ESTIMATION OF DYNAMIC THEATRE DEMAND FUNCTION: THE CASE OF TURKEY

Yılmaz KÖPRÜCÜ[1]

Abstract

This paper empirically examines the determinants of theatre demand function. The panel data model is established and the data set is limited to 19 NUTS-2 regions. Fixed-effects, random effects models, and an instrumental variable estimator (IV) are employed in this paper to investigate the determinants of demand, with a focus on estimating elasticities. The study also aims to determine whether attendance for theatre in Turkey is consistent with the addiction hypothesis as in Becker et al. (1994). Besides, financial aid's effects on theatre demand in private theaters are examined. Estimation results suggest that theatre for Turkish attendees is an addictive good since past demand increases current consumption. The findings show that the price elasticity is elastic, with an estimated price elasticity of -1.18 for IV with fixed-effect estimation. Income elasticity lies between 0.44 and 0.90 due to the demand for theatre not being an inferior good. Castiglione and Infante (2016) also find that income elasticity is positive with a magnitude that varies between 0.71 and 0.49.

Keywords: Theatre Demand, Addiction, Panel Data, Instrumental Variable, Turkey

JEL Classification: C23, C26, Z10

DİNAMİK TİYATRO TALEP FONKSİYONUNUN TAHMİNİ: TÜRKİYE ÖRNEĞİ

Öz

Bu makale, tiyatro talep fonksiyonunun belirleyicilerini araştırmaktadır. Panel veri modeli kurulmuş olup, veriler İİBS Düzey-2'deki 19 bölge ile sınırlıdır. Esneklikleri tahmin etmeye odaklanmakla birlikte, talebin belirleyicilerini araştırmak için sabit etkiler, rassal etkiler ve araç değişken tahmincisi (IV) kullanılmıştır. Çalışma Becker vd. (1994)'te de olduğu üzere, Türkiye'de tiyatro talebinin bağımlılık hipotezi ile tutarlı olup olmadığını belirlemeyi amaçlamaktadır. Ayrıca, özel tiyatrolara yapılan mali yardımların tiyatro talebi üzerindeki etkisi de incelenmiştir. Tahmin sonuçları, geçmişteki talebin cari tüketimi artırması sebebiyle, tiyatronun Türk seyirciler için bağımlılık yapan bir mal olduğunu göstermektedir. Fiyat esnekliği, -1.18 şeklinde tahmin edildiği için katsayı elastiktir. Tiyatro talebinin düşük bir mal olmaması nedeniyle, gelir esnekliği 0.44 ile 0.90 arasında değişmektedir. Castiglione ve Infante (2016) de gelir esnekliğinin 0.49 ile 0.71 arasında değişen büyüklükte olduğunu bulmuşlardır.

Anahtar Kelimeler: Tiyatro Talebi, Bağımlılık, Panel Veri, Araç Değişkeni, Türkiye

JEL Sınıflaması: C23, C26, Z10

[1] Araştırma Görevlisi, Eskişehir Osmangazi Üniversitesi, İktisat Bölümü, ykoprucu@ogu.edu.tr
ORCID: 0000-0002-9539-7957

1. Introduction

Economic theory assumes that demand for a commodity is principally a function of the commodity's price, prices of related commodities, income, and tastes (Lipsey, Courant & Ragan, 1999). Estimating theatre demand function is essential for identifying what factors could increase cultural participation (Castiglione & Infante, 2016). Therefore, the focus is on the factors determining the demand for theatre. This paper investigates the estimation of theatre demand in 19 regions of Turkey from 2005 to 2020. As there is no theatre demand in 7 regions, the regions in question are excluded from the models. The data are collected from TurkStat in 19 sub-regions based on the NUTS-2 regional classification system (see Figure A1 in Appendix for a map of subregions in Turkey and Table A1 in Appendix for the list of provinces in these subregions). While the paper aims to reveal the determinants of Turkish theatre demand, the essential contribution of this study is to investigate theatre attendance according to estimations for total demand in the Turkish regions.

There have been a significant number of papers regarding the estimation of theatre demand function of specific cities or countries in previous researches. While Baumol and Bowen (1966) explained a relationship between financial problems of theatre and art audiences before, Werck et al. (2008) especially struggle to predict price and income elasticities of demand nowadays. They demonstrate that ticket price and consumer income have negative and positive effects on audiences, as expected. Cameron (1999) investigates Becker's rational addiction model employing OLS and IV estimates for cinema demand in the United Kingdom. Estimation results suggest that there is no evidence regarding strongly supportive for rational addiction.

Werck and Heyndels (2007) employ panel fixed effect estimation to examine the impact on demand of traditional determinants such as price, income, and the price of substitutes. The results show that ticket prices have a negative effect on demand and the consumer income is a positive one. Since the total amount of subsidies decreased between 1980 and 2000, attendance declined severely. Because, ticket prices have increased as a result of reduced subsidies. Grisolia and Willis (2012) categorized theatergoers in England and found three results: affluent people as the main class firstly demonstrate a strong preference for theatre venues; secondly, the popular class (those who don't like more sophisticated shows) is the least willing to pay; and the intellectual class is the most willing to pay for drama as they also identify with this genre.

