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- RESEARCH ARTICLE -

# IMPACT OF DISTANCE ON STATE UNIVERSITY ENROLMENTS: A PANEL DATA ANALYSIS

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**Abstract**

*This study aims to explain the impact of distance on state university enrolments in Turkey based on the student data received from Canakkale Onsekiz Mart University (ÇOMÜ) and extend our previous study by incorporating 19 years of panel data (between 2000-2018). We are able to corroborate our earlier findings, explaining 70% of the variation in student composition by using 3 highly statistically significant variables; i) distance to university city, ii) distance to major cities, and iii) the number of students who pass the university entrance test, in addition to trend effects. Further analysis more robustly shows that a relatively significant gender disparity still persists and distance is found to be much less effective on female students. Additional parametric efficiency analysis also reveals that, compared to the predicted results, conservative and mostly landlocked provinces send increasingly fewer students to ÇOMÜ while nearby provinces, Eastern Anatolia and the Black Sea Region shows a much greater interest.*

**Keywords**: *Distance, University Enrolments, Efficiency Analysis, MOLS, Education.*

**JEL Classification**: *C44, D24, I11, L13.*

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# MESAFENİN DEVLET ÜNİVERSİTELERİ KAYITLARI ÜZERİNDEKİ ETKİSİ: PANEL VERİ ANALİZİ

***Öz***

*Bu çalışma, mesafenin Türkiye'de devlet üniversiteleri kayıtları üzerindeki etkisini,* Çanakkale Onsekiz Mart Üniversitesi (ÇOMÜ)'nden elde edilen verilerle, 19 senelik *(2000-2018) panel veri seti kullanarak ve daha önceki çalışmamızı genişletecek şekilde açıklamayı amaçlamaktadır. Trend etkilerine ek olarak istatistiki açıdan önemli değişkenler olan i) üniversite şehrine mesafe, ii) büyük şehirlere olan mesafe ve iii) üniversite sınavında başarılı olan öğrencilerin sayısı değişkenlerini kullanarak öğrenci kompozisyonundaki değişimin % 70'ini açıklamakta ve* önceki çalışmamızdaki bulgularımızı teyit etmiş bulunmaktayız. *Analizler, cinsler arası tercih farklarının hala var olduğu ve mesafenin kız öğrenciler üzerindeki etkisinin erkek öğrencilere nisbeten* çok *daha düşük olduğunu göstermektedir. Ek olarak, parametrik etkinlik analizleri de, beklenen sonuçlara kıyasla,* özellikle *muhafazakâr ve daha çok denize kıyısı olmayan Orta Anadolu'nun ÇOMÜ'yü daha az tercih ederken, yakın iller, Doğu Anadolu ve özellikle de Karadeniz'in ÇOMÜ'ye çok büyük ilgisinin olduğunu göstermektedir.*

**Anahtar Kelimeler**: Uzaklık, Üniversite Kayıtları, Etkinlik Analizi, MOLS, Eğitim

**JEL Sınıflandırması**: C44, D24, I11, L13

*Bu çalışma Araştırma ve Yayın Etiğine uygun olarak hazırlanmıştır.*

## 1. INTRODUCTION

Even though the under-graduate and graduate university education in Turkey is increasingly welcoming the non-profit private institutions, state universities still remain dominant, which are generally large institutions composed of multiple divisions appealing to a diverse array of students from all over the country and potentially abroad. During the 2000-2018 period, the number of private universities has increased from 22 to 80 from a total of 90 to 211, reaching an unprecedented level of 38% (Yükseköğretim Bilgi Yönetim Sistemi, 2020).

However, the overall number of students reveals a rather different picture. Out of the total number of 3.777.114 students who were registered in primary (morning) and secondary (evening) education in 2018, 84.2% (3.180.735) of them were attending a state university, down from the 2000 level of 96.7%. Understanding the mix of the student body and where they originate from is of crucial importance in many ways, and requires a proper evaluation of the pertinent statistics in order to develop necessary policies.

A closer look at the student statistics reveal that, if resources are scarce, it is best to evaluate a large state university with a universal appeal to not only the domestic students from all over the country but also from abroad. Fortunately Canakkale Onsekiz Mart University (ÇOMÜ)

has a large body of student enrolment statistics available to public, including but not limited to their province of origin. This provides us highly important information about the potential links between different regions of the country and help us not only get answers but also raise crucial questions.

Our study here extends on our previous article (Bekaroğlu, 2019), which examined the body of students registered in ÇOMÜ as of 2018, with three main goals; a) to find the direct links for student mobility to a state university from any origin and distance, b) evaluate the potential differences between genders and its implications, c) investigate whether or not the expected amount of students arrive from a certain origin. We, hereby, extend the study by incorporating a panel data set, including the years between 2000 and 2018 and the time variable to measure the trend effects.

