(0.0113)	(0.0146)	(0.0071)	(0.0037)	(0.0107)

Table B.8. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	KGIw	MGIw	SGIw	MESw	MASw	SUw	CAYw	COFw	TKAHw	BEERw
m10	-0.0421***	0.0025	0.0060**	0.0083	-0.0016	0.0418***	-0.0008	0.0050	0.0029	0.0024
	(0.0136)	(0.0047)	(0.0030)	(0.0054)	(0.0036)	(0.0089)	(0.0114)	(0.0056)	(0.0029)	(0.0084)
m11	-0.0189*	0.0029	0.0036	-0.0017	0.0041	0.0409***	-0.0024	0.0109**	0.0031	-0.0141**
	(0.0110)	(0.0042)	(0.0026)	(0.0047)	(0.0029)	(0.0072)	(0.0091)	(0.0048)	(0.0024)	(0.0069)
Constant	0.1884	0.0732	0.0424	0.1477	-0.0827	0.7201	-0.4293	0.9619***	0.1897	-0.5760
	(0.7608)	(0.2765)	(0.1721)	(0.3062)	(0.2001)	(0.4960)	(0.6357)	(0.3231)	(0.1618)	(0.4667)
Observations	864	864	864	864	864	864	864	864	864	864
R-squared	0.626	0.558	0.653	0.604	0.245	0.547	0.660	0.383	0.221	0.781

(Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.1)
Author's own calculations using Ipsos/KGM and TURKSTAT data.

APPENDIX C

Results from the unrestricted 3SLS Model

Table C. 1. Results of the unrestricted 3SLS model for the first-stage products

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
Price_BEV	0.0531	-0.0911	0.0382	-0.0031
	(0.03918)	(0.06313)	(0.02583)	(0.02639)
Price_FOOD	0.0819	-0.6737*	0.4845***	0.1073
	(0.24144)	(0.39048)	(0.15979)	(0.16330)
Price_CLEANING	0.0921***	-0.2739***	0.1300***	0.0523**
	(0.03260)	(0.05271)	(0.02157)	(0.02204)
Price_PERCARE	-0.1291***	0.0640	0.0255	0.0389*
	(0.03369)	(0.05425)	(0.02219)	(0.02267)
Price_OTHER	-0.0256	0.0133	0.0147	-0.0023
	(0.01648)	(0.02668)	(0.01092)	(0.01116)
Income1	-0.0001	-0.0002	-0.0001	0.0004**
	(0.00028)	(0.00045)	(0.00018)	(0.00019)
ab	-0.0145*	0.0283**	-0.0063	-0.0079
	(0.00793)	(0.01267)	(0.00518)	(0.00529)
c1	-0.0298**	0.0438**	-0.0064	-0.0075
	(0.01224)	(0.01958)	(0.00801)	(0.00817)
c2	-0.0082	0.0201	-0.0073	-0.0048
	(0.01332)	(0.02133)	(0.00872)	(0.00890)
agehh	0.0123	0.0052	-0.0122	-0.0035
	(0.01328)	(0.02124)	(0.00869)	(0.00887)
sq_agehh	-0.0002	-0.0000	0.0001	0.0000
	(0.00015)	(0.00024)	(0.00010)	(0.00010)
ageps	-0.0067	0.0133	-0.0035	-0.0044
	(0.00729)	(0.01167)	(0.00477)	(0.00487)
sq_ageps	0.0001	-0.0002	0.0001	0.0001
	(0.00010)	(0.00016)	(0.00006)	(0.00007)
urban	-0.0150***	0.0220***	-0.0046	-0.0022
	(0.00453)	(0.00725)	(0.00296)	(0.00303)
holiday	0.0348***	-0.0770***	0.0182**	0.0221***
	(0.01140)	(0.01826)	(0.00747)	(0.00762)
temp	0.0006*	-0.0010**	0.0004**	0.0001
	(0.00030)	(0.00048)	(0.00020)	(0.00020)
city1	0.0045	0.0040	-0.0194***	0.0114**
	(0.00698)	(0.01122)	(0.00459)	(0.00469)
city2	0.0031	0.0123	-0.0194***	0.0051
	(0.00485)	(0.00780)	(0.00319)	(0.00326)
city3	0.0261***	-0.0196	-0.0292***	0.0216***
	(0.00769)	(0.01237)	(0.00506)	(0.00517)
city4	0.0116*	-0.0072	-0.0168***	0.0123***
	(0.00660)	(0.01062)	(0.00434)	(0.00444)
city5	-0.0066	0.0316**	-0.0237***	-0.0003
	(0.00906)	(0.01459)	(0.00597)	(0.00610)
city6	0.0362***	-0.0094	-0.0241***	-0.0025
	(0.00421)	(0.00676)	(0.00276)	(0.00282)
city7	0.0333***	-0.0237***	-0.0197***	0.0097***
	(0.00429)	(0.00688)	(0.00281)	(0.00287)
city8	0.0139	-0.0211	-0.0124**	0.0200***
	(0.00864)	(0.01392)	(0.00569)	(0.00582)

Table C.1. (Continued)

VARIABLES	(1) wBEV	(2) wFOOD	(3) wCLEANING	(4) wPERCARE
city9	-0.0115	0.0238**	-0.0208***	0.0078
	(0.00738)	(0.01187)	(0.00485)	(0.00496)
city10	0.0128	0.0037	-0.0276***	0.0117**
	(0.00791)	(0.01272)	(0.00520)	(0.00531)
city11	-0.0215***	0.0257***	-0.0257***	0.0207***
	(0.00471)	(0.00754)	(0.00309)	(0.00315)
m1	-0.0031	-0.0044	0.0046**	0.0026
	(0.00308)	(0.00494)	(0.00202)	(0.00206)
m2	0.0054*	-0.0255***	0.0091***	0.0110***
	(0.00287)	(0.00461)	(0.00189)	(0.00192)
m3	0.0119***	-0.0325***	0.0085***	0.0119***
	(0.00276)	(0.00441)	(0.00180)	(0.00184)
m4	0.0069**	-0.0191***	0.0061***	0.0055**
	(0.00329)	(0.00527)	(0.00215)	(0.00220)
m5	0.0099**	-0.0177**	0.0033	0.0029
	(0.00442)	(0.00707)	(0.00289)	(0.00295)
m6	0.0097*	-0.0166*	0.0008	0.0021
	(0.00551)	(0.00882)	(0.00361)	(0.00368)
m7	0.0090	-0.0145	-0.0019	0.0023
	(0.00655)	(0.01048)	(0.00429)	(0.00438)
m8	0.0065	-0.0106	-0.0020	0.0022
	(0.00641)	(0.01026)	(0.00420)	(0.00428)
m9	-0.0020	-0.0064	0.0024	0.0033
	(0.00553)	(0.00885)	(0.00362)	(0.00369)
m10	-0.0080**	0.0104	0.0015	-0.0057**
	(0.00404)	(0.00647)	(0.00265)	(0.00270)
m11	-0.0124***	0.0210***	-0.0034*	-0.0058***
	(0.00301)	(0.00482)	(0.00197)	(0.00201)
Constant	-0.0323	0.3274	0.4528***	0.2340
	(0.22512)	(0.35992)	(0.14721)	(0.15022)
Observations	864	864	864	864
R-squared	0.561	0.554	0.633	0.632

Standard errors in parentheses , *** p<0.01, ** p<0.05, * p<0.
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table C. 2. Results of the restricted 3SLS model for the second-stage products

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
Price_KGI	-0.1555	-0.0872*	-0.0128	-0.0395	-0.0003	-0.4217***	0.0233	-0.0025	0.0606**	0.4521***
	(0.1613)	(0.0503)	(0.0373)	(0.0602)	(0.0525)	(0.1044)	(0.1518)	(0.1054)	(0.0295)	(0.1192)
Price_MGI	-0.1023	0.0334	0.1087**	0.0146	-0.0584	0.3932***	0.1639	-0.1334	-0.0531	-0.3042**
	(0.2015)	(0.0629)	(0.0467)	(0.0753)	(0.0657)	(0.1305)	(0.1900)	(0.1319)	(0.0369)	(0.1493)
Price_SGI	-0.0123	0.1059***	0.0060	-0.0094	-0.0192	-0.0059	0.0668	0.0330	-0.0013	-0.0640
	(0.0633)	(0.0198)	(0.0147)	(0.0237)	(0.0207)	(0.0410)	(0.0598)	(0.0415)	(0.0116)	(0.0470)
Price_MES	-0.0772	-0.0519*	-0.0164	0.0838**	0.0486	0.0763	-0.0505	-0.0196	-0.0287	0.0978
	(0.1004)	(0.0313)	(0.0233)	(0.0375)	(0.0327)	(0.0650)	(0.0946)	(0.0657)	(0.0184)	(0.0743)
Price_MAS	-0.0262	-0.0107	-0.0033	-0.0166	0.0154	-0.0120	0.0469	-0.0495*	-0.0001	0.0554*
	(0.0424)	(0.0132)	(0.0098)	(0.0159)	(0.0138)	(0.0275)	(0.0400)	(0.0278)	(0.0078)	(0.0314)
Price_SU	0.0814	-0.0180	-0.0010	-0.0157	-0.0313*	-0.0250	-0.0530	-0.0133	0.0013	0.0278
	(0.0554)	(0.0172)	(0.0128)	(0.0206)	(0.0180)	(0.0358)	(0.0519)	(0.0361)	(0.0102)	(0.0408)
Price_CAY	0.1274**	-0.0212	-0.0321**	-0.0095	0.0585***	-0.0960**	-0.0147	0.0535	0.0044	-0.0291
	(0.0632)	(0.0197)	(0.0146)	(0.0235)	(0.0205)	(0.0408)	(0.0593)	(0.0412)	(0.0116)	(0.0466)
Price_COF	0.1255	-0.0099	-0.0389	0.0324	0.0696*	-0.0667	-0.1589	0.1870**	0.0053	-0.1389
	(0.1185)	(0.0370)	(0.0274)	(0.0442)	(0.0386)	(0.0767)	(0.1115)	(0.0775)	(0.0217)	(0.0876)
Price_TKAH	-0.0673**	0.0252**	0.0100	-0.0090	-0.0224**	-0.0001	0.0243	-0.0313	0.0281***	0.0327
	(0.0336)	(0.0105)	(0.0077)	(0.0125)	(0.0109)	(0.0217)	(0.0315)	(0.0219)	(0.0062)	(0.0247)
Price_BEER	0.0412	0.0049	-0.0233	0.0290	0.0147	0.0807*	0.0443	0.0683	-0.0178	-0.0497
	(0.0686)	(0.0214)	(0.0159)	(0.0256)	(0.0224)	(0.0444)	(0.0647)	(0.0449)	(0.0126)	(0.0508)
Price_RAKI	0.0564	-0.0027	0.0261**	-0.0349*	-0.0234	-0.0065	0.0522	-0.0784**	-0.0040	-0.0280
	(0.0493)	(0.0154)	(0.0114)	(0.0184)	(0.0161)	(0.0319)	(0.0464)	(0.0322)	(0.0090)	(0.0365)
Income2	-0.0247***	-0.0003	-0.0015	0.0003	0.0010	0.0128***	-0.0220***	0.0087*	0.0020	0.0074
	(0.0075)	(0.0024)	(0.0017)	(0.0028)	(0.0025)	(0.0049)	(0.0071)	(0.0049)	(0.0014)	(0.0056)
ab	0.0144	-0.0112	0.0034	0.0078	-0.0004	0.0058	-0.0069	-0.0036	0.0038	-0.0124
	(0.0281)	(0.0087)	(0.0064)	(0.0103)	(0.0090)	(0.0180)	(0.0260)	(0.0182)	(0.0052)	(0.0204)
c1	0.0057	0.0033	0.0082	0.0050	0.0087	0.0260	-0.1019**	-0.0038	-0.0033	0.0347
	(0.0444)	(0.0137)	(0.0101)	(0.0163)	(0.0143)	(0.0285)	(0.0411)	(0.0287)	(0.0082)	(0.0323)
c2	0.0513	-0.0207	0.0031	0.0176	-0.0132	-0.0279	-0.0637	-0.0349	0.0012	0.0135
	(0.0471)	(0.0146)	(0.0107)	(0.0173)	(0.0152)	(0.0303)	(0.0437)	(0.0305)	(0.0087)	(0.0343)
agehh	0.0061	-0.0044	-0.0029	-0.0162	-0.0017	-0.0273	0.0421	-0.0656**	-0.0127	0.0508
	(0.0507)	(0.0157)	(0.0116)	(0.0186)	(0.0163)	(0.0326)	(0.0470)	(0.0328)	(0.0093)	(0.0369)
sq_agehh	-0.0001	0.0001	0.0000	0.0002	0.0000	0.0003	-0.0005	0.0008**	0.0001	-0.0006
	(0.0006)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0004)	(0.0005)	(0.0004)	(0.0001)	(0.0004)

Table C.2. (Continued).

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
ageps	-0.0050	-0.0017	0.0092	-0.0056	-0.0056	0.0002	0.0100	-0.0079	-0.0025	-0.0118
	(0.0258)	(0.0080)	(0.0059)	(0.0095)	(0.0083)	(0.0166)	(0.0240)	(0.0167)	(0.0047)	(0.0188)
sq_ageps	0.0001	0.0000	-0.0001	0.0001	0.0001	-0.0000	-0.0001	0.0001	0.0000	0.0002
	(0.0004)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0002)	(0.0001)	(0.0003)
urban	-0.0152	0.0083	0.0020	0.0039	0.0012	0.0166	-0.0094	0.0053	-0.0019	-0.0063
	(0.0168)	(0.0052)	(0.0038)	(0.0062)	(0.0054)	(0.0108)	(0.0156)	(0.0109)	(0.0031)	(0.0122)
holiday	0.2840***	0.0792***	0.0170*	-0.0729***	-0.0069	-0.0224	-0.1551***	-0.0000	0.0080	-0.0532*
	(0.0384)	(0.0119)	(0.0088)	(0.0141)	(0.0123)	(0.0246)	(0.0356)	(0.0248)	(0.0071)	(0.0280)
temp	0.0041***	0.0002	0.0001	0.0008*	0.0009**	-0.0018**	-0.0029**	0.0006	-0.0003	-0.0015
	(0.0013)	(0.0004)	(0.0003)	(0.0005)	(0.0004)	(0.0008)	(0.0012)	(0.0008)	(0.0002)	(0.0009)
city1	-0.0260	-0.0281**	0.0406***	0.0128	-0.0057	0.0667**	-0.0456	-0.0435	0.0217***	0.0330
	(0.0424)	(0.0132)	(0.0098)	(0.0158)	(0.0138)	(0.0274)	(0.0398)	(0.0277)	(0.0078)	(0.0313)
city2	-0.0223	0.0107*	0.0190***	0.0185**	0.0109*	0.0290**	0.0010	-0.0323**	0.0011	0.0204
	(0.0202)	(0.0063)	(0.0046)	(0.0075)	(0.0065)	(0.0130)	(0.0189)	(0.0131)	(0.0037)	(0.0148)
city3	-0.0260	-0.0389***	-0.0216***	0.0161	0.0556***	-0.0116	-0.0637*	0.0130	0.0093	0.0780***
	(0.0352)	(0.0110)	(0.0081)	(0.0131)	(0.0114)	(0.0228)	(0.0331)	(0.0230)	(0.0065)	(0.0260)
city4	-0.0603	0.0155	0.0665***	0.0051	-0.0124	0.0614*	-0.0268	-0.0069	0.0194**	-0.0438
	(0.0500)	(0.0156)	(0.0116)	(0.0187)	(0.0163)	(0.0324)	(0.0471)	(0.0327)	(0.0092)	(0.0370)
city5	-0.1586	-0.0031	0.0149	-0.0038	-0.0028	0.0428	0.1275	-0.1406**	0.0046	0.1640**
	(0.1013)	(0.0316)	(0.0234)	(0.0377)	(0.0330)	(0.0655)	(0.0952)	(0.0662)	(0.0186)	(0.0748)
city6	-0.0224	-0.0043	0.0165***	0.0273***	0.0038	0.1970***	-0.0851***	-0.0372**	0.0202***	-0.0180
	(0.0232)	(0.0072)	(0.0053)	(0.0086)	(0.0075)	(0.0150)	(0.0217)	(0.0151)	(0.0043)	(0.0170)
city7	0.0087	-0.0184***	0.0241***	0.0162**	0.0071	0.0339***	-0.0687***	-0.0234**	0.0060*	0.0448***
	(0.0183)	(0.0057)	(0.0042)	(0.0067)	(0.0059)	(0.0118)	(0.0170)	(0.0119)	(0.0033)	(0.0134)
city8	-0.0585*	0.0010	-0.0091	0.0040	0.0088	-0.0314	0.0808***	-0.0103	0.0189***	0.0496**
	(0.0309)	(0.0096)	(0.0071)	(0.0115)	(0.0100)	(0.0199)	(0.0289)	(0.0201)	(0.0057)	(0.0227)
city9	0.0598	0.0184	0.0143	0.0082	0.0040	0.0209	-0.0510	0.0521	0.0269*	-0.0773
	(0.0782)	(0.0244)	(0.0181)	(0.0292)	(0.0255)	(0.0506)	(0.0737)	(0.0512)	(0.0143)	(0.0579)
city10	-0.1079**	0.0071	0.0028	0.0673***	0.0259*	0.0559*	-0.0216	-0.0237	-0.0008	0.0534
	(0.0481)	(0.0149)	(0.0111)	(0.0178)	(0.0156)	(0.0310)	(0.0450)	(0.0313)	(0.0088)	(0.0353)
city11	-0.0450	-0.0244	0.0003	0.0182	0.0126	0.0707**	0.0881*	-0.0389	0.0137	0.0066
	(0.0509)	(0.0158)	(0.0117)	(0.0189)	(0.0165)	(0.0329)	(0.0478)	(0.0332)	(0.0093)	(0.0375)
m1	-0.0366***	-0.0059*	-0.0028	0.0023	0.0063*	0.0138*	0.0104	0.0151**	0.0028	-0.0017
	(0.0113)	(0.0035)	(0.0026)	(0.0041)	(0.0036)	(0.0072)	(0.0105)	(0.0073)	(0.0021)	(0.0082)

Table C.2. (Continued).