Willis et al. (2012) examined the determinants of demand at a regional theatre in England by using count data models such as Poisson regression and binomial models. The variables of socio-economic and travel cost are used to investigate theatre attendance and evaluate if consumer surplus surpasses government subsidy to the theatre. In a more recent study, Zieba

(2016) used city, and regional data on tourism flows from 1972 to 2011 in Austria. FGLS was employed in all models in the study. According to the results, even though demand price elasticity was inelastic, income elasticity was approximately one for all plays. The consequences revealed that foreign tourists positively affected theatre attendance. Besides, seat capacity has a positive impact on theatre demand. Contrary to Zieba (2016), Levy-Garboua and Montmarquette (1996) found that the price elasticity of theatre demand was elastic.

Castiglione and Infante (2016) investigated whether theatre demand in Italy was consistent with rational addiction from 1980 to 2013. Arellano-Bond GMM was used to obtain the estimations. As far as the results of the estimation of twenty regions in Italy are concerned, theatre demand function was consistent with the rational addiction behavior, and theatre attendance was a habitual activity. Moreover, theatre ticket prices affected prevailing attendance. Akdede and Binatli (2017) investigated determinants of attendance for plays in Turkey between 2002 and 2003. 2SLS was employed in the research. It was found that the price of tickets negatively affected live theatre for discounted ticket holders. However, live theatre consumption shows characteristics of the Veblen effect.[1] Fernandez-Blanco, Orea, and Prieto-Rodriguez (2013) estimate the demand function for the movie market in Spain. They show that average prices are endogenous because of the simultaneous determination of prices and quantities. Hence, a proper instrumental variable must be found as proxies of price. These authors obtain a mean estimate of price elasticity of -1.07 for the Spanish movie market. Kaymaz (2021) examines cinema demand in Turkey by employing static fixed-effect and dynamic GMM estimations. The results indicate that the rational addiction hypothesis is confirmed for Turkish cinema demand. Furthermore, the number of screens and the share of domestic films in total films are important for explaining the demand.

In Turkey, demand for theatre isn't common in all NUTS-2 regions. Due to the deficiency of theatre attendance, some regions aren't included in the analysis. Agri, one of these regions, is the region with the lowest average disposable income in Turkey (see Turkstat). In other regions where there is no or low demand for theatre, the income level is lower than in these 19 regions. The study aims to determine whether attendance for theatre in Turkey is consistent with the addiction hypothesis, with a focus on estimating elasticities. Moreover, the effects of financial aid to private theaters on theatre attendance are examined. In the estimation process, one of the problems encountered is endogeneity. The purpose of using the IV approach is to purge the variance overlapping the endogenous variable's error term and obtain consistent estimates for the endogenous variables.[3]

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[2] Veblen effect is defined as the effect of conspicuous consumption (Veblen, 1899). When the prices of such goods increase, their demand also increase.

[3] The reverse causality problem is overcome in this way.

This paper is organized as follows: Section 2 provides a brief history of Turkish Theatre; Section 3 discusses related econometric models and variables used to estimate IV; Section 4 presents estimation results; The final section offers concluding remarks.

2. Turkish Theatre: A History

Theatre rose from ritual along with other arts. It then became independent and developed as an art of its own kind. The name "theatre" was derived from "theatron", meaning "excursion spot" in Greek, and it was adopted into the Turkish language from the word "teatro" in Italian (Aksoy, [17.01.2018]). Turkish theatre has developed on the tradition of various societies forming Anatolian Civilisation, based on Turkish ancestors migrating to Anatolia and the cultural background of the Islamic World, including theatrical play with both eastern and western effects. Turkish people firstly showed western theatre by means of plays in minorities. Turkish people fully met western theatre in 1839 with Tanzimat. Thus, the written script was started, and Turkish writers started to write plays besides translations from foreign writers. Drama tradition, therefore, began later than in the west. Then, new theatre structures were constructed as a result of western theatre models that had come to Turkey, and groups started to exhibit plays regularly. Hence, an important step has been taken toward the institutionalization of theatre. The development of Turkish Theatre that adopts a western theatre model is generally examined in two stages (http://www.tiyatrotarihi.com[11.04.2018]):

1. The period between the proclamation of Tanzimat and the founding of the Turkish Republic (1839-1923).

2. The development stage from the founding Turkish Republic to nowadays.

2.1. 1839-1923

The first step to contemporary Turkish Theatre was taken with the Gedikpasa Theatre, built-in 1860. Gullu Agop rented this theatre in 1861, and directed Turkish writers and Turkish plays by founding a group named Ottoman Theatre. In 1870, Muslim Turkish players came up in a group of Gullu Agop. The first work in Turkish Theatre is "Şair Evlenmesi" written by Şinasi in 1860, and is a one-act comedy. "Tuluat" combines cast and the styles of western theatres with techniques and acting patterns of conventional theatres and based on improvisation was the situation of low comedy above the stage. The tuluat, which emerged in 1875 under the lead of Kavuklu Hamdi, lived in a common form until the first years of the republic. The first step towards the creation of a conservatory and practice stage for the education of Turkish actors was taken in 1914 by the establishment of Darulbedayi. Afife Jale

was the first Turkish-Muslim actress who firstly got on the stage in 1920 in Darulbedayi. In this framework, plays written were generally comedies, historical dramas, romantic dramas, and melodramas (http://www.tiyatrotarihi.com[11.04.2018]).

2.2. 1923 to now

Turkey adopting a western theatre model in the republic period made an essential move in both institutionalizations of theatre and the development of playwriting. An innovative contribution to theatre as a modern art stemmed from Muhsin Ertugrul, a famous actor. He became the head of Darulbedayi and laid the foundations for Turkish Theatre by encouraging Turkish writers, and actors. Ankara State Conservatories serves to train theatre actors founded as a part of the Music Academy. A training stage that graduated theatre actors was created in the academy in 1941. State theatres were founded in 1949 after this preparation phase. Theatergoers all over the country had a chance to show that state theatres had begun to operate in cities such as Ankara, Istanbul, Izmir, Bursa, Adana, Trabzon, and Diyarbakir. The number of private theatres also increased in the 1960s. Turkey Theatres Association is described as a union that organizes tours among cities, and arranges festivals and workshops. The purpose of the association, founded in 2007, has created a framework organization of theatre groups aiming at sharing and cooperating with each other in Turkey. The organizational form of the association is from local to regional and from regional to national. Theatres belonging to the association must arrange at least an organization in their cities on behalf of the Turkey Theatres Association. The association members hold a meeting at least every six months, apart from festivals and organizations, to share their experiences. The Union publishes training publications with a monthly bulletin to develop theatres (http://www.tiyatrotarihi.com[11.04.2018]).

Turkish theatre organization is as follows (Akdede & King, 2006):

a) Directorate General of State Theatres arranges state theaters. State theatres were founded on June 10, 1949, enacted with the law no 5441, aiming at increasing general education, language, and culture of the public with domestic and foreign works of art, sustaining the Turkish language; and providing a union of accents. Primary services provided are plays, tours, and festivals. The Ministry of Culture administrates Turkish State Theatres.

b) City theatres are organized by city municipalities and financed by the Ministry of Finance.

c) Municipal theatres are organized and financed by the municipality of the cities.

d) Private theatres are organized in big cities.

The regions of state theatres in Turkey are Ankara, Istanbul, Izmir, Bursa, Adana, Trabzon, Diyarbakir, Antalya, Erzurum, Konya, Sivas, Van, Gaziantep, Kahramanmaras, Elazig, Malatya, Samsun, Corum, Zonguldak, Denizli and Ordu respectively. All state theatres are administrated in Ankara.

The share of Turkish theatre allocation in the government's budget is shown in Table 1 for the Turkish theatre organization.

Table 1: The Position of Theatre Allocations in the Budget and GDP (Million TL)

Tarih	General Directorate of State Theater (1)	Ministry of Culture and Tourism (2)	Budget Spending of Central Administration (3)	GDP (4)	(1)/(2) %	(1)/(3) %	(1)/(4) %
2008	95	827	227,031	994,783	12	0.042	0.009
2009	106	1,003	268,219	999,192	11	0.040	0.011
2010	111	1,119	294,359	1,160,014	10	0.038	0.009
2011	132	1,510	314,607	1,394,477	9	0.042	0.009
2012	140	1,705	361,887	1,569,672	8	0.039	0.008
2013	165	1,852	408,225	1,809,713	9	0.041	0.009
2014	179	1,975	448,752	2,044,466	9	0.040	0.008
2015	191	2,298	506,305	2,338,647	8	0.038	0.008
2016	217	2,778	583,689	2,608,526	8	0.037	0.008
2017	229	3,460	677,722	2,212,254	7	0.034	0.010
2018	279	4,489	830,809	3,758,774	5.8	0.034	0.007
2019	317	6,412	960,976	4,317,787	4.9	0.033	0.007
2020	360	5,630	1,000,027	5,046,883	6.4	0.036	0.007

Source: General Directorate of Budget and Fiscal Control

Just as the share of state theatre allocation in the Ministry of Culture and Tourism decreased from 12 % to 7 % in the years between 2008 and 2017, the percentage in budget spending of central administration decreased from 0.042% to 0.034%. Furthermore, even though the share in GDP was 0.011% in 2009, it was 0.010% in 2017. The share of Turkish theatre allocation in the budget has decreased over the years. Nevertheless, Akdede and King (2006) suggest that since the coefficient of cumulative performance variable is significantly negative in less development regions, the use of public resources can be inefficient.

If state theater prices were applied in private theaters, saloons were built for private theaters and the government subsidized the expenditures of them, these theaters would also have developed both economically and artistically. Therefore, private theaters couldn't struggle

artistically and economically against the price policy of state theaters (Akdede, 2014: 257-258).

3. Data and Econometric Methods

In this section, the construction of the variables is described for econometric models to be introduced in the following subsection.

3.1. Data

To estimate theatre attendance, annual time series data on the 19 Turkish regions for the period of 2005-2020 are used and arranged panel data framework. The data are obtained from the Turkish Statistical Institute (TurkStat), including theatre attendance, theatre ticket price, cinema ticket price, income per capita, population, number of performances and a higher level of education. Financial aid to private theatre data belonging to Turkey for the period 2008-2017 are collected from Akdede and Özpınar (2021). Thus, the time series data on the 19 Turkish regions for the period of 2008 – 2017 are used (second specification). Data information and source of data are also shown in Table 2.

Based on aggregate data on theatre attendance, theatre demand (lq_{it}) is calculated by the number of tickets sold yearly between 2005 and 2020. Theatre ticket price, lp_th_{it}, depicts the price paid at the box office for each of 19 Turkish regions. It is expected that theatre attendance is negatively correlated with the ticket price. $linc_{it}$ is the income per capita in NUTS-2 level regional markets. Since theatre demand is expected to be a normal good, the anticipated sign is positive. lp_cin_{it} and lp_other respectively represent cinema ticket prices and other cultural activity prices at the box office. The anticipated sign can be positive or negative relating to whether cinema is a complementary or substitute good for theatre. lpop is the variable of population-based on NUTS-2 level regional markets. lperf is the number of performances. Educ is the ratio of the number of university-level graduates to the population.[4]

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[4] Table A2 in the Appendix summarizes the correlation matrix.