VARIABLES	(1) KGIw	(2) MGIw	(3) SGIw	(4) MESw	(5) MASw	(6) SUw	(7) CAYw	(8) COFw	(9) TKAHw	(10) BEERw
m2	-0.0499***	-0.0034	-0.0011	0.0033	0.0047	0.0217***	0.0106	0.0140*	0.0040*	-0.0029
	(0.0128)	(0.0040)	(0.0029)	(0.0047)	(0.0041)	(0.0083)	(0.0120)	(0.0083)	(0.0024)	(0.0094)
m3	-0.0572***	-0.0011	0.0010	0.0099**	-0.0006	0.0180**	0.0207*	0.0058	0.0035	0.0023
	(0.0118)	(0.0036)	(0.0027)	(0.0043)	(0.0038)	(0.0076)	(0.0110)	(0.0076)	(0.0022)	(0.0086)
m4	-0.0790***	-0.0003	0.0040	0.0113**	-0.0029	0.0246***	0.0303**	-0.0021	0.0023	0.0200*
	(0.0147)	(0.0046)	(0.0034)	(0.0054)	(0.0047)	(0.0095)	(0.0137)	(0.0095)	(0.0027)	(0.0108)
m5	-0.0589***	0.0050	0.0085**	0.0019	-0.0085	0.0292**	0.0211	-0.0083	0.0029	0.0207
	(0.0182)	(0.0056)	(0.0042)	(0.0067)	(0.0059)	(0.0117)	(0.0169)	(0.0118)	(0.0033)	(0.0133)
m6	-0.0471**	0.0111	0.0107**	-0.0188**	-0.0131*	0.0414***	0.0154	-0.0190	0.0050	0.0379**
	(0.0233)	(0.0072)	(0.0053)	(0.0085)	(0.0075)	(0.0149)	(0.0216)	(0.0151)	(0.0043)	(0.0170)
m7	-0.0220	0.0168**	0.0105*	-0.0314***	-0.0130	0.0431***	0.0100	-0.0214	0.0025	0.0364**
	(0.0247)	(0.0076)	(0.0056)	(0.0090)	(0.0079)	(0.0158)	(0.0229)	(0.0160)	(0.0045)	(0.0180)
m8	-0.0368	0.0107	0.0130**	-0.0292***	-0.0124	0.0499***	0.0141	-0.0197	0.0030	0.0362**
	(0.0241)	(0.0074)	(0.0055)	(0.0088)	(0.0077)	(0.0155)	(0.0223)	(0.0156)	(0.0044)	(0.0175)
m9	-0.0567***	0.0016	0.0056	-0.0006	-0.0078	0.0412***	0.0114	-0.0081	0.0035	0.0236*
	(0.0195)	(0.0060)	(0.0044)	(0.0071)	(0.0063)	(0.0125)	(0.0180)	(0.0126)	(0.0036)	(0.0142)
m10	-0.0386**	0.0007	0.0057	0.0126**	-0.0001	0.0357***	0.0037	0.0032	0.0040	0.0014
	(0.0155)	(0.0048)	(0.0035)	(0.0057)	(0.0050)	(0.0100)	(0.0144)	(0.0100)	(0.0029)	(0.0113)
m11	-0.0119	0.0020	0.0022	0.0067	0.0092**	0.0308***	-0.0035	0.0147	0.0054**	-0.0203*
	(0.0146)	(0.0045)	(0.0033)	(0.0054)	(0.0047)	(0.0094)	(0.0136)	(0.0095)	(0.0027)	(0.0107)
Constant	0.2205	0.1528	-0.1130	0.5480	0.1697	0.5367	-0.6624	1.6079***	0.3382*	-0.8299
	(0.9429)	(0.2916)	(0.2154)	(0.3466)	(0.3037)	(0.6060)	(0.8760)	(0.6107)	(0.1732)	(0.6879)
Observations	864	864	864	864	864	864	864	864	864	864
R-squared	0.561	0.554	0.633	0.632	0.208	0.527	0.536	0.397	-0.662	0.775

Standard errors in parentheses , *** $p<0.01$, ** $p<0.05$, * $p<0$.
Author's own calculations using Ipsos/KGM and TURKSTAT data.

APPENDIX D

Derivation of elasticities of demand with Tornqvist price index in LAIDS model

The general LAIDS model can be specified with the equation below:

$$w_i = \alpha_i^* + \sum_j \gamma_{ij} \ln p_i + \beta_i \ln(\frac{M}{P^T}) + u_i$$

with the Tornqvist price index , $\ln P_{Kt}^T = \sum_{k=1}^{K} w_k^T \ln p_k^T = \sum_{k=1}^{K} (\frac{w_{k0} + w_{kt}}{2}).\ln(\frac{p_{kt}}{p_{k0}})$

where w_k^T is the average weight of the product "k". Subscripts "zero" and "t" stand for the base and current periods.

The expenditure share of the product "i" is: $w_i = \frac{p_i q_i}{M}$

where M is the total expenditure for the group of products that include the product "i"
.

Taking log and differentiating w.r.t price of "j"yiels,

$$\frac{\partial \ln w_i}{\partial \ln p_j} = \lambda + \frac{\partial \ln q_i}{\partial \ln p_j} - \frac{\partial \ln M}{\partial \ln p_j} = \lambda + \varepsilon_{ij} - \frac{\partial \ln M}{\partial \ln p_j}$$

$$\varepsilon_{ij} = -\lambda + \frac{\partial \ln w_i}{\partial \ln p_j} + \frac{\partial \ln M}{\partial \ln p_j}$$

$$\varepsilon_{ij} = -\lambda + \frac{1}{w_i} \frac{\partial w_i}{\partial \ln p_j} + \frac{\partial \ln M}{\partial \ln P^T} \frac{\partial \ln P^T}{\partial \ln p_j}$$

where, $\lambda = 1$ if $i = j$ and $\lambda = 0$ if $i \neq j$.

From the LAIDS specification above,

$$\frac{\partial w_i}{\partial \ln p_j} = \gamma_{ij} - \beta_i \frac{\partial \ln P^T}{\partial \ln p_i}$$

The derivative of $\ln P^T$ w.r.t prices of "j" is as follows,

$$\frac{\partial \ln P^T}{\partial \ln p_j} = w_j^T \frac{\partial \ln p_j^T}{\partial \ln p_j} + \sum_k^K \ln p_k^T \frac{\partial w_k^T}{\partial \ln p_k}$$

$$\frac{\partial \ln P^T}{\partial \ln p_j} = w_j^T + \sum_k^K \ln p_k^T \frac{1}{2} \frac{\partial w_k}{\partial \ln p_k}$$

since $w_k^T = \frac{1}{2}(w_k^t + w_k^0)$ and w_k^0 is constant. Then, using the LAIDS model above,

$$\frac{\partial \ln P^T}{\partial \ln p_j} = w_j^T + \sum_k^K \ln p_k^T \frac{1}{2}\left(\gamma_{kj} - \beta_k \frac{\partial \ln P^T}{\partial \ln p_j} \right)$$

$$\frac{\partial \ln P^T}{\partial \ln p_j} - \sum_k^K \beta_k \ln p_k^T \frac{\partial \ln P^T}{\partial \ln p_j} = w_j^T + \frac{1}{2} \sum_k^K \ln p_k^T \gamma_{kj}$$

$$\frac{\partial \ln P^T}{\partial \ln p_j} \left(1 + \sum_k^K \beta_k \ln p_k^T \right) = w_j^T + \frac{1}{2} \sum_k^K \ln p_k^T \gamma_{kj}$$

$$\frac{\partial \ln P^T}{\partial \ln p_j} = \left(w_j^T + \frac{1}{2} \sum_k^K \gamma_{kj} \ln p_k^T \right) \left(1 + \frac{1}{2} \sum_k^K \beta_k \ln p_k^T \right)^{-1}$$

This expression will be substituted in the elasticity formula above later. Now, the expression $\frac{\partial \ln M}{\partial \ln P^T}$ can be rewritten as , $\frac{\partial \ln M}{\partial \ln P^T} = 1 + \delta$; where δ is the demand elasticity of the upper group to which products "i" belong to. This corresponds to the elasticity of demand of the "beverage" group in the first-stage LAIDS model estimated in this dissertation. This can be calculated by a similar formula after having estimates the demand system for the product in the upper level. Now, these expressions are substituted in the formula of the elasticity above to obtain the following:

$$\varepsilon_{ij} = -\lambda + \frac{\partial w_i}{\partial \ln p_j}\frac{1}{w_i} + \frac{\partial \ln M}{\partial \ln P^T}\frac{\partial \ln P^T}{\partial \ln p_j}$$

$$\varepsilon_{ij} = -\lambda + \frac{1}{w_i}\left(\gamma_{ij} - \beta_i \frac{\partial \ln P^T}{\partial \ln p_i}\right) + \left(1+\delta\right)\frac{\partial \ln P^{T\,-1}}{\partial \ln p_j}$$

$$\varepsilon_{ij} = -\lambda + \frac{1}{w_i}\left(\gamma_{ij} - \beta_i \frac{\partial \ln P^T}{\partial \ln p_i}\right) + \left(1+\delta\right)\frac{\partial \ln P^T}{\partial \ln p_j}$$

$$\varepsilon_{ij} = -\lambda + \frac{\gamma_{ij}}{w_i} - \frac{\partial \ln P^T}{\partial \ln p_j}\left(\frac{1}{w_i}\beta_i - \left(1+\delta\right)\right)$$

$$\varepsilon_{ij} = -\lambda + \frac{\gamma_{ij}}{w_i} - \left(w_j^T + \frac{1}{2}\sum_k^K \gamma_{kj} \ln p_k^T\right)\left(1 + \frac{1}{2}\sum_k^K \beta_k \ln p_k^T\right)^{-1}\left(\frac{1}{w_i}\beta_i - \left(1+\delta\right)\right)$$

where, $\lambda = 1$ if $i = j$ and $\lambda = 0$ if $i \neq j$.

APPENDIX E

Elasticities of cola products in every point of observation

Table E. 1. Own-price elasticities of "COLA" in each city / month pair (2000-2003)

Months	Adana	Ankara	Antalya	Bursa	Gaziantep	İstanbul	İzmir	Kayseri	Kocaeli	Konya	Osmaniye	Samsun
2000m5	-1.152	-1.297	-1.349	-1.329	-1.233	-1.559	-1.366	-1.319	-1.319	-1.453	-1.159	-1.253
2000m6	-1.152	-1.304	-1.356	-1.414	-1.169	-1.530	-1.314	-1.313	-1.346	-1.283	-1.061	-1.196
2000m7	-1.146	-1.213	-1.336	-1.280	-1.151	-1.462	-1.304	-1.197	-1.288	-1.224	-1.131	-1.186
2000m8	-1.190	-1.224	-1.349	-1.322	-1.237	-1.474	-1.260	-1.231	-1.177	-1.256	-1.139	-1.272
2000m9	-1.203	-1.309	-1.432	-1.398	-1.331	-1.592	-1.374	-1.521	-1.385	-1.374	-1.138	-1.359
2000m10	-1.155	-1.369	-1.594	-1.517	-1.434	-1.679	-1.389	-1.287	-1.538	-1.480	-1.299	-1.625
2000m11	-1.127	-1.304	-1.540	-1.480	-1.490	-1.736	-1.496	-1.547	-1.467	-1.361	-1.177	-1.516
2000m12	-1.129	-1.144	-1.257	-1.220	-1.183	-1.428	-1.218	-1.208	-1.207	-1.133	-1.001	-1.090
2001m1	-1.210	-1.290	-1.551	-1.360	-1.369	-1.636	-1.372	-1.315	-1.419	-1.453	-1.132	-1.515
2001m2	-1.193	-1.285	-1.402	-1.399	-1.371	-1.673	-1.356	-1.584	-1.390	-1.640	-1.207	-1.566
2001m3	-1.159	-1.311	-1.336	-1.446	-1.328	-1.489	-1.239	-1.311	-1.349	-1.357	-1.101	-1.373
2001m4	-1.253	-1.368	-1.429	-1.524	-1.449	-1.505	-1.375	-1.503	-1.516	-1.480	-1.253	-1.389
2001m5	-1.135	-1.351	-1.377	-1.391	-1.298	-1.518	-1.395	-1.463	-1.480	-1.492	-1.095	-1.502
2001m6	-1.145	-1.272	-1.276	-1.424	-1.288	-1.475	-1.276	-1.387	-1.386	-1.325	-1.145	-1.346
2001m7	-1.107	-1.204	-1.279	-1.284	-1.257	-1.442	-1.322	-1.278	-1.335	-1.273	-1.139	-1.365
2001m8	-1.151	-1.211	-1.371	-1.430	-1.212	-1.485	-1.381	-1.262	-1.383	-1.269	-1.250	-1.337
2001m9	-1.200	-1.386	-1.369	-1.436	-1.336	-1.587	-1.432	-1.328	-1.511	-1.380	-1.236	-1.519
2001m10	-1.212	-1.394	-1.352	-1.556	-1.431	-1.622	-1.460	-1.378	-1.805	-1.531	-1.186	-1.541
2001m11	-1.072	-1.227	-1.323	-1.415	-1.168	-1.546	-1.287	-1.150	-1.287	-1.370	-1.027	-1.463
2001m12	-1.262	-1.169	-1.178	-1.278	-1.248	-1.413	-1.246	-1.102	-1.176	-1.408	-1.053	-1.441
2002m1	-1.149	-1.376	-1.518	-1.473	-1.682	-1.560	-1.384	-1.377	-1.554	-1.524	-1.621	-1.782
2002m2	-1.133	-1.156	-1.285	-1.314	-1.354	-1.496	-1.244	-1.248	-1.327	-1.423	-1.218	-1.554
2002m3	-1.241	-1.287	-1.413	-1.531	-1.631	-1.624	-1.391	-1.715	-1.543	-1.474	-1.548	-1.706
2002m4	-1.278	-1.297	-1.319	-1.602	-1.420	-1.602	-1.381	-1.425	-1.610	-1.556	-1.255	-1.580
2002m5	-1.254	-1.289	-1.259	-1.430	-1.318	-1.485	-1.351	-1.300	-1.436	-1.392	-1.175	-1.589
2002m6	-1.274	-1.338	-1.326	-1.527	-1.346	-1.465	-1.325	-1.332	-1.237	-1.352	-1.211	-1.452

Table E.1. (Continued)

Months	Adana	Ankara	Antalya	Bursa	Gaziantep	İstanbul	İzmir	Kayseri	Kocaeli	Konya	Osmaniye	Samsun
2002m7	-1.159	-1.305	-1.223	-1.400	-1.347	-1.453	-1.312	-1.292	-1.333	-1.386	-1.221	-1.214
2002m8	-1.250	-1.370	-1.263	-1.422	-1.340	-1.487	-1.357	-1.395	-1.335	-1.341	-1.208	-1.483
2002m9	-1.241	-1.521	-1.326	-1.612	-1.211	-1.590	-1.369	-1.625	-1.486	-1.394	-1.166	-1.428
2002m10	-1.198	-1.416	-1.381	-1.556	-1.146	-1.574	-1.350	-1.548	-1.730	-1.424	-1.059	-1.464
2002m11	-1.040	-1.186	-1.219	-1.267	-1.099	-1.417	-1.187	-1.238	-1.278	-1.147	-1.116	-1.077
2002m12	-1.229	-1.344	-1.510	-1.333	-1.200	-1.553	-1.382	-1.265	-1.410	-1.375	-1.214	-1.304
2003m1	-1.320	-1.389	-1.387	-1.606	-1.488	-1.616	-1.458	-1.629	-1.594	-1.506	-1.404	-1.534
2003m2	-1.208	-1.326	-1.299	-1.473	-1.185	-1.587	-1.386	-1.389	-1.391	-1.477	-1.385	-1.374
2003m3	-1.328	-1.543	-1.414	-1.565	-1.533	-1.689	-1.495	-1.601	-1.784	-1.807	-1.518	-1.752
2003m4	-1.364	-1.501	-1.432	-1.771	-1.570	-1.744	-1.643	-1.835	-1.469	-1.433	-1.368	-1.620
2003m5	-1.188	-1.354	-1.265	-1.705	-1.466	-1.635	-1.514	-1.518	-1.428	-1.429	-1.259	-1.458
2003m6	-1.224	-1.408	-1.295	-1.529	-1.289	-1.528	-1.503	-1.573	-1.446	-1.469	-1.181	-1.520
2003m7	-1.168	-1.292	-1.220	-1.383	-1.336	-1.437	-1.381	-1.566	-1.242	-1.314	-1.218	-1.241
2003m8	-1.122	-1.328	-1.270	-1.368	-1.301	-1.462	-1.325	-1.398	-1.269	-1.260	-1.120	-1.223
2003m9	-1.223	-1.452	-1.388	-1.515	-1.215	-1.622	-1.431	-1.567	-1.346	-1.399	-1.100	-1.345
2003m10	-1.125	-1.364	-1.350	-1.518	-1.190	-1.536	-1.487	-1.252	-1.317	-1.437	-1.107	-1.266
2003m11	-1.003	-1.162	-1.263	-1.166	-1.008	-1.353	-1.261	-1.142	-1.127	-1.174	-1.047	-1.075
2003m12	-1.234	-1.279	-1.423	-1.398	-1.297	-1.583	-1.530	-1.332	-1.370	-1.457	-1.139	-1.293

All elasticities are significant at 1%level.