Table 2: Data Information

Variable	Definition	Source
lq	Theatre demand: number of theatre tickets sold per year	TurkStat
lp_th	Real theatre ticket price	TurkStat
lp_cin	Real cinema ticket price	TurkStat
lp_other	The real price of other cultural activities	TurkStat
linc	Real income per capita	TurkStat
lperf	Number of performances	TurkStat
laid	Financial aid to private theaters	Akdede and Özpınar (2021)
lpop	Population	TurkStat
educ	Higher level of education in the population	TurkStat

The data annually used regarding theatre statistics are obtained from the TurkStat (Turkish Statistical Institute) website. Theatre statistics in TurkStat include state theatres, governmental agencies, and private theatres. The statistics in question are compiled from theatre directorates using TurkStat regional directorates. Descriptive statistics are demonstrated in Table 3. All models are estimated using the log–log specification except for the variables of education (natural logarithms for the dependent and independent variables).

Table 3: Summary Statistics

Variable	Obs	mean	sd	min	max
lq	301	11.68	1.24	6.53	14.92
lp_th	323	1.32	0.54	0.09	3.32
lp_cin	323	1.65	0.25	0.91	2.21
p_other	305	2.03	1.09	0.35	5.72
linc	304	9.26	0.44	8.17	10.52
lperf	190	6.34	1.22	2.71	9.49
laid	190	9.58	0.32	8.54	10.17
lpop	190	14.60	0.71	13.12	16.53
educ	190	0.19	0.26	0.003	2.12

Figure 1 shows per capita theatre attendance. The highest average per capita theatre attendance is observed in the Ankara region. Although the number of theatergoers in the Istanbul region is the highest, the average per capita attendance is lower than the ratio in Ankara. From early 2020 to 2021, demand for theatre has dropped due to the COVID-19.
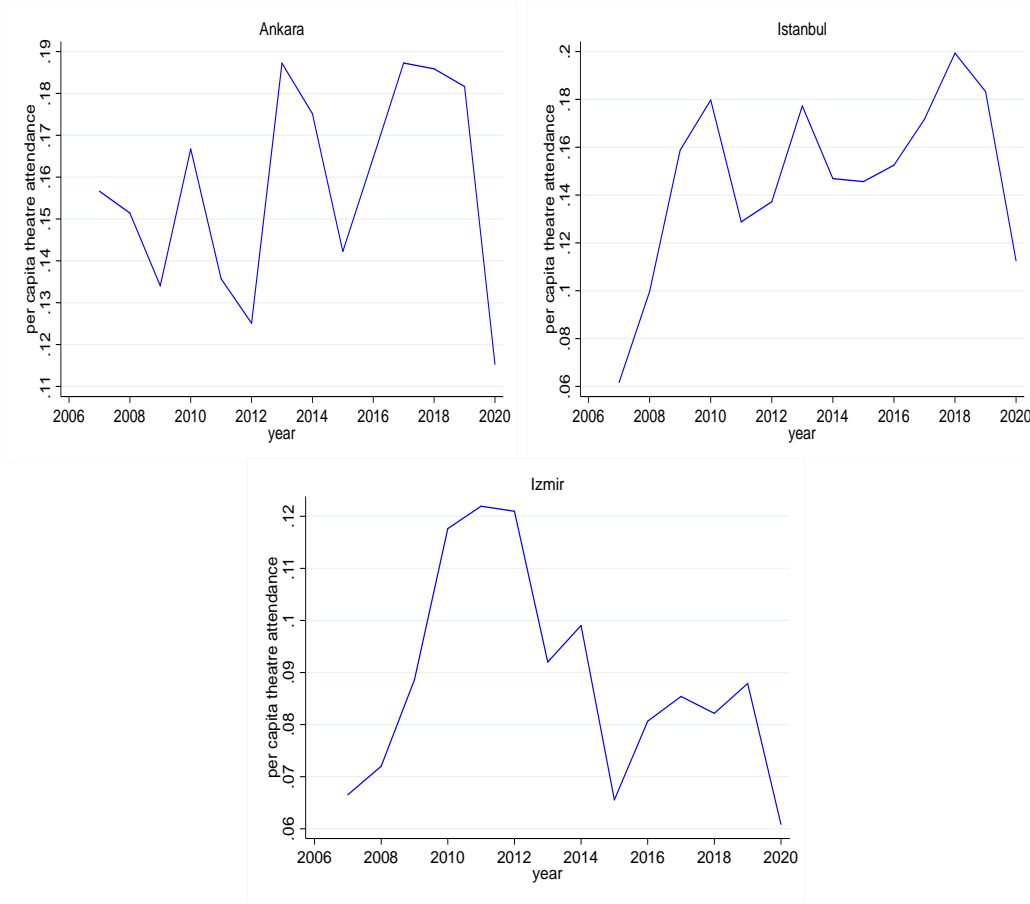
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Figure 1: Theatre Demand Per Capita

Figure 2 shows movements of the average theatre ticket price for Ankara, Istanbul, and Izmir regions. The average theatre ticket price is 5.49 in Ankara, 17.05 in Istanbul, and 7.63 Turkish Liras in Izmir, respectively. Despite the decrease in theater prices in the Istanbul region after 2009, it tended to increase in the Izmir region in 2016.

Figure 2: Theatre Ticket Price
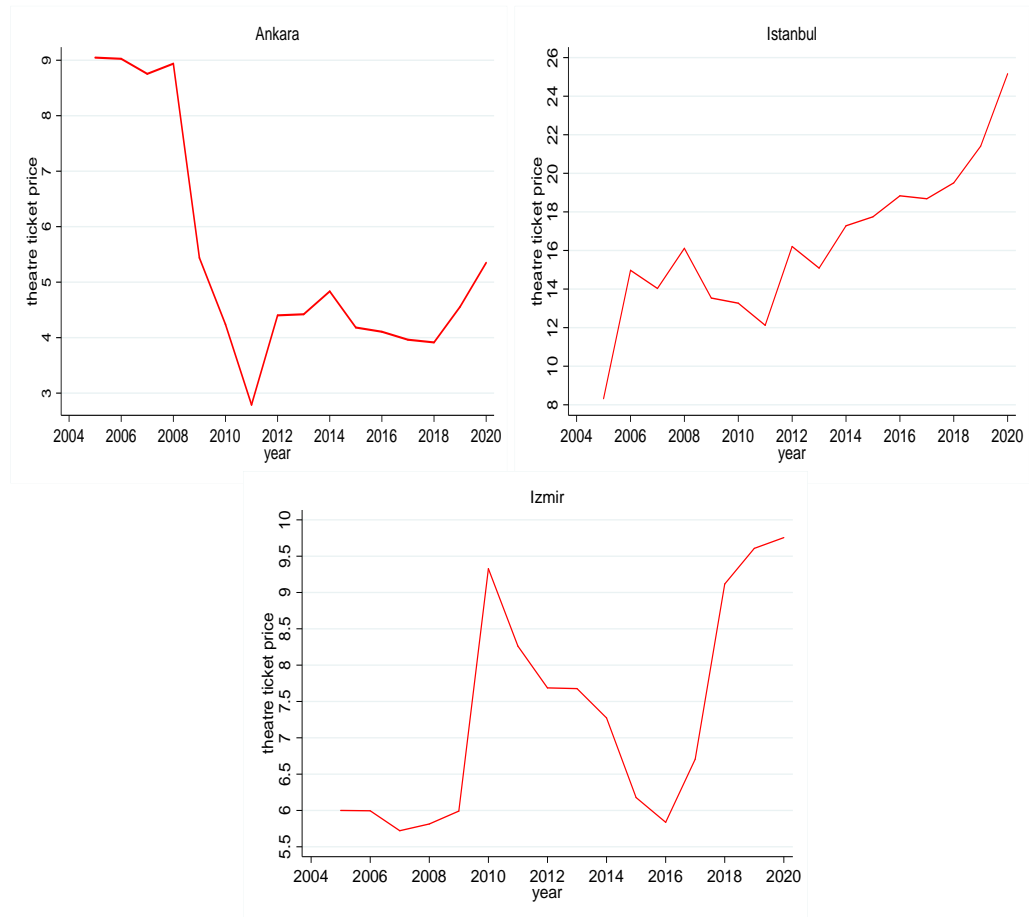
3.2. Econometric Methods

Firstly, fixed-effects and random-effects regressions are used in this study. Under omitted variable conditions, OLS is generally inconsistent. Therefore, the instrumental variable (IV) approach is employed because of the endogeneity problem (Anderson and Hsiao, 1981; Balestra and Varadharajan-Krishnakumar, 1987; Baltagi, 2008). This approach is also called Two Stage Least Squares (2SLS). When an unobserved variable is left in the disturbance term, we can use an estimation approach that recognizes the presence of the omitted variable

instead of estimating the model by OLS (Woolridge, 2012). To specify the method, the simple regression model takes the following form:

$$y = \alpha_0 + \alpha_1 x + u \tag{1}$$

where x and u are correlated:

$$cov(x, u) \neq 0 \tag{2}$$

To achieve consistent estimators of α_0 and α_1 when x and u are correlated, some other information is needed. We can obtain the information thanks to a new variable with certain properties. Assume that we have an observable variable z that satisfies the following two assumptions: z and u are uncorrelated,

$$cov(z, u) = 0 \tag{3}$$

and z and x are correlated,

$$cov(z, x) \neq 0 \tag{4}$$

Therefore, we use z as an instrument for x.

Using panel data on the NUTS-2 level regional markets of Turkey, the following theatre demand equation is pointed out:

$$lq_{it} = lq(t-1)_{it}\beta_0 + lp\_th_{it}\beta_1 + linc_{it}\beta_2 + lperf_{it}\beta_3 + laid_{it}\beta_4 + lpop_{it}\beta_5 + educ_{it}\beta_6 + \alpha_i + \epsilon_{it} \tag{5}$$

$$i = 1, \ldots, N; t = 1, \ldots, T$$

where lq_{it} is theatre demand, lp_th_{it} is real theatre ticket price, $linc_{it}$ is real income per capita, $lperf_{it}$ is the number of theatre performances, $laid_{it}$ is financial aid to private theatres, $lpop_{it}$ is the number of NUTS-2 level population, $educ_{it}$ is the higher level of education. The α_i are fixed effects, and the ϵ_{it} are disturbance terms that are presumed to be iid with a zero mean and constant variance σ_ϵ^2. As a requirement of the IV approach, cinema ticket price (lp_cin_{it}) and price of other cultural activities (lp_other_{it}) are used as the instruments for theatre ticket price.[5]

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[5] xtivreg STATA routine is used.