Table E. 2. Own-price elasticities of "COLA" in each city / month pair (2004-2006)

Months	Adana	Ankara	Antalya	Bursa	Gaziantep	İstanbul	İzmir	Kayseri	Kocaeli	Konya	Osmaniye	Samsun
2004m1	-1.164	-1.385	-1.362	-1.467	-1.246	-1.588	-1.384	-1.431	-1.268	-1.342	-1.075	-1.345
2004m2	-1.105	-1.373	-1.485	-1.438	-1.359	-1.565	-1.411	-1.540	-1.195	-1.362	-1.064	-1.375
2004m3	-1.154	-1.380	-1.445	-1.554	-1.363	-1.618	-1.536	-1.584	-1.214	-1.353	-1.137	-1.471
2004m4	-1.193	-1.395	-1.579	-1.543	-1.413	-1.621	-1.446	-1.671	-1.292	-1.479	-1.127	-1.363
2004m5	-1.136	-1.505	-1.421	-1.496	-1.362	-1.573	-1.485	-1.642	-1.233	-1.452	-1.192	-1.339
2004m6	-1.128	-1.322	-1.285	-1.347	-1.176	-1.492	-1.488	-1.387	-1.123	-1.345	-1.145	-1.345
2004m7	-1.109	-1.388	-1.285	-1.421	-1.191	-1.453	-1.458	-1.571	-1.234	-1.212	-1.131	-1.353
2004m8	-1.206	-1.333	-1.332	-1.435	-1.168	-1.471	-1.460	-1.264	-1.423	-1.258	-1.066	-1.214
2004m9	-1.157	-1.401	-1.377	-1.445	-1.298	-1.553	-1.453	-1.342	-1.338	-1.344	-1.076	-1.150
2004m10	-1.065	-1.237	-1.238	-1.215	-1.068	-1.411	-1.305	-1.205	-1.218	-1.174	-0.991	-1.127
2004m11	-1.074	-1.252	-1.254	-1.250	-1.070	-1.449	-1.396	-1.150	-1.256	-1.218	-1.024	-1.096
2004m12	-1.183	-1.354	-1.484	-1.581	-1.264	-1.577	-1.585	-1.522	-1.615	-1.388	-1.252	-1.410
2005m1	-1.123	-1.290	-1.434	-1.523	-1.164	-1.562	-1.516	-1.253	-1.349	-1.403	-1.182	-1.325
2005m2	-1.185	-1.400	-1.521	-1.673	-1.205	-1.651	-1.570	-1.540	-1.513	-1.495	-1.153	-1.466
2005m3	-1.151	-1.472	-1.483	-1.625	-1.246	-1.762	-1.651	-1.476	-1.564	-1.504	-1.295	-1.414
2005m4	-1.179	-1.522	-1.549	-1.641	-1.237	-1.753	-1.724	-1.461	-1.570	-1.529	-1.160	-1.475
2005m5	-1.178	-1.472	-1.543	-1.554	-1.166	-1.692	-1.720	-1.368	-1.472	-1.440	-1.153	-1.438
2005m6	-1.162	-1.351	-1.432	-1.515	-1.157	-1.637	-1.642	-1.370	-1.418	-1.405	-1.152	-1.321
2005m7	-1.132	-1.403	-1.333	-1.416	-1.167	-1.570	-1.588	-1.273	-1.382	-1.349	-1.166	-1.290
2005m8	-1.183	-1.427	-1.315	-1.543	-1.304	-1.609	-1.572	-1.344	-1.449	-1.357	-1.162	-1.303
2005m9	-1.141	-1.498	-1.520	-1.592	-1.192	-1.633	-1.590	-1.338	-1.659	-1.381	-1.145	-1.327
2005m10	-1.070	-1.386	-1.279	-1.256	-1.080	-1.461	-1.365	-1.108	-1.296	-1.264	-1.079	-1.114
2005m11	-1.135	-1.532	-1.463	-1.485	-1.242	-1.610	-1.636	-1.249	-1.303	-1.401	-1.205	-1.443

Table E.2. (Continued)

Months	Adana	Ankara	Antalya	Bursa	Gaziantep	İstanbul	İzmir	Kayseri	Kocaeli	Konya	Osmaniye	Samsun
2005m12	-1.214	-1.616	-1.526	-1.634	-1.290	-1.679	-1.721	-1.372	-1.425	-1.534	-1.236	-1.470
2006m1	-1.179	-1.627	-1.528	-1.690	-1.330	-1.615	-1.716	-1.342	-1.338	-1.490	-1.408	-1.467
2006m2	-1.311	-1.752	-1.775	-1.763	-1.249	-1.729	-1.727	-1.584	-1.411	-1.568	-1.388	-1.739
2006m3	-1.218	-1.799	-1.936	-1.807	-1.314	-1.763	-1.782	-1.459	-1.514	-1.544	-1.499	-1.782
2006m4	-1.192	-1.749	-1.720	-1.700	-1.233	-1.780	-1.666	-1.510	-1.431	-1.464	-1.347	-1.571
2006m5	-1.211	-1.695	-1.534	-1.470	-1.184	-1.694	-1.571	-1.495	-1.386	-1.549	-1.250	-1.512

All elasticities are significant at 1% level.
Author's own calculations using Ipsos/KGM and TURKSTAT data.

APPENDIX F

Results of the simple and nested logit models

List of variables

Variable Abbreviation	Variable Name
p	Deflated price of product j
lns_jmn	log of within nest market share of product j
ab	:percentage of households being in AB social economic group in a city/time
c1	:percentage of households being in C1 social economic group in a city/time
c2	:percentage of households being in C2 social economic group in a city/time
age_hh	:average age of the head of households in a city/time
sq_age_hh	:squared *age_hh*
age_ps	:average ages of the purchasing persons in the household in a city/time
sq_age_ps	:squared *age_ps*
size1	:percentage of households having size of 1-2 persons
size2	:percentage of households having size of 3-4 persons
urban	:percentage of households living in urban area
holiday	:percentage of holidays in month
temp	:monthly average temperature

Variable Abbreviation	Variable Name	Variable Abbreviation	Variable Name	Variable Abbreviation	Variable Name
city1	ADANA	city18	KOCAELI	month1	January
city2	ANKARA	city19	KONYA	month2	February
city3	ANTALYA	city20	KUTAHYA	month3	March
city4	BALIKESIR	city21	MALATYA	month4	April
city5	BOLU	city22	MARDIN	month5	May
city6	BURSA	city23	MERSIN	month6	June
city7	CANKIRI	city24	MUGLA	month7	July
city8	CORUM	city25	NIGDE	month8	August
city9	DENIZLI	city26	ORDU	month9	September
city10	DIYARBAKIR	city27	OSMANIYE	month10	October
city11	ERZURUM	city28	SAMSUN	month11	November
city12	ESKISEHIR	city29	TEKIRDAG	month12	December
city13	GAZIANTEP	city30	TRABZON		
city14	HATAY	city31	USAK		
city15	ISTANBUL	city32	VAN		
city16	IZMIR	city33	YALOVA		
city17	KAYSERI	city34	ZONGULDAK		

Definitions of Model Titles

2SLS: Two-stage least square estimation with instrumental variables “deflated hourly wage index of cold drink industry”, “deflated price index of electricity”, “average pack size of other firms’ products in the same nest/market/time”.

2SLS HAC Robust: Two-stage least square estimation with Heteroscedasticity and Autocorrelation Robust Standard Errors. Instruments are same as in “**2SLS”**.

2SLS (2): Two-stage least square estimation with instrumental variables “deflated hourly wage index of cold drink industry”, “deflated price index of electricity”, “average pack size of other firms’ products in the same nest/market/time” and “average of the prices of the product ‘j’ in other cities in the same shop type/time”.

2SLS Cluster Robust: Two-stage least square estimation with same instrumental variables as in **“2SLS”** and it is assumed that errors of the products belonging to the same firm are correlated (clustering on manufacturers).

2SLS (3) : Two-stage least square estimation with instrumental variables “deflated hourly wage index of **beverage** industry”, “deflated price index of electricity”, “average pack size of other firms’ products in the same nest/market/time”.

2SLS (3) HAC Robust: Two-stage least square estimation with Heteroscedasticity and Autocorrelation Robust Standard Errors. Instruments are same as in “**2SLS (3)”**.

2SLS (3) Cluster Robust: It is assumed that errors of the products belonging to the same firm are correlated (clustering on manufacturers). Instruments are same as in the previous footnote.

Estimation results for the simple logit model for each shop type

Table F. 1. Results for the simple logit models for every shop types

	Chain Shops		Discounter Shops		Medium Markets-Grocery		Non-Chain Shops		Other Shops	
VARIABLES	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
p	-1.052***	-3.024***	-0.845***	-4.645***	-0.056	0.945	-0.140	4.130***	-0.128	0.166
	(0.1260)	(0.7461)	(0.2629)	(1.1420)	(0.0872)	(0.6597)	(0.1127)	(1.0770)	(0.1742)	(1.4136)
ab	-1.313***	-1.130***	0.244	0.360	1.098***	0.969***	-0.206	-0.635*	0.373	0.348
	(0.3067)	(0.3166)	(0.5520)	(0.5608)	(0.1997)	(0.2171)	(0.2890)	(0.3270)	(0.4832)	(0.4955)
c1	-0.148	0.005	-0.619	-0.396	-0.606***	-0.713***	-0.857***	-1.041***	0.385	0.346
	(0.2970)	(0.3048)	(0.5139)	(0.5253)	(0.2057)	(0.2176)	(0.2880)	(0.3112)	(0.4792)	(0.5123)
c2	0.556	0.781**	2.751***	2.739***	0.918***	0.725***	1.069***	0.254	2.520***	2.486***
	(0.3735)	(0.3858)	(0.6148)	(0.6235)	(0.2477)	(0.2781)	(0.3743)	(0.4492)	(0.5907)	(0.6100)
agehh	-0.236	-0.126	1.229**	0.787	-0.337	-0.312	-0.319	-0.445	-0.554	-0.562
	(0.2894)	(0.2946)	(0.5366)	(0.5594)	(0.2093)	(0.2103)	(0.3130)	(0.3360)	(0.4562)	(0.4559)
sq_agehh	0.002	0.000	-0.013**	-0.009	0.004	0.003	0.004	0.005	0.006	0.006
	(0.0033)	(0.0034)	(0.0061)	(0.0063)	(0.0024)	(0.0024)	(0.0036)	(0.0039)	(0.0053)	(0.0053)
ageps	-0.870***	-0.881***	-0.502**	-0.332	-0.242**	-0.239**	-0.335**	-0.406***	0.988***	0.990***
	(0.1485)	(0.1498)	(0.2510)	(0.2593)	(0.0943)	(0.0945)	(0.1363)	(0.1468)	(0.2222)	(0.2215)
sq_ageps	0.012***	0.012***	0.006*	0.003	0.003**	0.003**	0.004**	0.005***	-0.013***	-0.013***
	(0.0020)	(0.0020)	(0.0033)	(0.0034)	(0.0013)	(0.0013)	(0.0018)	(0.0020)	(0.0030)	(0.0030)
size1	-1.175**	-1.641***	3.053***	1.573	0.248	0.330	-1.013**	-0.986*	1.574**	1.644*
	(0.4922)	(0.5257)	(0.9464)	(1.0528)	(0.3295)	(0.3345)	(0.4865)	(0.5199)	(0.7745)	(0.8399)
size2	-1.258***	-1.566***	-1.904***	-2.590***	-0.574***	-0.439**	-0.848***	-0.599*	1.453***	1.514***
	(0.2925)	(0.3165)	(0.4953)	(0.5409)	(0.1905)	(0.2105)	(0.2872)	(0.3132)	(0.4572)	(0.5394)
urban	1.210***	1.475***	2.080***	2.536***	1.244***	1.132***	1.122***	0.651***	-0.004	-0.038
	(0.1529)	(0.1831)	(0.2912)	(0.3240)	(0.0979)	(0.1222)	(0.1518)	(0.2005)	(0.2346)	(0.2833)
holiday	-0.957***	-0.940***	-0.623**	-0.619**	-0.915***	-0.901***	-0.754***	-0.822***	-0.562**	-0.558**
	(0.1713)	(0.1728)	(0.2696)	(0.2734)	(0.1386)	(0.1391)	(0.1923)	(0.2062)	(0.2834)	(0.2828)
temp	-0.001	0.004	0.009	0.010	0.010***	0.009**	0.002	-0.004	0.005	0.005
	(0.0049)	(0.0052)	(0.0081)	(0.0082)	(0.0035)	(0.0035)	(0.0048)	(0.0054)	(0.0079)	(0.0078)
city1	-1.142***	-1.253***	-0.363*	-0.494**	-1.189***	-1.141***	-1.142***	-0.948***	-0.360	-0.353
	(0.1364)	(0.1436)	(0.2160)	(0.2224)	(0.0842)	(0.0900)	(0.2221)	(0.2423)	(0.2576)	(0.2584)

Table F.1. (Continued)

	Chain Shops		Discounter Shops		Medium Markets-Grocery		Non-Chain Shops		Other Shops	
VARIABLES	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
city2	-1.720***	-1.742***	-2.268***	-2.249***	-1.591***	-1.567***	-2.328***	-2.195***	-2.224***	-2.225***
	(0.1309)	(0.1322)	(0.1880)	(0.1907)	(0.0803)	(0.0820)	(0.2166)	(0.2339)	(0.2464)	(0.2454)
city3	-0.673***	-0.738***	-0.497***	-0.587***	-0.841***	-0.828***	-0.819***	-0.609***	-0.723***	-0.725***
	(0.1228)	(0.1261)	(0.1750)	(0.1795)	(0.0734)	(0.0741)	(0.2086)	(0.2291)	(0.2332)	(0.2324)
city4	-0.360**	-0.274*	-0.809***	-0.657***	-0.934***	-0.950***	-1.774***	-1.851***	-1.435***	-1.452***
	(0.1574)	(0.1619)	(0.2359)	(0.2433)	(0.1024)	(0.1031)	(0.2372)	(0.2542)	(0.2815)	(0.2913)
city5	0.150	0.162	0.241	0.244	0.153	0.128	-0.633**	-0.729**		
	(0.3604)	(0.3634)	(0.4529)	(0.4593)	(0.2143)	(0.2153)	(0.3090)	(0.3311)		
city6	-0.949***	-1.001***	-1.296***	-1.281***	-1.522***	-1.488***	-1.828***	-1.618***	-1.067***	-1.070***
	(0.1177)	(0.1202)	(0.1651)	(0.1675)	(0.0697)	(0.0734)	(0.2103)	(0.2309)	(0.2284)	(0.2281)
city7	0.348*	0.232	0.397**	0.182	-0.749***	-0.688***	-1.082***	-0.853***	-0.540**	-0.527*
	(0.1833)	(0.1898)	(0.1942)	(0.2067)	(0.0736)	(0.0839)	(0.2138)	(0.2356)	(0.2647)	(0.2717)
city8	-0.699	-0.856	-0.159	-0.535	-0.037	0.052	-2.171***	-1.935***	-0.151	-0.127
	(0.6493)	(0.6572)	(0.9646)	(0.9844)	(0.4684)	(0.4729)	(0.6731)	(0.7218)	(1.1180)	(1.1193)
city9	-0.047	-0.099	0.641	0.652	-0.384***	-0.364***	-1.155***	-0.979***	-0.878**	-0.886**
	(0.1429)	(0.1454)	(0.4236)	(0.4296)	(0.0934)	(0.0945)	(0.2190)	(0.2382)	(0.3900)	(0.3900)
city10	-0.650***	-0.777***			-0.763***	-0.714***	-1.480***	-1.358***	0.198	0.215
	(0.1640)	(0.1721)			(0.0957)	(0.1011)	(0.2346)	(0.2526)	(0.2979)	(0.3081)
city11	-0.284*	-0.339**	-0.873***	-1.152***	-1.241***	-1.176***	-2.721***	-2.581***	0.448	0.470
	(0.1621)	(0.1647)	(0.2868)	(0.3021)	(0.0962)	(0.1053)	(0.2315)	(0.2499)	(0.2878)	(0.3054)
city12	-0.339**	-0.359**	-0.223	-0.325	-0.956***	-0.931***	-1.694***	-1.544***	-1.004***	-1.000***
	(0.1450)	(0.1463)	(0.2532)	(0.2585)	(0.0825)	(0.0844)	(0.2194)	(0.2374)	(0.2456)	(0.2453)
city13	-1.138***	-1.290***	-0.185	-0.478*	-0.899***	-0.830***	-1.496***	-1.234***	0.181	0.201
	(0.1520)	(0.1633)	(0.2658)	(0.2828)	(0.0910)	(0.1017)	(0.2291)	(0.2535)	(0.2756)	(0.2893)
city14	0.966*	0.862	0.438	0.317	0.232	0.263	-0.963***	-0.778**	-0.436	-0.434
	(0.5356)	(0.5413)	(0.3294)	(0.3360)	(0.1804)	(0.1818)	(0.2966)	(0.3203)	(0.5084)	(0.5065)
city15	-2.172***	-2.273***	-2.889***	-3.024***	-2.167***	-2.120***	-2.853***	-2.569***	-2.074***	-2.069***
	(0.1295)	(0.1358)	(0.1971)	(0.2037)	(0.0771)	(0.0832)	(0.2155)	(0.2411)	(0.2420)	(0.2421)
city16	-1.621***	-1.588***	-1.622***	-1.407***	-1.146***	-1.155***	-1.457***	-1.337***	-1.334***	-1.353***
	(0.1372)	(0.1389)	(0.2066)	(0.2188)	(0.0864)	(0.0868)	(0.2213)	(0.2385)	(0.2564)	(0.2702)

Table F.1. (Continued)

	Chain Shops		Discounter Shops		Medium Markets-Grocery		Non-Chain Shops		Other Shops	
VARIABLES	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
city17	-0.343**	-0.345**	0.213	0.217	-0.824***	-0.800***	-1.604***	-1.506***	-0.953***	-0.955***
	(0.1384)	(0.1395)	(0.1902)	(0.1929)	(0.0844)	(0.0860)	(0.2196)	(0.2360)	(0.2558)	(0.2549)
city18	-0.672***	-0.680***	-0.956***	-0.936***	-0.328***	-0.318***	-1.301***	-1.176***	-0.273	-0.279
	(0.1141)	(0.1151)	(0.1513)	(0.1535)	(0.0703)	(0.0707)	(0.2074)	(0.2239)	(0.2316)	(0.2325)
city19	-0.579***	-0.590***	-0.424**	-0.480***	-0.731***	-0.713***	-1.340***	-1.276***	-0.519**	-0.519**
	(0.1149)	(0.1159)	(0.1773)	(0.1805)	(0.0661)	(0.0673)	(0.2061)	(0.2208)	(0.2244)	(0.2235)
city20	-0.480	-0.564*	1.351**	1.236**	-0.652***	-0.605***	-1.123***	-0.946***	-1.315	-1.306
	(0.2943)	(0.2983)	(0.5679)	(0.5770)	(0.1421)	(0.1456)	(0.2596)	(0.2809)	(0.8057)	(0.8036)
city21	0.571***	0.500***			0.158**	0.207***	-1.016***	-0.840***	0.333	0.336
	(0.1346)	(0.1382)			(0.0724)	(0.0793)	(0.2096)	(0.2282)	(0.2778)	(0.2771)
city22					0.614**	0.654***	-0.929*	-0.920*	3.332***	3.318***
					(0.2502)	(0.2521)	(0.5186)	(0.5542)	(0.5565)	(0.5580)
city23	-0.587***	-0.636***	-0.299*	-0.252	-0.600***	-0.578***	-0.889***	-0.773***	-0.086	-0.087
	(0.1217)	(0.1241)	(0.1787)	(0.1817)	(0.0728)	(0.0743)	(0.2105)	(0.2268)	(0.2388)	(0.2379)
city24	0.415***	0.448***	0.404*	0.585***	0.068	0.055	0.292	0.268	-0.349	-0.365
	(0.1365)	(0.1381)	(0.2127)	(0.2221)	(0.0854)	(0.0859)	(0.2269)	(0.2426)	(0.2726)	(0.2829)
city25	-0.008	-0.105	-0.048	-0.143	0.185	0.247	-1.384***	-1.140***	0.095	0.099
	(0.2826)	(0.2871)	(0.7023)	(0.7128)	(0.2153)	(0.2195)	(0.2771)	(0.3024)	(0.8179)	(0.8148)
city26	0.175	0.131	-0.366**	-0.412**	-0.666***	-0.632***	-1.334***	-1.212***	-0.496**	-0.492**
	(0.1362)	(0.1383)	(0.1748)	(0.1778)	(0.0707)	(0.0742)	(0.2082)	(0.2246)	(0.2364)	(0.2361)
city27	0.573**	0.502*	-0.350*	-0.292	-0.040	-0.013	-0.580***	-0.459*	0.041	0.042
	(0.2748)	(0.2783)	(0.2120)	(0.2157)	(0.0775)	(0.0796)	(0.2176)	(0.2345)	(0.2491)	(0.2480)
city28	0.435***	0.470***	-0.344**	-0.335*	-0.554***	-0.559***	-0.911***	-0.951***	-0.560**	-0.570**
	(0.1246)	(0.1263)	(0.1714)	(0.1738)	(0.0711)	(0.0713)	(0.2114)	(0.2261)	(0.2276)	(0.2324)
city29	0.686***	0.713***	0.900***	0.989***	0.307***	0.304***	-0.102	-0.020	0.186	0.176
	(0.1295)	(0.1309)	(0.1694)	(0.1738)	(0.0761)	(0.0763)	(0.2114)	(0.2269)	(0.2629)	(0.2663)
city30	0.424	0.396	-0.092	-0.107	-0.333***	-0.314***	-0.793***	-0.747***	-0.543	-0.544
	(0.2604)	(0.2627)	(0.2442)	(0.2477)	(0.0871)	(0.0881)	(0.2234)	(0.2390)	(0.5891)	(0.5868)
city31	-0.306**	-0.342***	1.436***	1.355***	-1.166***	-1.139***	-1.896***	-1.767***	-0.647***	-0.645***
	(0.1288)	(0.1305)	(0.3265)	(0.3319)	(0.0751)	(0.0772)	(0.2092)	(0.2259)	(0.2403)	(0.2394)