To define the "between" and "within" framework of (5):

$$lq_i = lq(t-1)_i\beta_0 + lp\_th_i\beta_1 + linc_i\beta_2 + lperf_i\beta_3 + laid_i\beta_4 + lpop_i\beta_5 + educ_i\beta_6 + \alpha_i + \epsilon_i \tag{6}$$

and

$$\widetilde{lq_{it}} = lq(\widetilde{t-1})_{it}\beta_0 + \widetilde{p\_th}_{it}\beta_1 + \widetilde{linc}_{it}\beta_2 + \widetilde{lperf}_{it}\beta_3 + \widetilde{laid}_{it}\beta_4 + \widetilde{lpop}_{it}\beta_5 + \widetilde{educ}_{it}\beta_6 + \widetilde{\epsilon_{it}} \tag{7}$$

An instrumental variable estimator with instruments is employed because of the endogeneity problem, cov(lp_th_{it}, ϵ_{it})≠0. In many empirical studies on cultural and sports economics, attendance prices are specified as average ticket prices owing to limited data (Akdede and King, 2006; Werck and Heyndels, 2007; Fernandez-Blanco, Orea, & Prieto-Rodriguez, 2013). As mentioned in Fernandez-Blanco, Orea, and Prieto-Rodriguez (2013), cinema ticket price and the price of other cultural activities are used as instrumental variables.

4. Estimation Results

The empirical results are organized as follows. Firstly, the baseline estimation results from panel data model are presented for myopic model 1 and myopic model 2 in Table 4 and Table 5. Two models are estimated, where the first specification included only fundamental variables and the second specification contains all the control variables. In the following tables also provide information on the number of countries covered by each model, the number of observations, and R-squares. Heteroscedasticity-robust standard errors are presented in parantheses unders coefficient estimates.

In Table 4, the findings show that the price elasticity is inelastic, with an estimated price elasticity of -0.49 for fixed-effect estimation. The fixed-effects and random-effects estimation results in the second specification are also similar. Considering past theatre attendance, one can be seen that theatre attendance is an addictive good since past demand positively affects current attendance. In second specification, income elasticity is 0.207 due to the demand for theatre not being an inferior good.

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Table 4: Fixed-Effects and Random-Effects Estimation Results (myopic model 1)

| | First Specification | | Second Specification | |
Variables	FE	RE	FE	RE
lp_th *(t)*	-0.491**	0.114	-0.380***	-0.312***
	(0.177)	(0.084)	(0.114)	(0.058)
lq *(t-1)*	0.548***	0.827***	0.067	0.052
	(0.098)	(0.054)	(0.042)	(0.036)
linc	0.169	0.115	0.405	0.207**
	(0.128)	(0.088)	(0.253)	(0.092)
lperf			0.883***	0.838***
			(0.043)	(0.036)
laid			0.082	0.106***
			(0.091)	(0.033)
lpop			-0.169	0.142**
			(0.155)	(0.066)
educ			-0.002	0.026
			(0.072)	(0.063)
Constant	4.438**	0.844	3.901	1.347
	(1.804)	(0.587)	(2.751)	(0.952)
Observations	262	262	160	160
Number of ID	19	19	19	19
R^2	0.652	0.788	0.812	0.806
F (p-value)	0.000	0.000	0.000	0.000

Note: Robust standard errors in parentheses. Significance levels: *10%; **5%; ***1%

Table 5 displays the results of other addiction models with past prices handled as an exogenous variable. The main variables in the model include current prices and first lags of prices, income and theatre demand. Parameter estimates in the main model show that income per capita, lags in prices and attendance are positively relevant to theatre attendance. The estimated price elasticities for myopic model 2 are also similar to the findings of myopic model 1. Moreover, there is a positive relationship between the number of performance and theatre demand. Following the baseline estimation results, IV estimation results are discussed.

Table 5: Fixed-Effects and Random-Effects Estimation Results (myopic model 2)

	First Specification		Second Specification	
Variables	FE	RE	FE	RE
lp_th *(t)*	-0.529**	-0.246	-0.440***	-0.404***
	(0.248)	(0.169)	(0.124)	(0.102)
lp_th *(t-1)*	0.055	0.394*	0.137	0.126
	(0.097)	(0.209)	(0.153)	(0.125)
lq *(t-1)*	0.551***	0.828***	0.069	0.056
	(0.218)	(0.054)	(0.041)	(0.035)
linc	0.168	0.103	0.374	0.193*
	(0.128)	(0.087)	(0.244)	(0.099)
lperf			0.878***	0.837***
			(0.044)	(0.036)
laid			0.037	0.093**
			(0.096)	(0.037)
lpop			-0.193	0.127**
			(0.159)	(0.062)
educ			-0.006	0.023
			(0.075)	(0.064)
Constant	4.390**	0.906	4.862*	1.728*
	(1.828)	(0.594)	(2.455)	(1.009)
Observations	262	262	160	160
Number of ID	19	19	19	19
R^2	0.661	0.791	0.814	0.809
F Stat	0.000	0.000	0.000	0.000

Note: Robust standard errors in parentheses. Significance levels: *10%; **5%; ***1%

According to the instrumental variable approach, it must be tested whether instrumented variable and instruments are correlated (first stage, see Table 6). F-statistic indicates that cinema ticket price and the price of other cultural activities, which are used as instrumental variables, are not weak. Moreover, the correlation coefficients between theatre ticket price and cinema ticket price, and theatre ticket price and the price of other cultural activities are 0.74 and 0.40, respectively.