Table F.1. (Continued)

	Chain Shops		Discounter Shops		Medium Markets-Grocery		Non-Chain Shops		Other Shops	
VARIABLES	OLS	2SLS	OLS	2SLS	OLS	VARIABLES	OLS	2SLS	OLS	2SLS
city32	-1.390**	-1.603***			-0.391*	-0.248	-1.700***	-1.378***		
	(0.5511)	(0.5612)			(0.2155)	(0.2354)	(0.4483)	(0.4858)		
city33	-0.098	-0.035	-0.683***	-0.559***	-0.509***	-0.519***	-1.276***	-1.269***	-0.566**	-0.580**
	(0.1345)	(0.1376)	(0.1706)	(0.1768)	(0.0782)	(0.0786)	(0.2120)	(0.2265)	(0.2451)	(0.2536)
ay1	0.176***	0.209***	0.205***	0.264***	0.033	0.016	0.078	0.029	0.225***	0.221***
	(0.0448)	(0.0469)	(0.0689)	(0.0720)	(0.0352)	(0.0369)	(0.0495)	(0.0543)	(0.0741)	(0.0764)
ay2	0.213***	0.240***	0.089	0.158**	0.120***	0.105***	0.170***	0.112**	0.250***	0.245***
	(0.0441)	(0.0455)	(0.0680)	(0.0719)	(0.0347)	(0.0362)	(0.0484)	(0.0537)	(0.0731)	(0.0763)
ay3	0.075*	0.081*	-0.145**	-0.092	-0.085**	-0.094***	-0.022	-0.055	0.028	0.023
	(0.0453)	(0.0457)	(0.0674)	(0.0701)	(0.0356)	(0.0361)	(0.0493)	(0.0533)	(0.0761)	(0.0795)
ay4	-0.001	-0.019	-0.191**	-0.176**	-0.185***	-0.190***	-0.038	-0.013	-0.097	-0.099
	(0.0544)	(0.0552)	(0.0828)	(0.0841)	(0.0420)	(0.0422)	(0.0593)	(0.0637)	(0.0920)	(0.0921)
ay5	-0.044	-0.076	-0.320***	-0.289***	-0.344***	-0.349***	-0.161**	-0.113	-0.131	-0.134
	(0.0705)	(0.0721)	(0.1092)	(0.1111)	(0.0531)	(0.0533)	(0.0744)	(0.0804)	(0.1167)	(0.1174)
ay6	-0.063	-0.120	-0.465***	-0.421***	-0.428***	-0.434***	-0.179*	-0.151	-0.251*	-0.257*
	(0.0907)	(0.0938)	(0.1419)	(0.1445)	(0.0673)	(0.0675)	(0.0938)	(0.1005)	(0.1477)	(0.1497)
ay7	-0.081	-0.148	-0.540***	-0.514***	-0.481***	-0.488***	-0.247**	-0.183	-0.247	-0.254
	(0.1064)	(0.1101)	(0.1674)	(0.1699)	(0.0783)	(0.0786)	(0.1093)	(0.1179)	(0.1733)	(0.1763)
ay8	-0.074	-0.143	-0.418**	-0.378**	-0.421***	-0.425***	-0.229**	-0.187	-0.149	-0.156
	(0.1036)	(0.1076)	(0.1635)	(0.1663)	(0.0770)	(0.0772)	(0.1075)	(0.1154)	(0.1682)	(0.1709)
ay9	0.007	-0.048	-0.279**	-0.255*	-0.332***	-0.330***	-0.107	-0.059	-0.061	-0.066
	(0.0852)	(0.0883)	(0.1320)	(0.1341)	(0.0638)	(0.0640)	(0.0892)	(0.0961)	(0.1405)	(0.1420)
ay10	-0.016	-0.056	-0.159	-0.148	-0.180***	-0.182***	-0.073	-0.039	-0.036	-0.038
	(0.0653)	(0.0674)	(0.1001)	(0.1016)	(0.0498)	(0.0499)	(0.0693)	(0.0746)	(0.1082)	(0.1081)
ay11	0.080*	0.073	-0.132*	-0.116	-0.112***	-0.112***	0.004	0.016	0.251***	0.251***
	(0.0484)	(0.0488)	(0.0756)	(0.0768)	(0.0383)	(0.0384)	(0.0528)	(0.0565)	(0.0815)	(0.0812)
Constant	22.046***		-19.417*		10.226***		13.143**		-8.714	
	(5.1133)		(9.9656)		(3.7439)		(5.8328)		(8.0969)	
Observations	11694	11689	5530	5517	20139	20133	9778	9765	6496	6483
R-squared	0.359	0.345	0.422	0.400	0.246	0.241	0.346	0.248	0.286	0.286
Number of Product	84	79	71	58	88	82	80	67	78	65

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 Author's own calculations using Ipsos/KGM and TURKSTAT data.

Estimation results for the nested logit model for each shop type

Table F. 2. Results of the nested logit models for chain shops

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
p	-0.360***	-4.122***	-4.122***	-2.249***	-4.122***
	(0.0765)	(0.5919)	(0.7476)	(0.3357)	(0.9195)
lns_jmn	0.867***	0.418***	0.418***	0.316***	0.418***
	(0.0061)	(0.0654)	(0.0751)	(0.0635)	(0.0833)
ab	-2.017***	-1.094***	-1.094***	-1.015***	-1.094***
	(0.1859)	(0.2562)	(0.3309)	(0.2697)	(0.3628)
c1	-1.122***	-0.728***	-0.728**	-0.835***	-0.728*
	(0.1802)	(0.2459)	(0.3282)	(0.2566)	(0.4037)
c2	0.286	0.844***	0.844**	0.789**	0.844
	(0.2264)	(0.3004)	(0.3879)	(0.3154)	(0.5217)
agehh	-0.193	-0.156	-0.156	-0.268	-0.156
	(0.1754)	(0.2269)	(0.2827)	(0.2395)	(0.3295)
sq_agehh	0.002	0.000	0.000	0.002	0.000
	(0.0020)	(0.0026)	(0.0033)	(0.0028)	(0.0038)
ageps	-0.392***	-0.675***	-0.675***	-0.730***	-0.675***
	(0.0901)	(0.1229)	(0.1610)	(0.1282)	(0.1754)
sq_ageps	0.006***	0.009***	0.009***	0.010***	0.009***
	(0.0012)	(0.0017)	(0.0022)	(0.0017)	(0.0023)
size1	0.438	-1.524***	-1.524***	-1.140***	-1.524**
	(0.2986)	(0.4271)	(0.5497)	(0.4364)	(0.6495)
size2	-0.303*	-1.662***	-1.662***	-1.475***	-1.662***
	(0.1774)	(0.2513)	(0.3392)	(0.2568)	(0.3817)
urban	1.079***	1.580***	1.580***	1.348***	1.580***
	(0.0927)	(0.1401)	(0.1818)	(0.1321)	(0.2079)
holiday	-0.281***	-0.588***	-0.588***	-0.724***	-0.588***
	(0.1039)	(0.1423)	(0.1362)	(0.1499)	(0.2057)
temp	-0.004	0.006	0.006	0.001	0.006
	(0.0030)	(0.0040)	(0.0043)	(0.0041)	(0.0061)
ADANA	-0.342***	-1.044***		-0.995***	
	(0.0829)	(0.1265)		(0.1334)	
ANKARA	-0.577***	-1.267***		-1.363***	
	(0.0797)	(0.1376)		(0.1416)	
ANTALYA	0.183**	-0.403***		-0.425***	
	(0.0747)	(0.1209)		(0.1266)	
BALIKESIR	-0.391***	-0.356***		-0.425***	
	(0.0954)	(0.1340)		(0.1382)	
BOLU	0.281	0.238		0.266	
	(0.2185)	(0.3232)		(0.3351)	
BURSA	-0.423***	-0.794***		-0.797***	
	(0.0714)	(0.1076)		(0.1136)	
CANKIRI	0.412***	0.050		0.147	
	(0.1111)	(0.1638)		(0.1704)	
CORUM	-0.253	-0.851*		-0.676	
	(0.3936)	(0.4980)		(0.5146)	

Table F.2. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
DENIZLI	0.196**	-0.075		-0.070	
	(0.0866)	(0.1234)		(0.1305)	
DIYARBAKIR	0.114	-0.692***		-0.609***	
	(0.0996)	(0.1467)		(0.1529)	
ERZURUM	-0.043	-0.351**		-0.291**	
	(0.0983)	(0.1403)		(0.1465)	
ESKISEHIR	-0.373***	-0.383***		-0.326**	
	(0.0879)	(0.1229)		(0.1287)	
GAZIANTEP	-0.456***	-1.220***		-1.105***	
	(0.0922)	(0.1363)		(0.1417)	
HATAY	-0.327	0.087		0.413	
	(0.3248)	(0.4274)		(0.4384)	
ISTANBUL	-0.676***	-1.660***		-1.671***	
	(0.0792)	(0.1486)		(0.1521)	
IZMIR	-0.410***	-0.986***		-1.133***	
	(0.0836)	(0.1506)		(0.1495)	
KAYSERI	0.060	-0.278**		-0.352***	
	(0.0839)	(0.1209)		(0.1272)	
KOCAELI	-0.148**	-0.486***		-0.535***	
	(0.0693)	(0.1063)		(0.1112)	
KONYA	0.149**	-0.322***		-0.368***	
	(0.0698)	(0.1121)		(0.1165)	
KUTAHYA	-0.962***	-0.888***		-0.683***	
	(0.1784)	(0.2367)		(0.2428)	
MALATYA	0.600***	0.430***		0.482***	
	(0.0816)	(0.1179)		(0.1230)	
MARDIN	-0.010	-0.526***		-0.515***	
	(0.0739)	(0.1128)		(0.1188)	
MERSIN	0.820***	0.621***		0.547***	
	(0.0828)	(0.1235)		(0.1277)	
MUGLA	-0.135	-0.411*		-0.295	
	(0.1713)	(0.2264)		(0.2334)	
NIGDE	0.368***	0.086		0.137	
	(0.0826)	(0.1197)		(0.1251)	
ORDU	-0.021	-0.126		0.031	
	(0.1666)	(0.3057)		(0.3176)	
OSMANIYE	0.392***	0.411***		0.403***	
	(0.0755)	(0.1097)		(0.1153)	
SAMSUN	0.685***	0.676***		0.678***	
	(0.0785)	(0.1132)		(0.1185)	
TEKIRDAG	0.045	0.606**		0.528	
	(0.1578)	(0.2868)		(0.3337)	
TRABZON	0.001	-0.324***		-0.299**	
	(0.0781)	(0.1139)		(0.1195)	
USAK	-0.853**	-1.442***		-1.243**	
	(0.3341)	(0.5094)		(0.5262)	
VAN	-0.300***	-0.147		-0.160	
	(0.0816)	(0.1201)		(0.1252)	

Table F.2. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
January	0.003	0.146***		0.129***	
	(0.0272)	(0.0369)		(0.0389)	
February	-0.000	0.162***		0.147***	
	(0.0268)	(0.0374)		(0.0396)	
March	-0.067**	-0.003		-0.001	
	(0.0275)	(0.0362)		(0.0383)	
April	-0.130***	-0.093**		-0.051	
	(0.0330)	(0.0436)		(0.0458)	
May	-0.142***	-0.152***		-0.102*	
	(0.0427)	(0.0562)		(0.0587)	
June	-0.082	-0.178**		-0.108	
	(0.0550)	(0.0724)		(0.0755)	
July	-0.098	-0.213**		-0.129	
	(0.0645)	(0.0850)		(0.0885)	
August	-0.133**	-0.236***		-0.141	
	(0.0628)	(0.0834)		(0.0865)	
September	-0.078	-0.133*		-0.057	
	(0.0516)	(0.0685)		(0.0711)	
October	-0.083**	-0.119**		-0.067	
	(0.0396)	(0.0523)		(0.0544)	
November	-0.008	0.018		0.042	
	(0.0293)	(0.0380)		(0.0402)	
Constant	11.804***	19.093***			
	(3.1002)	(4.0744)			
Observations	11694	11364	11364	10707	11364
R-squared	0.764	0.864	0.431	0.584	0.431
Number of Product	84			62	

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table F. 3. Results of the nested logit models for discounter shops

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
p	-0.198	-4.554***	-4.554***	-5.013***	-4.554***
	(0.1823)	(1.1461)	(1.3979)	(1.0260)	(1.7612)
lns_jmn	0.812***	0.025	0.025	0.051	0.025
	(0.0106)	(0.1050)	(0.1083)	(0.0992)	(0.1176)
ab	0.683*	0.194	0.194	0.487	0.194
	(0.3825)	(0.6137)	(0.6864)	(0.6059)	(0.6968)
c1	-0.720**	-0.756	-0.756	-0.169	-0.756
	(0.3561)	(0.5571)	(0.6806)	(0.5572)	(0.7221)
c2	2.864***	2.953***	2.953***	3.322***	2.953***
	(0.4260)	(0.6544)	(0.8447)	(0.6545)	(0.8878)
agehh	1.565***	0.566	0.566	0.678	0.566
	(0.3719)	(0.5836)	(0.6691)	(0.5768)	(0.7934)
sq_agehh	-0.017***	-0.006	-0.006	-0.007	-0.006
	(0.0042)	(0.0066)	(0.0075)	(0.0066)	(0.0089)
ageps	-0.501***	-0.160	-0.160	-0.027	-0.160
	(0.1739)	(0.2737)	(0.2932)	(0.2678)	(0.3313)
sq_ageps	0.007***	0.001	0.001	-0.000	0.001
	(0.0023)	(0.0036)	(0.0039)	(0.0035)	(0.0044)
size1	2.642***	1.727	1.727	2.166**	1.727
	(0.6558)	(1.1071)	(1.3155)	(1.0620)	(1.5207)
size2	-0.804**	-2.522***	-2.522***	-2.842***	-2.522***
	(0.3435)	(0.5804)	(0.6429)	(0.5731)	(0.6889)
urban	0.940***	2.483***	2.483***	2.291***	2.483***
	(0.2023)	(0.3735)	(0.4307)	(0.3602)	(0.4635)
holiday	-0.131	-0.555**	-0.555**	-0.400	-0.555*
	(0.1869)	(0.2771)	(0.2628)	(0.2871)	(0.3299)
temp	0.004	0.009	0.009	0.005	0.009
	(0.0056)	(0.0083)	(0.0085)	(0.0085)	(0.0093)
city1	0.254*	-0.444*		-0.333	
	(0.1499)	(0.2536)		(0.2471)	
city2	-0.991***	-2.081***		-2.011***	
	(0.1313)	(0.2489)		(0.2410)	
city3	0.503***	-0.436*		-0.290	
	(0.1220)	(0.2239)		(0.2161)	
city4	-0.906***	-0.676**		-0.560**	
	(0.1634)	(0.2634)		(0.2598)	
city5	0.107	-0.640		-0.527	
	(0.3138)	(0.6870)		(0.6689)	
city6	-0.739***	-1.183***		-1.081***	
	(0.1146)	(0.1958)		(0.1906)	
city7	0.786***	0.358		0.489**	
	(0.1346)	(0.2354)		(0.2251)	
city9	-0.281	0.391		0.493	
	(0.2937)	(0.6991)		(0.6815)	
city11	-0.345*	-1.089***		-1.090***	
	(0.1988)	(0.3311)		(0.3243)	
city12	-0.258	-0.537*		-0.408	
	(0.1754)	(0.3144)		(0.3064)	

Table F.3. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
city13	0.617***	-0.330		-0.239	
	(0.1845)	(0.3141)		(0.3022)	
city14	0.702***	0.493		0.761**	
	(0.2283)	(0.3771)		(0.3664)	
city15	-0.877***	-2.806***		-2.454***	
	(0.1391)	(0.3194)		(0.2911)	
city16	-0.597***	-1.251***		-1.197***	
	(0.1438)	(0.2609)		(0.2507)	
city17	0.483***	0.287		0.203	
	(0.1318)	(0.2125)		(0.2114)	
city18	-0.315***	-0.817***		-0.755***	
	(0.1052)	(0.1834)		(0.1778)	
city19	0.071	-0.377*		-0.396*	
	(0.1230)	(0.2046)		(0.2020)	
city20	1.547***	1.343**		1.450**	
	(0.3935)	(0.6844)		(0.6652)	
city23	0.113	-0.163		-0.100	
	(0.1239)	(0.2064)		(0.2017)	
city24	0.226	0.741***		0.768***	
	(0.1474)	(0.2530)		(0.2491)	
city26	0.071	-0.328		-0.214	
	(0.1213)	(0.2007)		(0.1944)	
city27	0.293**	-0.271		-0.215	
	(0.1472)	(0.2478)		(0.2393)	
city28	0.175	-0.267		-0.216	
	(0.1189)	(0.2032)		(0.1968)	
city29	1.195***	1.067***		1.177***	
	(0.1175)	(0.1956)		(0.1911)	
city30	0.155	-0.388		-0.351	
	(0.1692)	(0.3030)		(0.2953)	
city31	1.032***	1.079**		1.171**	
	(0.2263)	(0.5055)		(0.4920)	
city33	-0.328***	-0.498**		-0.436**	
	(0.1183)	(0.2015)		(0.1959)	
ay1	0.058	0.238***		0.212***	
	(0.0478)	(0.0757)		(0.0770)	
ay2	-0.060	0.151**		0.096	
	(0.0472)	(0.0754)		(0.0753)	
ay3	-0.195***	-0.117		-0.171**	
	(0.0467)	(0.0711)		(0.0713)	
ay4	-0.228***	-0.176**		-0.183**	
	(0.0574)	(0.0841)		(0.0866)	
ay5	-0.267***	-0.295***		-0.238**	
	(0.0757)	(0.1115)		(0.1147)	
ay6	-0.327***	-0.403***		-0.360**	
	(0.0984)	(0.1456)		(0.1485)	
ay7	-0.400***	-0.530***		-0.476***	
	(0.1160)	(0.1719)		(0.1756)	

Table F.3. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
ay8	-0.386***	-0.389**		-0.334*	
	(0.1133)	(0.1668)		(0.1713)	
ay9	-0.240***	-0.258*		-0.183	
	(0.0915)	(0.1344)		(0.1379)	
ay10	-0.138**	-0.176*		-0.174*	
	(0.0694)	(0.1016)		(0.1043)	
ay11	-0.120**	-0.147*		-0.115	
	(0.0524)	(0.0768)		(0.0789)	
city8	-0.115				
	(0.6684)				
city25	-0.512				
	(0.4867)				
Constant	-27.439***	-9.569			
	(6.9058)	(10.8159)			
Observations	5530	5253	5253	4647	5253
R-squared	0.723	0.774	0.038	0.394	0.038
Number of Product	71			39	

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table F. 4. Results of the nested logit models for medium markets-groceries

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
p	-0.056	-2.353***	-2.353***	-0.881***	-2.348***	-2.348***	-2.353***	-2.348***
	(0.0396)	(0.4113)	(0.6033)	(0.1874)	(0.3904)	(0.5545)	(0.6725)	(0.6371)
lns_jmn	0.924***	0.627***	0.627***	0.551***	0.650***	0.650***	0.627***	0.650***
	(0.0033)	(0.0406)	(0.0463)	(0.0368)	(0.0405)	(0.0460)	(0.0651)	(0.0649)
ab	-0.152*	0.536***	0.536***	0.409***	0.505***	0.505***	0.536**	0.505**
	(0.0907)	(0.1264)	(0.1815)	(0.1295)	(0.1236)	(0.1760)	(0.2159)	(0.2128)
c1	-1.604***	-1.053***	-1.053***	-1.102***	-1.078***	-1.078***	-1.053***	-1.078***
	(0.0934)	(0.1252)	(0.1799)	(0.1287)	(0.1226)	(0.1743)	(0.1951)	(0.1926)
c2	0.491***	1.034***	1.034***	0.788***	1.022***	1.022***	1.034***	1.022***
	(0.1124)	(0.1584)	(0.2295)	(0.1513)	(0.1543)	(0.2169)	(0.2862)	(0.2778)
agehh	0.233**	-0.011	-0.011	0.009	0.003	0.003	-0.011	0.003
	(0.0950)	(0.1206)	(0.1740)	(0.1259)	(0.1185)	(0.1698)	(0.1991)	(0.1967)
sq_agehh	-0.003***	-0.000	-0.000	-0.001	-0.001	-0.001	-0.000	-0.001
	(0.0011)	(0.0014)	(0.0020)	(0.0015)	(0.0014)	(0.0020)	(0.0023)	(0.0023)
ageps	-0.057	-0.110**	-0.110	-0.112**	-0.106**	-0.106	-0.110	-0.106
	(0.0428)	(0.0540)	(0.0742)	(0.0560)	(0.0531)	(0.0722)	(0.0749)	(0.0740)
sq_ageps	0.002***	0.002**	0.002	0.002**	0.002**	0.002	0.002	0.002
	(0.0006)	(0.0007)	(0.0010)	(0.0008)	(0.0007)	(0.0010)	(0.0010)	(0.0010)
size1	1.144***	0.670***	0.670**	0.666***	0.692***	0.692***	0.670**	0.692**
	(0.1495)	(0.1904)	(0.2644)	(0.1983)	(0.1870)	(0.2580)	(0.2897)	(0.2884)
size2	-0.085	-0.582***	-0.582***	-0.476***	-0.569***	-0.569***	-0.582***	-0.569***
	(0.0865)	(0.1188)	(0.1685)	(0.1173)	(0.1158)	(0.1626)	(0.1780)	(0.1736)
urban	0.901***	1.277***	1.277***	1.133***	1.268***	1.268***	1.277***	1.268***
	(0.0444)	(0.0692)	(0.1020)	(0.0626)	(0.0669)	(0.0970)	(0.1101)	(0.1089)
holiday	-0.178***	-0.449***	-0.449***	-0.459***	-0.431***	-0.431***	-0.449***	-0.431***
	(0.0629)	(0.0839)	(0.0745)	(0.0868)	(0.0826)	(0.0739)	(0.1528)	(0.1516)
temp	0.007***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***
	(0.0016)	(0.0020)	(0.0023)	(0.0021)	(0.0020)	(0.0023)	(0.0035)	(0.0035)

Table F.4. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
city1	-0.520***	-0.848***		-0.809***	-0.831***			
	(0.0383)	(0.0548)		(0.0570)	(0.0538)			
city2	-0.690***	-1.033***		-1.034***	-1.011***			
	(0.0366)	(0.0580)		(0.0586)	(0.0573)			
city3	-0.171***	-0.417***		-0.430***	-0.400***			
	(0.0334)	(0.0496)		(0.0506)	(0.0490)			
city4	-1.010***	-0.935***		-0.915***	-0.937***			
	(0.0465)	(0.0582)		(0.0604)	(0.0572)			
city5	-0.048	0.081		0.085	0.076			
	(0.0972)	(0.1214)		(0.1249)	(0.1193)			
city6	-0.850***	-1.143***		-1.122***	-1.127***			
	(0.0317)	(0.0475)		(0.0492)	(0.0467)			
city7	-0.011	-0.391***		-0.346***	-0.373***			
	(0.0335)	(0.0519)		(0.0531)	(0.0507)			
city8	-0.009	-0.229		-0.100	-0.228			
	(0.2125)	(0.2669)		(0.2720)	(0.2622)			
city9	-0.386***	-0.426***		-0.382***	-0.426***			
	(0.0424)	(0.0535)		(0.0549)	(0.0525)			
city10	-0.021	-0.383***		-0.388***	-0.365***			
	(0.0435)	(0.0618)		(0.0650)	(0.0607)			
city11	-0.732***	-1.054***		-0.989***	-1.041***			
	(0.0437)	(0.0603)		(0.0611)	(0.0589)			
city12	-0.806***	-0.911***		-0.862***	-0.907***			
	(0.0375)	(0.0477)		(0.0489)	(0.0468)			
city13	-0.040	-0.486***		-0.441***	-0.465***			
	(0.0414)	(0.0627)		(0.0654)	(0.0614)			
city14	0.549***	0.374***		0.354***	0.382***			
	(0.0819)	(0.1028)		(0.1072)	(0.1010)			
city15	-0.661***	-1.254***		-1.241***	-1.217***			
	(0.0354)	(0.0741)		(0.0726)	(0.0734)			

Table F.4. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
city16	-0.484***	-0.667***		-0.692***	-0.651***			
	(0.0393)	(0.0577)		(0.0567)	(0.0570)			
city17	-0.426***	-0.611***		-0.584***	-0.601***			
	(0.0383)	(0.0502)		(0.0519)	(0.0494)			
city18	-0.117***	-0.206***		-0.192***	-0.201***			
	(0.0319)	(0.0405)		(0.0420)	(0.0399)			
city19	-0.136***	-0.372***		-0.368***	-0.357***			
	(0.0301)	(0.0442)		(0.0449)	(0.0436)			
city20	-0.544***	-0.685***		-0.613***	-0.682***			
	(0.0645)	(0.0821)		(0.0830)	(0.0806)			
city21	0.371***	0.188***		0.245***	0.194***			
	(0.0329)	(0.0447)		(0.0442)	(0.0436)			
city22	0.630***	0.525***		0.596***	0.526***			
	(0.1135)	(0.1422)		(0.1456)	(0.1397)			
city23	-0.136***	-0.336***		-0.325***	-0.324***			
	(0.0331)	(0.0450)		(0.0469)	(0.0443)			
city24	0.319***	0.269***		0.256***	0.275***			
	(0.0387)	(0.0504)		(0.0511)	(0.0495)			
city25	-0.073	-0.061		0.070	-0.067			
	(0.0977)	(0.1276)		(0.1284)	(0.1254)			
city26	-0.584***	-0.691***		-0.641***	-0.688***			
	(0.0321)	(0.0419)		(0.0420)	(0.0410)			
city27	0.205***	0.064		0.093**	0.070			
	(0.0352)	(0.0453)		(0.0468)	(0.0445)			
city28	-0.323***	-0.385***		-0.401***	-0.379***			
	(0.0323)	(0.0417)		(0.0427)	(0.0410)			
city29	0.438***	0.409***		0.413***	0.412***			
	(0.0345)	(0.0435)		(0.0448)	(0.0427)			
city30	-0.479***	-0.473***		-0.419***	-0.476***			
	(0.0395)	(0.0506)		(0.0514)	(0.0497)			

Table F.4. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
city31	-0.607***	-0.847***		-0.835***	-0.833***			
	(0.0341)	(0.0478)		(0.0496)	(0.0471)			
city32	0.429***	-0.172		-0.016	-0.152			
	(0.0978)	(0.1330)		(0.1322)	(0.1298)			
city33	-0.806***	-0.662***		-0.625***	-0.669***			
	(0.0355)	(0.0461)		(0.0479)	(0.0453)			
ay1	-0.070***	0.002		-0.016	-0.000			
	(0.0160)	(0.0209)		(0.0215)	(0.0204)			
ay2	-0.018	0.059***		0.049**	0.056***			
	(0.0158)	(0.0207)		(0.0216)	(0.0203)			
ay3	-0.156***	-0.114***		-0.126***	-0.116***			
	(0.0162)	(0.0204)		(0.0213)	(0.0201)			
ay4	-0.271***	-0.229***		-0.233***	-0.231***			
	(0.0191)	(0.0240)		(0.0251)	(0.0236)			
ay5	-0.383***	-0.354***		-0.366***	-0.355***			
	(0.0241)	(0.0301)		(0.0315)	(0.0296)			
ay6	-0.400***	-0.390***		-0.410***	-0.389***			
	(0.0305)	(0.0382)		(0.0400)	(0.0375)			
ay7	-0.395***	-0.399***		-0.431***	-0.397***			
	(0.0356)	(0.0447)		(0.0467)	(0.0439)			
ay8	-0.366***	-0.368***		-0.392***	-0.367***			
	(0.0350)	(0.0437)		(0.0459)	(0.0429)			
ay9	-0.304***	-0.310***		-0.321***	-0.309***			
	(0.0290)	(0.0361)		(0.0379)	(0.0355)			
ay10	-0.134***	-0.140***		-0.152***	-0.139***			
	(0.0226)	(0.0282)		(0.0296)	(0.0277)			
ay11	-0.082***	-0.088***		-0.097***	-0.087***			
	(0.0174)	(0.0217)		(0.0228)	(0.0213)			

Table F.4. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
Constant	-3.534**	3.965*						
	(1.6995)	(2.1997)						
Observations	20139	20107	20107	19325	20101	20107	20107	20107
R-squared	0.845	0.933	0.693	0.742	0.767	0.705	0.693	0.705
Number of Product	88			67	82			

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table F. 5. Results of the nested logit models for non-chain shops

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
p	0.072	0.121	0.121	-0.484	0.121
	(0.0719)	(0.8648)	(1.0836)	(0.9423)	(1.3815)
lns_jmn	0.871***	0.478***	0.478***	0.536***	0.478***
	(0.0073)	(0.0521)	(0.0579)	(0.0519)	(0.0802)
ab	-1.055***	-0.812***	-0.812***	-0.845***	-0.812***
	(0.1844)	(0.2229)	(0.2552)	(0.2217)	(0.2947)
c1	-0.615***	-0.782***	-0.782***	-0.787***	-0.782**
	(0.1836)	(0.2135)	(0.2441)	(0.2139)	(0.3198)
c2	0.801***	0.593*	0.593	0.519	0.593
	(0.2387)	(0.3162)	(0.3792)	(0.3229)	(0.4636)
agehh	-0.236	-0.156	-0.156	-0.118	-0.156
	(0.1996)	(0.2334)	(0.2641)	(0.2325)	(0.3110)
sq_agehh	0.003	0.002	0.002	0.001	0.002
	(0.0023)	(0.0027)	(0.0030)	(0.0027)	(0.0035)
ageps	-0.264***	-0.340***	-0.340***	-0.336***	-0.340**
	(0.0869)	(0.1005)	(0.1200)	(0.1002)	(0.1504)
sq_ageps	0.004***	0.005***	0.005***	0.004***	0.005**
	(0.0012)	(0.0014)	(0.0016)	(0.0014)	(0.0020)
size1	0.088	-0.306	-0.306	-0.116	-0.306
	(0.3103)	(0.3670)	(0.4258)	(0.3665)	(0.4977)
size2	0.137	-0.416*	-0.416	-0.284	-0.416
	(0.1833)	(0.2196)	(0.2661)	(0.2189)	(0.2941)
urban	0.428***	0.816***	0.816***	0.815***	0.816***
	(0.0969)	(0.1385)	(0.1772)	(0.1419)	(0.2156)
holiday	-0.156	-0.408***	-0.408***	-0.318**	-0.408*
	(0.1227)	(0.1476)	(0.1468)	(0.1473)	(0.2341)
temp	-0.002	0.000	0.000	0.001	0.000
	(0.0031)	(0.0037)	(0.0038)	(0.0038)	(0.0057)
city1	0.058	-0.547***		-0.483***	
	(0.1420)	(0.1764)		(0.1724)	
city2	-0.573***	-1.378***		-1.244***	
	(0.1389)	(0.1866)		(0.1808)	
city3	0.121	-0.333**		-0.322**	
	(0.1332)	(0.1633)		(0.1593)	
city4	-1.346***	-1.515***		-1.444***	
	(0.1513)	(0.1814)		(0.1773)	
city5	-0.066	-0.395*		-0.343	
	(0.1971)	(0.2303)		(0.2241)	
city6	-0.929***	-1.345***		-1.306***	
	(0.1343)	(0.1646)		(0.1610)	
city7	-0.183	-0.620***		-0.596***	
	(0.1365)	(0.1664)		(0.1629)	
city8	-1.666***	-1.917***		-1.887***	
	(0.4292)	(0.4849)		(0.4720)	
city9	-0.311**	-0.690***		-0.686***	
	(0.1398)	(0.1688)		(0.1654)	
city10	-0.102	-0.803***		-0.708***	
	(0.1500)	(0.1896)		(0.1855)	

Table F.5. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
city11	-0.969***	-1.803***		-1.662***	
	(0.1484)	(0.1957)		(0.1921)	
city12	-0.907***	-1.309***		-1.270***	
	(0.1400)	(0.1684)		(0.1645)	
city13	-0.164	-0.838***		-0.773***	
	(0.1465)	(0.1840)		(0.1800)	
city14	-0.060	-0.514**		-0.557**	
	(0.1893)	(0.2214)		(0.2217)	
city15	-0.699***	-1.712***		-1.530***	
	(0.1386)	(0.1937)		(0.1853)	
city16	-0.459***	-0.917***		-0.870***	
	(0.1414)	(0.1729)		(0.1688)	
city17	-0.401***	-0.941***		-0.840***	
	(0.1404)	(0.1757)		(0.1716)	
city18	-0.447***	-0.811***		-0.759***	
	(0.1325)	(0.1614)		(0.1576)	
city19	-0.232*	-0.752***		-0.685***	
	(0.1317)	(0.1649)		(0.1609)	
city20	-0.489***	-0.776***		-0.767***	
	(0.1656)	(0.1942)		(0.1918)	
city21	0.229*	-0.346**		-0.248	
	(0.1340)	(0.1687)		(0.1643)	
city22	0.407	-0.256		-0.129	
	(0.3308)	(0.3835)		(0.3738)	
city23	0.088	-0.412**		-0.353**	
	(0.1345)	(0.1651)		(0.1609)	
city24	0.441***	0.515***		0.502***	
	(0.1447)	(0.1744)		(0.1706)	
city25	-0.256	-0.814***		-0.756***	
	(0.1769)	(0.2112)		(0.2068)	
city26	-0.496***	-0.886***		-0.863***	
	(0.1329)	(0.1607)		(0.1569)	
city27	0.310**	-0.111		-0.040	
	(0.1389)	(0.1690)		(0.1650)	
city28	-0.112	-0.472***		-0.385**	
	(0.1349)	(0.1670)		(0.1630)	
city29	0.671***	0.331**		0.355**	
	(0.1350)	(0.1625)		(0.1583)	
city30	-0.379***	-0.504***		-0.459***	
	(0.1425)	(0.1717)		(0.1676)	
city31	-0.998***	-1.393***		-1.346***	
	(0.1336)	(0.1620)		(0.1579)	
city32	-0.523*	-1.128***		-1.059***	
	(0.2860)	(0.3317)		(0.3243)	
city33	-0.580***	-0.961***		-0.932***	
	(0.1353)	(0.1641)		(0.1600)	

Table F.5. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS Cluster Robust
ay1	-0.070**	-0.002		-0.023	
	(0.0316)	(0.0371)		(0.0377)	
ay2	-0.025	0.066*		0.048	
	(0.0309)	(0.0370)		(0.0372)	
ay3	-0.121***	-0.081**		-0.105***	
	(0.0314)	(0.0364)		(0.0369)	
ay4	-0.176***	-0.115**		-0.146***	
	(0.0378)	(0.0449)		(0.0458)	
ay5	-0.221***	-0.197***		-0.224***	
	(0.0474)	(0.0556)		(0.0574)	
ay6	-0.156***	-0.176***		-0.200***	
	(0.0598)	(0.0683)		(0.0694)	
ay7	-0.177**	-0.215***		-0.231***	
	(0.0697)	(0.0803)		(0.0819)	
ay8	-0.209***	-0.232***		-0.254***	
	(0.0686)	(0.0785)		(0.0800)	
ay9	-0.159***	-0.135**		-0.165**	
	(0.0569)	(0.0661)		(0.0676)	
ay10	-0.062	-0.082		-0.104**	
	(0.0442)	(0.0510)		(0.0519)	
ay11	-0.011	-0.014		-0.025	
	(0.0337)	(0.0389)		(0.0395)	
Constant	9.927***	10.531**			
	(3.7189)	(4.4013)			
Observations	9778	9521	9521	8818	9521
R-squared	0.734	0.878	0.491	0.670	0.491
Number of Product	80			49	

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table F. 6. Results of the nested logit models for “other” shops