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Table 6: A Simple Regression between Instrumented and Instrumental Variables

Dep. Var: lp_th	Coef.	Std. Err.	t	Prob.
lp_cin	1.083	0.095	11.41	0.000
lp_other	0.090	0.014	6.57	0.000
Constant	-0.634	0.165	-3.84	0.000
Observations	305			
Number of ID	19			
Within-R^2	0.34			
F Stat (2, 284)	73.02	(test for lp_cin=0 and lp_other=0)		
Prob	0.000			

Secondly, Equations 6 and 7 are estimated using an instrumental variable estimator with panel data on the NUTS-2 level regional markets of Turkey. The empirical strategy is the estimation of myopic addiction. Tables 7 and 8 report the estimation results of two models that are presented in two specifications. As mentioned in Castiglione and Infante (2016), the first specification includes only the fundamental variables, and the second specification contains all the control variables. The models are estimated by employing fixed effect (FE) and random effect (RE) with the instrumental variable approach in order to solve possible endogeneity problems.

Table 7 and Table 8 summarize the IV estimation results of the addiction model. The first two columns present the results regarding only the main variables, which include prices, income per capita and lags in attendance. Then, the second two columns show the results when all control variables are considered. Estimating equations (6) and (7) using lp_cin and lp_other as instrumental variables for lp_th gives an elastic demand for FE estimation. One can be seen that theatre attendance is an addictive good since past demand positively affects current attendance. Becker et al. (1994) also reached similar results. As is expected, the sign on lp_th is negative, therefore confirming that attendance rises as ticket price falls in the second column. As far as demand theory is concerned, income elasticity lies between 0.44 and 0.90 due to the demand for theatre not being an inferior good. The model estimates that financial aid to private theaters and the number of performances positively influence current theatre demand. There is a positive relationship between population and attendance with random-effect estimation even though the sign of population is negative with fixed-effect estimation. Although there isn't a significant relationship between higher education and consumption, the sign of education level is positive. This result indicates that theatre cannot be thought an elitist good, unlike Castiglione and Infante (2016).

Table 7: Instrumental Variable Estimation Results (myopic model 1)

Variables	First Specification		Second Specification	
	FE	RE	FE	RE
lp_th *(t)*	-1.178***	0.029	-1.160**	-0.743***
	(0.354)	(0.790)	(0.536)	(0.209)
lq *(t-1)*	0.496***	0.840***	0.0664*	0.0461
	(0.113)	(0.058)	(0.0353)	(0.0355)
linc	0.638***	0.158**	0.899**	0.436***
	(0.214)	(0.068)	(0.384)	(0.120)
lperf			0.891***	0.867***
			(0.0320)	(0.0371)
laid			0.282	0.351***
			(0.179)	(0.123)
lpop			-0.546**	0.212***
			(0.265)	(0.0753)
educ			0.0383	0.0898
			(0.0678)	(0.0628)
Constant	1.637	0.424	3.934	-3.688
	(1.744)	(0.629)	(2.942)	(2.430)
Observations	245	245	160	160
Number of ID	19	19	19	19
R^2	0.258	0.801	0.670	0.947
Wald chi2 (p-value)	0.000	0.000	0.000	0.000

Note: Robust standard errors in parentheses. . Significance levels: *10%; **5%; ***1%

Table 8 displays the results of other addiction models with past prices handled as an exogenous variable. The main variables in the model encapsulate current prices and first lags of prices, income and theatre demand. Parameter estimates in the main model indicate that income per capita, lags in prices, and attendance are positively relevant to theatre attendance. That's why, there is an evidence that Turkish theatergoers' behaviors are consistent with the addiction hypothesis (see the main model with RE). The findings show that the price elasticity is elastic, with an estimated price elasticity of -1.11 for fixed-effect estimation. When all control variables are used in the second specification, price elasticity lies between -0.83 and -1.19, showing that theatre can be a luxury good. The sign of past consumption coefficients is positive with fixed-effect and random-effect estimations. Similarly, income per capita rises with current consumption of roughly 0.44 and 0.87, indicating that theatre attendance is a normal good. According to the estimation results, the number of performances increases, and theatre demand goes up. The estimated impact of financial aid to private theaters on demand is roughly 0.30.

Table 8: Instrumental Variable Estimation Results (myopic model 2)

Variables	First Specification		Second Specification	
	FE	RE	FE	RE
lp_th *(t)*	-1.113*	-0.763*	-1.190**	-0.833***
	(0.622)	(0.432)	(0.517)	(0.278)
lp_th *(t-1)*	-0.094	0.796*	0.084	0.159
	(0.544)	(0.439)	(0.216)	(0.199)
lq *(t-1)*	0.493***	0.855***	0.068*	0.0708**
	(0.108)	(0.060)	(0.035)	(0.0329)
linc	0.627***	0.169**	0.876**	0.444***
	(0.197)	(0.081)	(0.370)	(0.156)
lperf			0.888***	0.888***
			(0.034)	(0.0306)
laid			0.252	0.304**
			(0.182)	(0.120)
lpop			-0.558**	0.0719
			(0.260)	(0.0753)
educ			0.036	0.0573
			(0.068)	(0.0624)
Constant	1.806	0.136	4.522*	-1.778
	(1.823)	(0.765)	(2.412)	(2.318)
Observations	244	244	160	160
Number of ID	19	19	19	19
R^2	0.232	0.800	0.678	0.946
F Stat	0.000	0.000	0.000	0.000

Note: Robust standard errors in parentheses. Significance levels: *10%; **5%; ***1%

There isn't a statistically significant relationship between population and demand for theatre with random-effect estimation, even though the sign of population is negative with fixed-effect estimation. Additionally, there is no statistically significant relationship between a higher level of education and current attendance.