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
p	-0.056	-1.470	-1.470	0.248	-2.270*	-2.270*	-1.470	-2.270
	(0.0396)	(1.1456)	(1.2874)	(1.0235)	(1.1980)	(1.3451)	(1.7156)	(1.7355)
lns_jmn	0.924***	0.567***	0.567***	0.558***	0.575***	0.575***	0.567***	0.575***
	(0.0033)	(0.0649)	(0.0687)	(0.0671)	(0.0660)	(0.0693)	(0.1034)	(0.1034)
ab	-0.152*	-0.240	-0.240	-0.658	-0.150	-0.150	-0.240	-0.150
	(0.0907)	(0.4373)	(0.5242)	(0.4519)	(0.4464)	(0.5278)	(0.6668)	(0.6688)
c1	-1.604***	1.760***	1.760***	1.325***	1.872***	1.872***	1.760***	1.872***
	(0.0934)	(0.4473)	(0.5447)	(0.4559)	(0.4571)	(0.5520)	(0.6265)	(0.6301)
c2	0.491***	3.884***	3.884***	3.334***	3.996***	3.996***	3.884***	3.996***
	(0.1124)	(0.5446)	(0.6826)	(0.5459)	(0.5559)	(0.6937)	(0.9471)	(0.9621)
agehh	0.233**	0.146	0.146	0.125	0.171	0.171	0.146	0.171
	(0.0950)	(0.3848)	(0.4376)	(0.3954)	(0.3919)	(0.4417)	(0.6016)	(0.6059)
sq_agehh	-0.003***	-0.002	-0.002	-0.002	-0.003	-0.003	-0.002	-0.003
	(0.0011)	(0.0045)	(0.0050)	(0.0046)	(0.0045)	(0.0051)	(0.0069)	(0.0070)
ageps	-0.057	0.790***	0.790***	0.751***	0.790***	0.790***	0.790***	0.790***
	(0.0428)	(0.1882)	(0.2216)	(0.1954)	(0.1917)	(0.2228)	(0.2899)	(0.2913)
sq_ageps	0.002***	-0.009***	-0.009***	-0.009***	-0.010***	-0.010***	-0.009**	-0.010**
	(0.0006)	(0.0026)	(0.0030)	(0.0026)	(0.0026)	(0.0030)	(0.0039)	(0.0039)
size1	1.144***	0.139	0.139	0.543	-0.053	-0.053	0.139	-0.053
	(0.1495)	(0.7175)	(0.8704)	(0.7155)	(0.7335)	(0.8873)	(1.2862)	(1.3027)
size2	-0.085	1.101**	1.101**	1.558***	0.923*	0.923*	1.101	0.923
	(0.0865)	(0.4652)	(0.5364)	(0.4533)	(0.4775)	(0.5438)	(0.7197)	(0.7241)
urban	0.901***	0.175	0.175	0.092	0.253	0.253	0.175	0.253
	(0.0444)	(0.2329)	(0.2619)	(0.2294)	(0.2387)	(0.2670)	(0.3289)	(0.3321)
holiday	-0.178***	0.017	0.017	0.231	0.015	0.015	0.017	0.015
	(0.0629)	(0.2339)	(0.2273)	(0.2456)	(0.2382)	(0.2299)	(0.2483)	(0.2508)

Table F.6. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
temp	0.007***	0.014**	0.014*	0.011*	0.014**	0.014*	0.014	0.014
	(0.0016)	(0.0066)	(0.0073)	(0.0069)	(0.0067)	(0.0074)	(0.0107)	(0.0109)
city1	-0.520***	0.511		0.538	0.492			
	(0.0383)	(0.3361)		(0.3377)	(0.3423)			
city2	-0.690***	-0.846**		-0.815**	-0.841**			
	(0.0366)	(0.3302)		(0.3318)	(0.3362)			
city3	-0.171***	0.116		0.096	0.117			
	(0.0334)	(0.3197)		(0.3204)	(0.3256)			
city4	-1.010***	-0.724**		-0.829**	-0.687*			
	(0.0465)	(0.3502)		(0.3505)	(0.3568)			
city6	-0.850***	-0.214		-0.240	-0.209			
	(0.0317)	(0.3155)		(0.3159)	(0.3213)			
city7	-0.011	-0.232		-0.142	-0.285			
	(0.0335)	(0.3512)		(0.3490)	(0.3580)			
city9	-0.386***	-1.171**		-1.185**	-1.150*			
	(0.0424)	(0.5870)		(0.5859)	(0.5978)			
city10	-0.021	0.644*		0.699*	0.585			
	(0.0435)	(0.3780)		(0.3783)	(0.3854)			
city11	-0.732***	0.920**		0.982***	0.847**			
	(0.0437)	(0.3689)		(0.3649)	(0.3765)			
city12	-0.806***	-0.273		-0.322	-0.289			
	(0.0375)	(0.3241)		(0.3246)	(0.3300)			
city13	-0.040	1.013***		1.086***	0.956***			
	(0.0414)	(0.3559)		(0.3547)	(0.3629)			
city14	0.549***	0.281		0.312	0.268			
	(0.0819)	(0.4766)		(0.5004)	(0.4854)			

Table F.6. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
city15	-0.661***	-0.719**		-0.623*	-0.726**			
	(0.0354)	(0.3315)		(0.3325)	(0.3376)			
city16	-0.484***	-0.228		-0.311	-0.179			
	(0.0393)	(0.3367)		(0.3354)	(0.3432)			
city17	-0.426***	-0.104		-0.098	-0.108			
	(0.0383)	(0.3292)		(0.3298)	(0.3353)			
city18	-0.117***	0.220		0.241	0.227			
	(0.0319)	(0.3188)		(0.3191)	(0.3247)			
city19	-0.136***	0.505		0.518*	0.499			
	(0.0301)	(0.3145)		(0.3145)	(0.3203)			
city20	-0.544***	-1.118*		-1.032	-1.154*			
	(0.0645)	(0.6778)		(0.6749)	(0.6903)			
city21	0.371***	0.577		0.607*	0.557			
	(0.0329)	(0.3604)		(0.3593)	(0.3670)			
city22	0.630***	3.971***		3.932***	4.011***			
	(0.1135)	(0.5462)		(0.5779)	(0.5563)			
city23	-0.136***	0.657**		0.704**	0.649**			
	(0.0331)	(0.3227)		(0.3234)	(0.3286)			
city24	0.319***	0.614*		0.622*	0.633*			
	(0.0387)	(0.3521)		(0.3536)	(0.3586)			
city26	-0.584***	0.100		0.133	0.075			
	(0.0321)	(0.3245)		(0.3239)	(0.3306)			
city27	0.205***	0.835**		0.840**	0.829**			
	(0.0352)	(0.3279)		(0.3289)	(0.3339)			
city28	-0.323***	0.200		0.165	0.223			
	(0.0323)	(0.3167)		(0.3158)	(0.3226)			

Table F.6. (Continued)

VARIABLES	(1) OLS	(2) 2SLS	(3) 2SLS HAC Robust	(4) 2SLS (2)	(5) 2SLS (3)	(6) 2SLS (3) HAC Robust	(7) 2SLS Cluster Robust	(8) 2SLS (3) Cluster Robust
city29	0.438***	0.668*		0.683**	0.683*			
	(0.0345)	(0.3428)		(0.3448)	(0.3491)			
city31	-0.607***	0.084		0.141	0.069			
	(0.0341)	(0.3242)		(0.3240)	(0.3302)			
city33	-0.806***	-0.018		-0.153	0.002			
	(0.0355)	(0.3361)		(0.3375)	(0.3424)			
ay1	-0.070***	0.191***		0.161**	0.201***			
	(0.0160)	(0.0626)		(0.0663)	(0.0638)			
ay2	-0.018	0.183***		0.147**	0.195***			
	(0.0158)	(0.0626)		(0.0661)	(0.0639)			
ay3	-0.156***	-0.055		-0.073	-0.042			
	(0.0162)	(0.0656)		(0.0691)	(0.0669)			
ay4	-0.271***	-0.280***		-0.264***	-0.277***			
	(0.0191)	(0.0775)		(0.0826)	(0.0789)			
ay5	-0.383***	-0.353***		-0.350***	-0.347***			
	(0.0241)	(0.0988)		(0.1039)	(0.1006)			
ay6	-0.400***	-0.450***		-0.460***	-0.435***			
	(0.0305)	(0.1247)		(0.1313)	(0.1271)			
ay7	-0.395***	-0.401***		-0.406***	-0.383**			
	(0.0356)	(0.1466)		(0.1536)	(0.1494)			
ay8	-0.366***	-0.365**		-0.343**	-0.347**			
	(0.0350)	(0.1428)		(0.1496)	(0.1456)			
ay9	-0.304***	-0.299**		-0.303**	-0.288**			
	(0.0290)	(0.1191)		(0.1247)	(0.1213)			
ay10	-0.134***	-0.204**		-0.200**	-0.200**			
	(0.0226)	(0.0897)		(0.0947)	(0.0914)			

Table F.6. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	OLS	2SLS	2SLS HAC Robust	2SLS (2)	2SLS (3)	2SLS (3) HAC Robust	2SLS Cluster Robust	2SLS (3) Cluster Robust
ay11	-0.082***	0.123*		0.101	0.122*			
	(0.0174)	(0.0673)		(0.0709)	(0.0685)			
Constant	-3.534**	-19.500***						
	(1.6995)	(6.6999)						
Observations	20139	5871	5871	5298	5857	5871	5871	5871
R-squared	0.845	0.791	0.383	0.542	0.542	0.368	0.383	0.368
Number of Product	88			42	64			

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

APPENDIX G

Results of the merger simulation

Table G. 1. List of corrections for the own-price elasticities in medium markets-groceries

Correction on Coca Cola 2 lt + normal cola product (Medium)				
Region	Own-price elasticity		PCM	
	Original	Corrected	Original	Corrected
Marmara	-0.9183	-1.1	1.1812	0.981
Aegean	-0.8333	-1.15	1.4071	0.998
Central Anatolia	-0.877	-1.17	1.3054	0.957
Black Sea	-0.8234	-1.15	1.0276	0.9689
Mediterranean	-0.8151	-1.22	1.4156	0.9184
South Eastern Anatolia	-0.8317	-1.2	1.387	0.94

Correction on Coca Cola 1 lt diet cola product (Medium)				
Region	Own-price elasticity		PCM	
	Original	Corrected	Original	Corrected
Black Sea	-1.0759	-1.4	1.3973	0.9879
South Eastern Anatolia	-1.1841	-1.4	1.2644	0.984

Correction on Pepsi 2,5 lt normal cola product (Medium)				
Region	Own-price elasticity		PCM	
	Original	Corrected	Original	Corrected
Eastern Anatolia	-1.0509	-1.1	1.0175	0.9712

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 2. List of corrections for the own-price elasticities in chain shops

Correction on Coca Cola 2.5 lt normal cola product (Chain)

Region	Own-price elasticity		PCM	
	Original	Corrected	Original	Corrected
Marmara	-0.9446	-1.15	1.1957	0.975
Aegean	-0.9604	-1.25	1.269	0.9595
Central Anatolia	-0.9471	-1.15	1.1869	0.9706
Black Sea	-0.8264	-1.2	1.4565	0.9781
Mediterranean	-0.9116	-1.2	1.2976	0.9704
Eastern Anatolia	-1.0957	-1.2	1.0229	0.9301
South Eastern Anatolia				

Correction on Coca Cola 1 lt diet cola product (Chain)

Region	Own-price elasticity		PCM	
	Original	Corrected	Original	Corrected
Eastern Anatolia	-1.1863	-1.25	1.0657	0.9944

Correction on Coca Turca 2.5 lt normal cola product (Chain)

Region	Own-price elasticity		PCM	
	Original	Corrected	Original	Corrected
Eastern Anatolia	-1.0004	-1.1	1.0416	0.9464

Correction on Pepsi 2.5 lt normal cola product (Chain)

Region	Own-price elasticity		PCM	
	Original	Corrected	Original	Corrected
Eastern Anatolia	-0.9919	-1.1	1.0082	0.9091

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 3. Results of merger simulation in Aegean Region (chain shops in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.044	0.046	-4.166	-4.248	0.395	0.408	0.596	0.609	2.2
Coca Cola	Normal	1 lt	0.157	0.166	-1.881	-1.933	0.802	0.810	0.293	0.306	4.4
Coca Cola	Normal	2 lt +	0.389	0.374	-1.250	-1.282	0.960	0.968	0.204	0.256	25.6
Coca Cola	Diet	330 ml	0.017	0.016	-4.103	-4.153	0.399	0.408	0.606	0.615	1.4
Coca Cola	Diet	1 lt	0.039	0.039	-1.622	-1.648	0.828	0.833	0.292	0.301	3.0
Cola Turca	Normal	1 lt	0.033	0.032	-1.899	-2.128	0.596	0.639	0.274	0.307	12.1
Cola Turca	Normal	2 lt +	0.114	0.119	-1.142	-1.350	0.899	0.915	0.181	0.215	18.3
Cola Turca	Diet	1 lt	0.009	0.008	-2.103	-2.372	0.506	0.559	0.311	0.348	12.0
Pepsi	Normal	330 ml	0.013	0.012	-4.127	-4.347	0.282	0.318	0.585	0.616	5.3
Pepsi	Normal	1 lt	0.028	0.028	-2.001	-2.218	0.574	0.616	0.287	0.319	10.9
Pepsi	Normal	2 lt +	0.129	0.133	-1.219	-1.411	0.847	0.868	0.195	0.226	16.1
Pepsi	Diet	330 ml	0.010	0.010	-3.969	-4.119	0.301	0.326	0.577	0.598	3.7
Pepsi	Diet	1 lt	0.018	0.017	-1.736	-1.878	0.635	0.661	0.273	0.295	7.7

Standard errors in parentheses,*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 4. Results of merger simulation in Central Anatolia Region (chain shops in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.032	0.033	-4.499	-4.585	0.356	0.369	0.641	0.654	2.0
Coca Cola	Normal	1 lt	0.083	0.088	-2.017	-2.089	0.761	0.771	0.300	0.313	4.4
Coca Cola	Normal	2 lt +	0.402	0.400	-1.150	-1.168	0.971	0.976	0.207	0.248	19.8
Coca Cola	Diet	330 ml	0.015	0.015	-4.307	-4.369	0.366	0.377	0.629	0.640	1.7
Coca Cola	Diet	1 lt	0.041	0.041	-1.703	-1.730	0.770	0.778	0.299	0.310	3.6
Cola Turca	Normal	330 ml	0.030	0.027	-4.046	-4.306	0.296	0.338	0.577	0.613	6.4
Cola Turca	Normal	1 lt	0.040	0.038	-2.020	-2.277	0.583	0.629	0.292	0.329	12.6
Cola Turca	Normal	2 lt +	0.129	0.133	-1.074	-1.306	0.974	0.978	0.175	0.212	21.1
Cola Turca	Diet	330 ml	0.008	0.007	-3.945	-4.243	0.292	0.340	0.568	0.610	7.3
Cola Turca	Diet	1 lt	0.011	0.010	-1.894	-2.187	0.586	0.639	0.283	0.325	14.6
Pepsi	Normal	330 ml	0.020	0.018	-3.597	-3.875	0.329	0.376	0.511	0.551	7.7
Pepsi	Normal	1 lt	0.033	0.031	-1.988	-2.262	0.586	0.636	0.287	0.326	13.7
Pepsi	Normal	2 lt +	0.133	0.134	-1.200	-1.452	0.868	0.891	0.194	0.233	20.3
Pepsi	Diet	1 lt	0.026	0.024	-1.705	-1.918	0.632	0.670	0.278	0.310	11.4

Standard errors in parentheses,*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 5. Results of merger simulation in Black Sea Region (chain shops in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.054	0.057	-4.299	-4.442	0.414	0.436	0.618	0.642	3.8
Coca Cola	Normal	1 lt	0.073	0.079	-1.985	-2.115	0.866	0.876	0.296	0.320	8.0
Coca Cola	Normal	2 lt +	0.430	0.410	-1.200	-1.248	0.978	0.984	0.209	0.284	36.0
Coca Cola	Diet	330 ml	0.028	0.027	-3.974	-4.084	0.479	0.494	0.607	0.626	3.0
Coca Cola	Diet	1 lt	0.045	0.045	-1.607	-1.688	0.963	0.965	0.302	0.320	6.1
Cola Turca	Normal	330 ml	0.027	0.023	-4.411	-4.833	0.256	0.321	0.628	0.688	9.5
Cola Turca	Normal	2 lt +	0.100	0.101	-1.275	-1.662	0.800	0.846	0.201	0.261	29.8
Cola Turca	Diet	1 lt	0.023	0.021	-1.898	-2.110	0.562	0.603	0.305	0.337	10.3
Pepsi	Normal	330 ml	0.014	0.014	-4.054	-4.334	0.315	0.359	0.575	0.615	6.9
Pepsi	Normal	1 lt	0.030	0.031	-1.882	-2.153	0.665	0.708	0.272	0.312	14.7
Pepsi	Normal	2 lt +	0.1772	0.1915	-1.1444	-1.3399	0.9066	0.9222	0.1996	0.2396	20.04

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 6. Results of merger simulation in Mediterranean Region (chain shops in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.042	0.044	0.392	0.409	0.392	0.409	0.619	0.637	2.9
Coca Cola	Normal	1 lt	0.098	0.106	0.809	0.820	0.809	0.820	0.300	0.318	5.9
Coca Cola	Normal	2 lt +	0.394	0.385	0.970	0.977	0.970	0.977	0.209	0.267	27.4
Coca Cola	Diet	330 ml	0.020	0.020	0.403	0.417	0.403	0.417	0.605	0.620	2.4
Coca Cola	Diet	1 lt	0.037	0.038	0.799	0.808	0.799	0.808	0.305	0.320	4.8
Cola Turca	Normal	330 ml	0.028	0.026	0.290	0.339	0.290	0.339	0.581	0.624	7.4
Cola Turca	Normal	1 lt	0.035	0.034	0.617	0.669	0.617	0.669	0.273	0.317	15.8
Cola Turca	Normal	2 lt +	0.107	0.113	0.942	0.953	0.942	0.953	0.179	0.222	24.1
Cola Turca	Diet	330 ml	0.032	0.027	0.283	0.335	0.283	0.335	0.591	0.637	7.8
Pepsi	Normal	330 ml	0.015	0.014	0.276	0.321	0.276	0.321	0.619	0.660	6.7
Pepsi	Normal	1 lt	0.032	0.031	0.572	0.624	0.572	0.624	0.298	0.339	13.9
Pepsi	Normal	2 lt +	0.131	0.137	0.863	0.886	0.863	0.886	0.198	0.239	20.9
Pepsi	Diet	330 ml	0.010	0.009	0.316	0.356	0.316	0.356	0.564	0.599	6.3
Pepsi	Diet	1 lt	0.0204	0.0193	0.6223	0.6641	0.6223	0.6641	0.2859	0.3215	12.45

Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 7. Results of merger simulation in Eastern Anatolia Region (chain shops in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.025	0.025	-4.370	-4.517	0.341	0.368	0.622	0.648	4.2
Coca Cola	Normal	1 lt	0.073	0.077	-2.032	-2.159	0.705	0.728	0.301	0.328	8.8
Coca Cola	Diet	330 ml	0.298	0.324	-1.096	-1.127	0.930	0.941	0.213	0.254	18.8
Coca Cola	Diet	1 lt	0.046	0.045	-1.186	-1.256	0.994	0.995	0.296	0.333	12.5
Cola Turca	Normal	330 ml	0.041	0.032	-4.226	-4.710	0.310	0.382	0.605	0.675	11.7
Cola Turca	Normal	1 lt	0.037	0.030	-2.819	-3.300	0.463	0.542	0.405	0.476	17.4
Cola Turca	Normal	2 lt +	0.217	0.211	-1.000	-1.433	0.946	0.963	0.184	0.268	45.5
Pepsi	Normal	2 lt +	0.2645	0.2559	-0.9919	-1.4016	0.9091	0.9366	0.1921	0.2754	43.4

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 8. Results of merger simulation in Southeastern Anatolia Region (chain shops in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		Price-Cost Margin		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.058	0.061	-4.601	-4.723	0.403	0.421	0.661	0.681	3.1
Coca Cola	Normal	1 lt	0.092	0.101	-2.016	-2.120	0.880	0.888	0.303	0.323	6.7
Coca Cola	Normal	2 lt +	0.513	0.481	-1.200	-1.247	0.985	0.989	0.215	0.290	34.7
Coca Cola	Diet	330 ml	0.015	0.015	-3.985	-4.091	0.534	0.549	0.594	0.614	3.4
Coca Cola	Diet	1 lt	0.048	0.046	-1.550	-1.617	0.982	0.984	0.301	0.343	14.0
Cola Turca	Normal	2 lt +	0.105	0.115	-1.178	-1.390	0.849	0.874	0.187	0.223	19.5
Pepsi	Normal	330 ml	0.016	0.016	-4.064	-4.284	0.283	0.321	0.577	0.609	5.5
Pepsi	Normal	1 lt	0.035	0.037	-2.142	-2.354	0.529	0.572	0.309	0.341	10.2
Pepsi	Normal	2 lt +	0.108	0.118	-1.265	-1.442	0.818	0.843	0.200	0.232	15.9
Pepsi	Diet	330 ml	0.01	0.0103	-3.9651	-4.045	0.2708	0.2897	0.5813	0.5967	2.65

Standard errors in parentheses,*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 9. Results of merger simulation in Aegean Region (medium markets-groceries in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.045	0.046	-4.578	-4.734	0.409	0.430	0.693	0.719	3.7
Coca Cola	Normal	1 lt	0.084	0.091	-2.029	-2.162	0.880	0.889	0.322	0.348	8.1
Coca Cola	Normal	2 lt +	0.489	0.469	-1.150	-1.198	0.998	0.998	0.237	0.310	30.8
Coca Cola	Diet	330 ml	0.002	0.002	-4.966	-5.089	0.379	0.395	0.759	0.779	2.7
Coca Cola	Diet	1 lt	0.015	0.015	-1.468	-1.500	0.864	0.872	0.333	0.353	6.1
Cola Turca	Normal	330 ml	0.012	0.011	-4.101	-4.488	0.273	0.336	0.615	0.673	
Cola Turca	Normal	1 lt	0.020	0.019	-2.113	-2.496	0.525	0.598	0.320	0.378	18.1
Cola Turca	Normal	2 lt +	0.084	0.087	-1.281	-1.636	0.799	0.842	0.210	0.269	27.6
Cola Turca	Diet	1 lt	0.007	0.006	-2.024	-2.314	0.509	0.564	0.358	0.403	12.5
Pepsi	Normal	330 ml	0.044	0.043	-4.438	-4.684	0.279	0.318	0.672	0.711	5.7
Pepsi	Normal	1 lt	0.029	0.030	-2.012	-2.258	0.611	0.655	0.307	0.345	12.5
Pepsi	Normal	2 lt +	0.162	0.175	-1.252	-1.430	0.837	0.861	0.224	0.263	17.2
Pepsi	Diet	330 ml	0.003	0.002	-4.152	-4.452	0.286	0.332	0.640	0.684	6.9
Pepsi	Diet	1 lt	0.004	0.004	-1.833	-2.121	0.602	0.652	0.304	0.348	14.5

Standard errors in parentheses,*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 10. Results of merger simulation in Central Anatolia Region (medium markets-groceries in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.038	0.040	-4.258	-4.415	0.416	0.439	0.644	0.669	4.0
Coca Cola	Normal	1 lt	0.080	0.087	-2.031	-2.165	0.836	0.848	0.321	0.346	8.0
Coca Cola	Normal	2 lt +	0.477	0.462	-1.177	-1.209	0.957	0.967	0.235	0.304	29.1
Coca Cola	Diet	330 ml	0.003	0.003	-4.320	-4.424	0.445	0.459	0.671	0.689	2.6
Coca Cola	Diet	1 lt	0.014	0.013	-1.338	-1.375	0.948	0.951	0.315	0.333	5.6
Cola Turca	Normal	330 ml	0.016	0.015	-3.972	-4.316	0.300	0.356	0.596	0.648	8.7
Cola Turca	Normal	1 lt	0.018	0.018	-1.975	-2.317	0.599	0.658	0.299	0.350	17.3
Cola Turca	Normal	2 lt +	0.137	0.145	-1.172	-1.461	0.874	0.899	0.205	0.257	25.2
Cola Turca	Diet	330 ml	0.001	0.001	-4.458	-4.771	0.255	0.303	0.672	0.718	6.9
Cola Turca	Diet	1 lt	0.003	0.002	-1.797	-2.106	0.589	0.645	0.291	0.337	15.9
Pepsi	Normal	330 ml	0.032	0.029	-3.965	-4.292	0.303	0.356	0.599	0.648	8.3
Pepsi	Normal	1 lt	0.026	0.026	-1.965	-2.290	0.606	0.662	0.299	0.349	16.6
Pepsi	Normal	2 lt +	0.148	0.154	-1.278	-1.552	0.813	0.847	0.223	0.273	22.3
Pepsi	Diet	330 ml	0.003	0.003	-4.454	-4.659	0.270	0.302	0.690	0.721	4.4
Pepsi	Diet	1 lt	0.005	0.004	-1.983	-2.176	0.553	0.591	0.337	0.368	9.1

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 11. Results of merger simulation in Black Sea Region (medium markets-groceries in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		Price-Cost Margin		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.038	0.037	-4.351	-4.453	0.419	0.432	0.657	0.673	2.4
Coca Cola	Normal	1 lt	0.068	0.068	-2.019	-2.116	0.871	0.877	0.316	0.332	5.0
Coca Cola	Normal	2 lt +	0.524	0.535	-1.150	-0.847	0.969	0.971	0.235	0.251	6.7
Coca Cola	Diet	330 ml	0.005	0.005	-4.189	-4.240	0.525	0.531	0.676	0.684	1.2
Coca Cola	Diet	1 lt	0.016	0.016	-1.400	-1.102	0.988	0.988	0.311	0.319	2.7
Cola Turca	Normal	330 ml	0.010	0.009	-3.611	-3.815	0.337	0.372	0.541	0.571	5.6
Cola Turca	Normal	1 lt	0.021	0.020	-1.943	-2.146	0.619	0.655	0.295	0.325	10.3
Cola Turca	Normal	2 lt +	0.153	0.153	-1.132	-1.317	0.904	0.917	0.202	0.232	15.1
Cola Turca	Diet	330 ml	0.0002	0.0002	-4.919	-5.078	0.214	0.239	0.736	0.760	3.2
Pepsi	Normal	330 ml	0.021	0.018	-4.161	-4.421	0.278	0.320	0.625	0.664	6.2
Pepsi	Normal	1 lt	0.017	0.016	-1.940	-2.199	0.594	0.641	0.293	0.332	13.2
Pepsi	Normal	2 lt +	0.125	0.121	-1.287	-1.537	0.795	0.826	0.219	0.258	17.6
Pepsi	Diet	1 lt	0.003	0.003	-1.635	-1.701	0.636	0.650	0.269	0.279	3.9

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 12. Results of merger simulation in Mediterranean Region (medium markets-groceries in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		PCM		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.035	0.037	-4.344	-4.539	0.417	0.444	0.656	0.688	4.8
Coca Cola	Normal	1 lt	0.078	0.086	-2.071	-2.237	0.837	0.852	0.327	0.358	9.7
Coca Cola	Normal	2 lt +	0.509	0.481	-1.227	-1.253	0.918	0.941	0.236	0.325	37.3
Coca Cola	Diet	330 ml	0.003	0.002	-4.989	-5.135	0.376	0.395	0.763	0.787	3.1
Coca Cola	Diet	1 lt	0.016	0.015	-1.484	-1.529	0.854	0.864	0.336	0.360	7.1
Cola Turca	Normal	330 ml	0.013	0.013	-3.742	-4.066	0.334	0.387	0.561	0.610	8.7
Cola Turca	Normal	1 lt	0.030	0.031	-1.959	-2.273	0.627	0.679	0.299	0.348	16.4
Cola Turca	Normal	2 lt +	0.155	0.172	-1.103	-1.335	0.940	0.952	0.199	0.249	24.6
Cola Turca	Diet	330 ml	0.003	0.003	-3.780	-4.101	0.316	0.367	0.587	0.635	8.1
Cola Turca	Diet	1 lt	0.005	0.004	-2.156	-2.466	0.518	0.575	0.358	0.406	13.3
Pepsi	Normal	330 ml	0.015	0.013	-4.580	-5.006	0.251	0.315	0.687	0.751	9.3
Pepsi	Normal	1 lt	0.021	0.021	-1.927	-2.348	0.590	0.664	0.292	0.356	21.9
Pepsi	Normal	2 lt +	0.110	0.114	-1.316	-1.692	0.780	0.829	0.221	0.285	29.0
Pepsi	Diet	330 ml	0.002	0.002	-4.100	-4.440	0.291	0.344	0.628	0.678	8.0
Pepsi	Diet	1 lt	0.005	0.005	-1.812	-2.137	0.592	0.649	0.309	0.359	16.3

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 13. Results of merger simulation in Eastern Anatolia Region (medium markets-groceries in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		Price-Cost Margin		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.020	0.021	-4.110	-4.269	0.328	0.354	0.617	0.643	4.1
Coca Cola	Normal	1 lt	0.038	0.043	-2.092	-2.239	0.632	0.659	0.320	0.345	7.9
Coca Cola	Normal	2 lt +	0.255	0.293	-1.202	-1.208	0.870	0.883	0.232	0.258	10.9
Coca Cola	Diet	330 ml	0.001	0.001	-4.213	-4.292	0.334	0.347	0.634	0.646	1.9
Coca Cola	Diet	1 lt	0.012	0.011	-1.551	-1.577	0.708	0.720	0.299	0.312	4.1
Cola Turca	Normal	330 ml	0.004	0.003	-3.749	-4.438	0.359	0.458	0.560	0.663	18.3
Cola Turca	Normal	1 lt	0.020	0.016	-2.001	-2.688	0.664	0.749	0.303	0.405	33.9
Cola Turca	Normal	2 lt +	0.231	0.215	-1.038	-1.669	0.990	0.993	0.203	0.306	50.6
Cola Turca	Diet	330 ml	0.005	0.004	-3.834	-4.037	0.464	0.489	0.601	0.632	5.1
Cola Turca	Diet	1 lt	0.018	0.017	-1.186	-1.348	0.989	0.990	0.282	0.312	10.8
Pepsi	Normal	330 ml	0.015	0.012	-4.167	-4.691	0.361	0.432	0.625	0.703	12.5
Pepsi	Normal	1 lt	0.056	0.052	-1.863	-2.374	0.778	0.825	0.290	0.368	27.0
Pepsi	Normal	2 lt +	0.326	0.312	-1.100	-1.526	0.971	0.979	0.225	0.310	38.0

Author's own calculations using Ipsos/KGM and TURKSTAT data.

Table G. 14. Results of merger simulation in Southeastern Anatolia Region (medium markets-groceries in 2005).

Firm	Type	Pack	Exp. Market Share		Own-price elasticity		Price-Cost Margin		Price		Change in price (%)
			Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	Pre-merger	Post-merger	
Coca Cola	Normal	330 ml	0.042	0.044	-4.143	-4.329	0.436	0.462	0.628	0.658	4.9
Coca Cola	Normal	1 lt	0.073	0.080	-2.019	-2.183	0.861	0.873	0.318	0.348	9.7
Coca Cola	Normal	2 lt +	0.499	0.476	-1.200	-1.232	0.940	0.956	0.236	0.318	34.8
Coca Cola	Diet	330 ml	0.006	0.006	-3.716	-3.834	0.523	0.543	0.600	0.627	4.5
Coca Cola	Diet	1 lt	0.014	0.013	-1.400	-1.482	0.984	0.987	0.286	0.345	20.5
Cola Turca	Normal	330 ml	0.017	0.016	-3.737	-4.088	0.326	0.385	0.561	0.615	9.5
Cola Turca	Normal	1 lt	0.021	0.021	-1.974	-2.321	0.612	0.671	0.299	0.352	17.8
Cola Turca	Normal	2 lt +	0.143	0.156	-1.106	-1.382	0.929	0.944	0.197	0.250	27.0
Cola Turca	Diet	330 ml	0.000	0.000	-5.257	-5.561	0.217	0.260	0.787	0.833	5.8
Cola Turca	Diet	1 lt	0.003	0.003	-1.803	-2.083	0.590	0.646	0.289	0.335	15.8
Pepsi	Normal	330 ml	0.021	0.019	-4.403	-4.791	0.269	0.328	0.662	0.720	8.8
Pepsi	Normal	1 lt	0.025	0.025	-1.855	-2.237	0.630	0.693	0.282	0.341	20.7
Pepsi	Normal	2 lt +	0.133	0.139	-1.303	-1.631	0.793	0.836	0.224	0.283	26.0
Pepsi	Diet	1 lt	0.004	0.004	-1.581	-1.782	0.665	0.706	0.269	0.307	14.0

Author's own calculations using Ipsos/KGM and TURKSTAT data.

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PUBLICATIONS

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TURKISH SUMMARY

Rekabet hukuku ve politikası, iktisatla birçok açıdan ilişkilidir. Bu tezin amacı, Türkiye'deki içecek endüstrisinde –özel olarak da kolalı içecek piyasasında– talep yapısının ve pazar gücünün analizi yoluyla, rekabet politikasının iktisadi açıdan incelenmesi alanına katkıda bulunmaktır. Tezin ilk ampirik bölümünde, iki aşamalı bütçeleme çerçevesinde doğrusallaştırılmış İdeale Yakın Talep Sistemi (AIDS) kullanılarak, içecek ürünleri için bir talep sistemi tahmin edilmektedir. Ardından, ikinci ekonometrik çalışma olarak, kolalı içecek ürünlerinin talep esneklikleri marka ve paket hacmi düzeyinde basit ve yuvalı logit modeller yordamıyla tahmin edilmektedir. Son bölümde de, tahmin edilen talep esnekliklerinden yararlanılarak, firmaların pazar gücünün derecesi ölçülmekte ve bir birleşme/devralma simülasyonu tekniği çerçevesinde kolalı içecek sağlayıcıları arasındaki hipotetik bir birleşmenin olası etkileri tahmin edilmektedir.

Tezdeki ampirik çalışmaların tümünde aynı veri seti kullanılmıştır. Veri setinin asıl bölümünü oluşturan "Hanehalkı Tüketim Paneli Veritabanı", özel bir piyasa araştırma şirketi olan *Ipsos/KMG Türkiye*'den temin edilmiştir. Veritabanı, panele katılan hanehalklarının hızlı devinen tüketim malı harcamalarına ilişkin verilerinin hanehalkı düzeyinde derlenmesiyle oluşturulmuştur; Ocak 2000 ile Mayıs 2006 arasındaki dönemi kapsamaktadır ve, 2006 yılı itibariyle, Türkiye'nin 34 kentinde yaşayan 6000'den fazla hanehalkına ilişkin veriyi içermektedir. Söz konusu verilerin kapsamında, panel katılımcıları tarafından satın alınan ürünlerin fiyatı, miktarı, markası, paket büyüklüğü ve tipi ile birlikte ilgili ürünün satıldığı mağaza türü hakkında bilgiler de yer almaktadır. Bu bilgilerin yanısıra, katılımcıların yaşı, sosyo-ekonomik konumu, hanehalkı büyüklüğü ve yerleşim yeri gibi bilgiler de veritabanında mevcuttur. Hanehalkı düzeyinde bulunan orijinal veriler, tezde tahmin edilen ekonometrik modellerde kullanılabilmelerine olanak sağlamak amacıyla toplulaştırılmıştır. Toplulaştırma, bazı gözlem noktalarında gözlenemeyen fiyatların bulunması sorununun üstesinden gelmek için gerekli görülmüştür. Türkiye İstatistik Kurumu tarafından sağlanan girdi maliyetlerine ilişkin verilerden de araçsal değişkenler olarak yararlanılmıştır.

Kolalı içecek piyasasının tezin odağı olarak tercih edilmesinin iki dayanağı bulunmaktadır. Bunlardan ilki, kolalı içecek piyasasının oligopolistik bir yapıya sahip olmasıdır. Rekabet hukuku ve politikası, genel olarak eksik rekabet piyasalarında faaliyet gösteren firmaların davranışlarıyla ilgili bulunduğu için, kolalı içecek piyasasının tezin amacı açısından uygun bir tercih olacağı düşünülmüştür. İkincisi, Rekabet Kurumu ile piyasada lider konumdaki kolalı içecek sağlayıcı arasında baş gösteren, kola ve diğer ticari içeceklere ilişkin pazarın nasıl tanımlanması gerektiği hakkındaki tartışmalardır. İlgili pazarın tanımlanması, pazar gücünün gelişmiş bir analizinin yapılabilmesi için gerekli önadımlardan birini oluşturur. Homojen ürünlere kıyasla, farklılaştırılmış ürünler için ilgili pazarın tanımlanması görece daha zordur. İçecek ürünleri yüksek oranda farklılaştırılmış ürünlerdir ve farklılaştırılmış ürün piyasalarının pazar tanımına yönelik analizi, talep tarafı özelliklerin de dikkate alınmasını zorunlu kılar. Bu tezde, kolalı içecekler için ilgili pazarın tanımlanmasında "SSNIP[16]-testi" olarak bilinen güncel yöntem uygulanmıştır.