5. Conclusion

This paper investigates the Turkish theatre demand function determinants for 19 sub-regions based on the NUTS-2 regional classification system using OLS and the IV approaches. Two different specifications of the addiction model are estimated using panel data for the years 2005 to 2020. The research aims to determine whether attendance for theatre in Turkey is consistent with the addiction hypothesis (Becker et al., 1994; Becker & Murphy,

1988). The study also aims to examine the effect of financial aid to private theaters on consumption.

Estimation results show that theatre attendance is an addictive good since past demand and prices positively affect current attendance as in Castiglione and Infante (2016). The hypothesis of theatre addiction is acceptable because of healthy habits. In another sense, theatre addiction isn't addicted harmful as cigarette, alcohol, or drug consumption. It can be said that the elasticity of theatre ticket prices is elastic in Turkey, indicating that theatre is a luxury good. Therefore, we say that Turkish theatergoers have a high sensitivity regarding consumption against ticket price. Demand for theatre is positively correlated with income per capita, which implies that cultural activities aren't an inferior good. The results suggest that financial aid to private theaters and the number of performances positively influence current theatre demand. Although there is no statistically significant relationship between consumption and a higher level of education, the positive sign of the estimation coefficient is compliance with the expectations.

Overall, estimation results have considerable implications for policy recommendations. Since theatergoers are consistent with addiction behavior, subsidies can be a way of influencing their theatre demand. That's why the subsidies can be increased to raise the attendance of arts activities. Considering financial aid to private theaters, the sustainability of these aids is vitally important. As stated in Akdede and Özpınar (2021), it should be provided non-financial aid such as the promotion of private theater plays by public service announcements as well as financial aid. Another way of influencing consumption must be ticket price regulation because the price elasticity is elastic. And also numbers of saloon and performance in provinces should increase to raise the theater demand and solve many problems of theater.

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Appendix

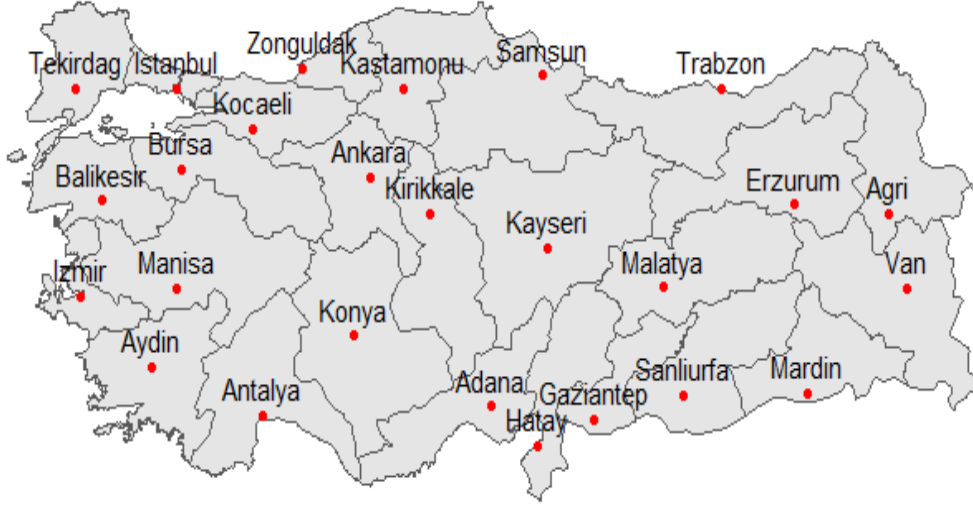**Figure A1:** Map of NUTS-2 Sub-regions in Turkey

Table A1: Provinces in NUTS-2 Level Sub-regions

Adana, Mersin-TR62	Kayseri, Sivas, Yozgat-TR72
Ankara-TR51	Kocaeli, Sakarya, Düzce, Bolu, Yalova-TR42
Antalya, Isparta, Burdur-TR61	Konya, Karaman -TR52
Aydın, Denizli, Muğla-TR32	Malatya, Elazığ, Bingöl, Tunceli-TRB1
Balıkesir, Çanakkale-TR22	Samsun, Tokat, Çorum, Amasya-TR83
Bursa, Eskişehir, Bilecik-TR41	Şanlıurfa, Diyarbakır-TRC2
Erzurum, Erzincan, Bayburt-TRA1	Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane-TR90
Gaziantep, Adıyaman, Kilis-TRC1	Van, Muş, Bitlis, Hakkari-TRB2
İstanbul-TR10	Zonguldak, Karabük, Bartın-TR81
İzmir-TR31	

Table A2: Correlation Matrix

	lq	lp_th	lp_cin	lpother	linc	lperf	laid	lpop	educ
lq	1.00								
lp_th	0.56	1.00							
lp_cin	0.29	0.73	1.00						
lpother	-0.10	0.10	0.25	1.00					
linc	0.64	0.68	0.64	-0.10	1.00				
lperf	0.97	0.61	0.33	-0.03	0.63	1.00			
laid	-0.15	0.32	0.58	0.34	0.005	-0.10	1.00		
lpop	0.82	0.60	0.38	-0.08	0.62	0.79	-0.11	1.00	
educ	0.61	0.45	0.22	-0.20	0.52	0.59	-0.20	0.60	1.00