SSNIP-testi talep yapısının özelliklerini ve alternatif ürünler arasındaki ikame imkanlarını dikkate alır. Dolayısıyla, SSNIP-testinin gerektiği gibi uygulanabilmesi için, ürünlerin talep esnekliklerinin analize dahil edilmesi zorunludur. Bu amaçla, tezde AIDS modelinin doğrusallaştırılmış bir versiyonu kullanılarak, içecek ürünleri için bir talep sistemi belirlenmiş ve tahmin edilmiştir. AIDS modelinin spesifikasyonu, temel olarak, belirli bir ürünün bir hanehalkının bütçesindeki harcama payının, ürünlerin fiyatlarının logaritması ve bir fiyat endeksi tarafından deflate edilmiş toplam hanehalkı harcamasıyla regresyona sokulmasına dayanır.

[16] SSNIP: Fiyatlarda küçük fakat belirgin, kalıcı artış (Small but Significant Non-transitory Increase in Prices).

Rotterdam modeli ya da translog modeli gibi diğer talep modelleriyle karşılaştırıldığında, AIDS modelinin bazı avantajları bulunmaktadır (Deaton ve Muellbauer, 1980:312). AIDS modeli, esas maliyet fonksiyonunun ikinci dereceden lokal bir yakınlaştırması olarak kabul edilebilecek belirli bir maliyet fonksiyonundan türetilir. Ayrıca, tahmin edilecek denklemler, herhangi bir talep sisteminin birinci dereceden lokal bir yakınlaştırılması olarak ele alınmalarına yetecek sayıda parametre içerirler.

AIDS modelinin başka bir avantajı, tüketiciler üzerinden toplulaştırmaya elverişli olmasıdır. Ayrıca, mikroekonomi teorisinden kaynaklanan homojenlik ve simetri kısıtlamalarının uygulanmasına ve test edilmesine de imkan verir. Öte yandan, maliyet fonksiyonunun içbükeyliğine ilişkin teoretik kısıtlamanın modelin katsayı matriksi üzerinde bir koşula dönüştürülmesine elverişli değildir (Erdil, 2003:37). Orijinal AIDS modelinin doğrusal olmayan tahmin teknikleri kullanılarak tahmin edilme zorunluluğu da bir başka dezavantaj oluşturur. Bu sorun, literatürde, toplam harcama değişkenini deflate eden orijinal fiyat endeksinin yerine, tahmin öncesi oluşturulan Stone fiyat endeksinin kullanılması ile çözümlenmiştir. Bu yolla model doğrusal tahmin yöntemleri kullanılarak tahmin edilebilir. Ancak Buse (1994: 783), AIDS modelini doğrusallaştırmak amacıyla Stone benzeri endeksler kullanmanın tutarsız tahminlere yol açtığını göstermiştir. Öte yandan Buse ve Chan (2000), Stone endeksi yerine Tornqvist fiyat endeksinin kullanılmasının, doğrusallaştırmadan kaynaklanan sapmayı azalttığını ortaya koymuşlardır. Dolayısıyla, bu tezde, doğrusal AIDS modelinin tahmin edilmesinde ve talep parametrelerinin tahmin edildiği her ürün için fiyat endeksinin oluşturulmasında Tornqvist endeksi kullanılmıştır.

Tezde, her talep denkleminin hata terimleri arasında korelasyonun dikkate alınması ve daha etkin tahminler elde edilebilmesi amacıyla, içecek ürünleri için talep tahmininde sistem yaklaşımı tercih edilmiştir. AIDS benzeri modellerin bir dezavantajı, serbestlik derecesi sorunundan ötürü, modelde çok sayıda ürünün içerilmesine imkan vermemesidir. Bu nedenle, tezde, tahmin edilecek parametrelerin sayısını azaltabilmek amacıyla, iki aşamalı bütçeleme yaklaşımı benimsenmiştir. Talep sisteminin ilk aşamasında, gıda, içecekler, temizlik maddeleri, kişisel bakım malzemeleri gibi toplulaştırılmış harcama grupları yer almıştır. İkinci aşama ürünleri ise kola, meyveli gazoz, sade gazoz, meyve suyu, maden suyu, şişe suyu, çay, granül kahve, Türk kahvesi, bira ve rakıdan oluşmaktadır. Birinci ve ikinci aşama denklemleri eşzamanlı olarak aynı sistem içerisinde tahmin edilmektedir.

Bu talep sisteminin tahmininde kullanılan örneklem, Mayıs 2000 – Mayıs 2006 döneminde Türkiye'nin 12 büyük kentine ilişkin gözlemleri kapsamaktadır. Tahmin, fiyat endekslerindeki ve toplam harcama değişkenlerindeki endojenliği de dikkate alabilmek amacıyla, üç aşamalı en küçük kareler (3SLS) yöntemiyle yapılmıştır. 3SLS yöntemi, bir denklemler sisteminin tahmininde araçsal değişkenlerin de kullanılabilmesine imkan vermektedir. Araçsal değişkenler anlamlılık (relevance) ve geçerlilik (validity) açısından test edilmişlerdir. Testlerde anlamlılık ve geçerlilik reddedilmemiştir. Homojenlik ve simetri kısıtları her denklem için ayrı ayrı test edilmiştir. Toplam 65 kısıttan yalnızca 12'si reddedilmiştir. Ardından kısıtlar, kısıtlı model ile kısıtsız modeli kıyaslayan "likelihood ratio" (LR) testi ile de sınanmış ve LR testinde de kısıtlar reddedilmemiştir. Literatürde, AIDS modelinde Tornqvist endeksine yer veren bir esneklik formülü bulunamaması nedeniyle, talebin fiyat esnekliklerinin hesaplanmasında kullanılabilecek bir formül bu tezin yazarı tarafından türetilmiştir. Esneklikler, ürünlerin fiyat ve harcama payının ortalama düzeylerinde hesaplanmıştır.

Sonuçlar, içecek ürünlerinin kendi fiyat esnekliğinin -0,684 olduğunu, başka bir deyişle, esnek olmadığını ortaya koymaktadır. Kola, sade gazoz, çay, bira ve rakının kendi fiyat esneklikleri negatiftir ve %5 düzeyinde istatistiksel olarak anlamlıdır. Meyveli gazoz, meyve suyu, maden suyu, ve şişe suyunun kendi fiyat esneklikleri anlamlı bulunmamıştır. Meyveli gazoz ile sade gazoz arasındaki ikame esnekliğinin kuvvetli olduğu görülmüştür; aralarındaki çapraz fiyat esnekliği 3,323 ve 1,917'dir. Her iki ürünün fiyatındaki bir artış, kola talebini etkilemediği gibi, kola fiyatındaki bir artış da bu ürünlerin talebini etkilememektedir. Kolanın kendi fiyat esnekliği -1,45'tir ve anlamlıdır. Bu bulgular, kolanın sade ve meyveli gazoz ürünleriyle aynı ilgili ürün pazarında yer almaktan çok, kendi başına ayrı bir ilgili ürün pazarı oluşturduğunu göstermektedir.

Kolanın daha geniş bir ilgili ürün pazarının bir unsuru mu olduğu, yoksa kendi başına bir ilgili pazar olarak mı ele alınması gerektiği konusunda karara varabilmek için, kolanın kendi fiyat esnekliği kullanılarak SSNIP testi yapılmıştır. Test, kolalı içecek üreticisi hipotetik bir tekelin fiyatını karlı olarak %5 -10 oranında arttırabileceğini ve dolayısıyla kolanın ayrı bir ilgili ürün pazarı olarak kabul edilmesi gerektiğini ortaya koymuştur. Ardından, pazar gücünün ölçülmesi ve kola piyasasında hipotetik bir birleşmenin olası etkilerinin değerlendirilmesi amacıyla, kolalı içecekler için talep esneklikleri, basit ve yuvalı logit modellerinin Berry (1994) tarafından geliştirilen bir versiyonu kullanılarak marka ve paket hacmi düzeyinde tahmin edilmiştir. Bu modeller, çok sayıda ürün için toplulaştırılmış veri kullanılarak talep parametrelerinin tahmin edilmesine elverişli oldukları gibi, endojenlik sorununa karşı doğrusal araçsal değişken tekniklerinin kullanılmasına da imkan vermektedirler. Ancak, öte yandan, çapraz fiyat esneklikleri üzerinde bazı kısıtlamalar koymaktadırlar. Basit logit modeli, belirli bir ürünün fiyatına göre diğer tüm ürünlerin çapraz fiyat esnekliklerinin eşit olduğunu varsayar. Yuvalı logit modelinde bu kısıtlama, ürünler arasında *a priori* bir ayrımlaştırma varsayılarak gevşetilmektedir. Benzer ürünlerin aynı yuva içerisinde yer aldığı varsayılır. Bu durumda, farklı yuvalarda yer alan ürünlerin çapraz fiyat esnekliklerinin aynı yuvadakilere göre farklılaşmasına ve böylece daha esnek ikame biçimlerine imkan tanınmış olur. Diğer taraftan, aynı yuvada bulunan ürünlerin çapraz fiyat esneklikleri, ilgili yuvadaki belirli bir ürünün fiyatına göre eşittir. Bu tezde, diyet ve normal kola ürünlerinin ayrı yuvalarda yer aldığı varsayılmıştır. Teknik bir gereksinim olarak da, meyveli gazoz ve sade gazozlar, "kola dışında kalan gazlı meşrubat" adıyla toplulaştırılarak "dış ürünler" kategorisi olarak tanımlanmış ve üçüncü yuvaya yerleştirilmiştir.

Beş farklı mağaza türü için ayrı ayrı tahmin yapılmıştır. Her denklemin bağımlı değişkeni, belirli bir ürünün göreli pazar payının logaritması olarak belirlenmiştir. Her kola markasının her farklı hacimdeki paketi ayrı bir ürün olarak kabul edilmiştir. Küçük sağlayıcılar tek bir sağlayıcı olarak ele alınmıştır. İlgili talep modellerinde toplam 93 ayrı ürün yer almaktadır. Talep denklemlerinin açıklayıcı değişkenleri; her ürün ve her ay için ortalama fiyat, nüfus değişkenleri ve kukla değişkenler ile birlikte diğer talep kaydırıcı değişkenlerden oluşmaktadır. Tahminde iki aşamalı en küçük kareler (2SLS) yöntemi kullanılmıştır. Yuvalı logit modelinde, ürünlerin yuva-içi pazar payları ek bir açıklayıcı değişken olarak yer almıştır. Bu değişkenin katsayısı, aynı yuvada bulunan ürünlerin fayda korelasyonunu göstermektedir. Diagnostik testler, hata terimlerinin heteroskedastik ve otokorelasyonlu olduğunu ortaya koyduğundan, "robust" tahmin yöntemleri kullanılmıştır.

Mağaza zincirleri ve orta büyüklükteki mağazalar-bakkallar için belirlenen modellerde, fiyat ve yuva-içi korelasyon katsayıları istatistiksel açıdan anlamlı, işaretleri de teoretik olarak beklenen yönde çıkmıştır. İndirimli mağaza satışlarına ilişkin yuvalı logit modelinde yuva-içi korelasyon anlamlı çıkmamıştır. Zincir dışı mağazalara ilişkin fiyat katsayısı da anlamlı bulunmamıştır. Dolayısıyla, bu türdeki mağazalar için yuvalı logit modelinin uygun olmadığı sonucuna varılabilir.

Yuvalı logit modeliyle elde edilen esnekliklerin, basit logit modeliyle elde edilenlerden daha yüksek olduğu gözlenmektedir. Sonuçlar, kolalı içecek ürünü için talebin, küçük paketlerde büyük paketlere göre daha esnek olduğunu göstermektedir. Ortalama olarak esneklik, en küçük paketten (200 ml.) en büyük pakete (3000 ml.) doğru -5,131 ile -1,048 arasında değişmektedir. Yuvalı logit modellerinde, aynı yuva içindeki çapraz fiyat esnekliklerinin, diğer yuvadaki ürünlerin çapraz fiyat esnekliklerine göre belirgin olarak daha yüksek çıktığı görülmektedir. Bu sonuç, beklendiği üzere, aynı gruptaki ürünlerin diğer gruplardaki ürünlere kıyasla ikame edilebilirliklerinin daha yüksek olduğunu ortaya koymaktadır.

2,5 lt.'lik paketlerdeki normal kola ürünleri en fazla satılan kalemi oluşturmaktadır. Bu tip ürünlerde Coca Cola'nın kendi fiyat esnekliği mutlak değer olarak mağaza zincirlerinde birden biraz düşük (-0,946), orta büyüklükteki mağazalar-bakkallarda ise birden biraz yüksek (-1,009) çıkmaktadır. Bu tip paket için en yüksek talep esnekliği, mağaza zincirlerinde -1,294 ve orta büyüklükteki mağazalar-bakkallar için -1,348 olmak üzere Pepsi Cola'ya aittir. Mağaza zincirlerinde diğer firmaların ürünlerinin esnekliği mutlak değer olarak birin altındadır. Küçük hacımlı paketler arasında en çok satılan 330 ml'lik pakette üç ulusal firmanın kendi fiyat esneklikleri -4'ün altında çıkmıştır. Bu paket için mağaza zincirlerinde en yüksek talep esnekliği Coca Cola'ya (-4,5), orta büyüklükteki mağaza ve bakkallarda da Pepsi'ye (-4,8) aittir. Genel olarak, normal kolalı içeceklere olan talebin, diyet ürünlere kıyasla daha esnek olduğu görülmektedir. 1000 ml.'lik normal kolaların ortalama olarak kendi fiyat esneklikleri Coca Cola için -2,25 ve Pepsi için -2,12 iken, aynı hacımdaki diyet ürününde bu değerler sırasıyla, -1,80 ve -1,93 olarak bulunmuştur.

Yuvalı logit modelle tahmin edilen esneklikler, pazar gücünün ölçülmesinde ve Pepsi ile Cola Turca arasındaki hipotetik bir birleşmenin olası etkilerinin değerlendirilmesinde kullanılmıştır. Pepsi ve Cola Turca markaları ürünlerin toplam pazar payları %30 ile %35 arasındadır. *Fiyat-maliyet marjı* kavramı, pazar gücünün bir ölçüsü olarak alınmıştır. Fiyat-maliyet marjlarının ölçülmesinde, kolalı içecek tedarikçilerinin farklılaştırılmış ürünlerle fiyat rekabetine giriştikleri bir Bertrand oyunu varsayılarak birinci derece koşulları çözülmüştür. Mağaza zincirlerinde 1 lt.'lik paketler için fiyat-maliyet marjları %50 ile %66 arasında, 330 ml.'lik paketler için de %27 ile %33,5 arasında değişmektedir. Bu değerler, orta büyüklükteki mağazalarla kıyaslandığında görece düşüktür.

Ürünlerin içerdikleri kalori bakımından farklılaştırılmalarının firmaların pazar gücünü nasıl etkileyeceğini görebilmek için, normal ve diyet ürünlerin birbirinden bağımsız birimlerce üretildikleri varsayılarak, fiyat-maliyet marjları yeniden hesaplanmıştır. Sonuçlar, normal kola üreticilerinin diyet ürün de üretme kararı vermeleri halinde, fiyat-maliyet marjlarının % 0,1-% 0,4 arasında artacağını ortaya koymaktadır. Diyet ürün üretenlerin normal kolalı içecek de üretmeleri halinde ise, marj üreticiye ve mağaza türüne gore % 4,3 ile % 27,4 arasında artış göstermektedir.

Pepsi ile Cola Turca arasında hipotetik bir birleşmenin potansiyel etkilerinin değerlendirilebilmesi için, her ilgili pazarda birleşme sonrası pazar yapısının birinci derece koşullarının, birleşme sonrası fiyatlar için çözümlenmesi gerekmiştir. Birleşme simülasyonunun sonuçları, birleşen firmaların fiyatlarının mağaza zincirlerinde ortalama % 15,64 ve orta büyüklükteki mağazalarda da ortalama % 21,02 oranında artacağını ortaya koymaktadır. Coca Cola da fiyatlarını arttıracaktır. Piyasa fiyatı, ortalama olarak, mağaza zincirlerinde % 16,64 ve orta büyüklükteki mağazalarda % 21,79 oranında artış göstermektedir. Bu durumda, tüketici fazlası mağaza zincirlerinde % 4,97 ve orta büyüklükteki mağazalarda % 4,46 oranında azalmaktadır. Birleşen firmaların hasıla açısından pazar payları, birleşme sonrasında ortalamada belirgin bir değişme göstermemektedir.

Rekabet otoritesinin birleşme sonrası olası fiyat artışlarına tolerans göstermeyeceği ve birleşecek firmaların marjinal maliyetlerde azalma biçiminde gerçekleşecek etkinlik artışlarının ancak bu birleşmeyle mümkün olabileceğini savunacakları varsayıldığında, birleşen firmaların birleşme sonrasında marjinal maliyetlerinin mağaza zincirlerinde % 13,22 ve orta büyüklükteki mağazalarda % 16,98 oranında azalacağını göstermeleri gerektiği hesaplanmıştır.

Bu sonuçlar, oligopolistik bir piyasada toplam pazar payları yalnızca % 30-35 civarında bulunan tedarikçiler arasındaki bir birleşmenin bile belirgin fiyat artışlarına ve tüketici fazlasında azalmaya yol açabileceğini ortaya koymaktadır. Yalnızca hakim durum ölçütüne dayanarak birleşme ve devralmaların kontrolünü amaçlayan geleneksel rekabet politikaları, böyle bir birleşme sonrasında ortaya çıkabilecek pazar gücü artışını kontrol altına almakta yetersiz kalabilirler. Bu tezde de gösterildiği gibi, hakim durumda bulunmayan firmalar arasındaki bir birleşme de pazar gücünü arttırma potansiyeline sahip olabilir ve hakim durum kriterinden daha kuvvetli bir politika enstrümanına ihtiyaç doğurabilir. Türk rekabet kanununda değişikliğe gidilmesini amaçlayan yeni kanun taslağının, Avrupa Birliği'ndeki gelişmelere de paralel olarak, birleşme ve devralmaların kontrolüne ilişkin kriterlerin kapsamını genişletmesi beklenmektedir. Yeni kanun taslağı, hakim durum kriterini dışlamamakta, fakat ona ek olarak Rekabet Kurumuna rekabeti belirgin olarak azaltacak birleşme ve devralmaları yasaklama yetkisini tanımaktadır. Bu değişiklik, iktisadi açıdan, firmaların birleşmelerinin bir hakim durum yaratmayacak olması halinde bile, fiyatlarda belirgin bir yükselme ya da tüketici fazlasında belirgin bir azalmayla sonuçlanması söz konusu olduğunda birleşmeye izin verilmeyebileceği şeklinde yorumlanabilir. Yeni taslağın mevcut biçimiyle yasalaşması durumunda, hem Rekabet Kurumu, hem de birleşmek isteyen taraflar rekabet politikasıyla ilgili iktisadi analiz yöntemlerinden daha fazla yararlanma gereksinimi duyacaklardır. Bu olasılık, akademik kurumlarda, Rekabet Kurumu'nda ve ilgili yargı kurumlarında bilgi ve veri yeterliliği açısından kapasite inşasına yönelik çabaların arttırılmasını gündeme getirebilecektir.