Rather than survey-based techniques such as conjoint analysis, we use a heteroskedasticity corrected log-linear regression analysis based on Ordinary Least Squares (OLS) to estimate the links between student enrolment both in total and gender specific numbers. At the subsequent stage, a regression based parametric efficiency analysis (Modified OLS or simply MOLS) is employed to determine the relative efficiency levels of the number of students enrolled from each province, which will be compared with the cross-sectional results from our earlier study to get a more sound and broader idea.

This study will enable us to find more robust and statistically sound results regarding student mobility, gender behavior differences and student diversity as a result of policy changes and the political consequences because we work with a much more thorough student statistics for the entire university for a 19 year period. We do not investigate, however, the factors that students claim to choose based on survey methods with questionable reliability but rather how they actually behave and react given the expected or unexpected circumstances.

Study consists of four parts; the first section is composed of a brief literature review followed by the goals of the study. At the second section, we present the methodology and data, detailing the general framework and the model specification. Third section includes the results in multiple stages and a large amount of visual data. The final section concludes the study with several discussion points and policy implications.

### 1.1 Literature Review

The first major comprehensive study of the college selection process is developed by Lewis and Morrison in 1975 (cited in Beswick, 1989) who laid the stage for further studies. The three-stage model by Chapman (1981) is the first systematic definitive model to formulate university preferences, while the broadest study examining the factors affecting university preference in Turkey is a field study by Cati et al. (2016), which lists a long and well-studied list of literature on the subject.

As previously discussed in the literature, there are many factors that influence the university preferences (i.e. Kallio, 1995; Moogan et al., 1999; Soutar & Turner, 2002; Akar, 2012), including but not limited to the institution's reputation, financial support and costs, academic climate, housing options, place and distance, open areas, work opportunities, campus life and social opportunities, (Cati et al., 2016).

Hooley & Lynch (1981) counts six factors affecting the university preferences of the students in the UK: the presence of suitable fields, the location, type and reputation of the university, the distance from home, and recommendations from family, friends and educators. Baird (1967) and Bowers & Pugh (1972) define high academic standards as the most important factor influencing student preferences. Likewise Amca (2011) defines the factors in Turkey as the job opportunities after graduation, graduation success rates, cost of the selected institution, living cost of the university city, geographic location and social life quality.

Many studies consistently find distance to university city as a key factor for university preferences as in Gibbons et al. (2002), Tatar & Oktay (2006), Dunnett et al. (2012), Kurt (2013), and Erol et al. (2013) while Çiftçi et al. (2011) emphasizes the university's distance to the city center. Other authors such as Çokgezen (2012), Amca (2011), Kurt (2013) who find little difference between Turkish students and their Western counterparts at university preferences, also emphasize the city factor and whether or not the college is located near or in a major city or hub such as Istanbul and Ankara, which is especially important for future job opportunities and socioeconomic life.

While Filter (2010) finds no distinction between genders in his dissertation report, Shank et al. (1998) and Dunnett et al. (2012) disagree and find a substantial gender gap in university preferences; suggesting that female students prefer to go to universities closer to home and located near major and relatively more developed cities compared to their male counterparts. Similarly, Cullen et al. (2016) examine only the factors affecting female university choice, and find the quality and the variety of academic programs as the most important factors, supporting the theory of gender disparity.

Additionally, we can talk about two recent prominent studies that examine the factors affecting the university preferences, both of which use survey based techniques, rather than quantitative analysis employed in our study. Gulluce et al. (2016) employs a six dimensional survey (consisting of prestige, opportunity, campus, knowledge, location, and economy) on a faculty level, with varying results for different demographics. Ilgan et al. (2018) who find similar results, investigate the factors affecting university choice of freshman students on the topics of university popularity, location, facilities, as well as demographic variables such as gender, socioeconomic background and university exam results.

Finally, our parent study (Bekaroğlu, 2019) looks at the impact of the distances on student enrolments at ÇOMÜ by using cross sectional student data and finds that a) distance to both

university city and major city centers are crucial, explaining 2/3 of the variation, b) there is a significant gender difference in terms of student response, c) landlocked and relatively conservative cities are underrepresented while nearby, Black Sea and Eastern provinces are overrepresented in student preferences.

### 1.2. Goals of the Study

Despite a long list of studies dealing with the general factors, most studies concentrate on survey methods often using the conjoint approach and there is hardly any research focusing solely on distance and analyzing the subject from a mere quantitative point of view with the major exception being our aforementioned study, which varies in a number of significant areas from the literature.

First, our goal is not to determine all the factors affecting university preference but rather to determine how much of this can be explained by using "distance" variables with the appropriate controls. We will then project the efficiency of these preferences based on these "distance" variables, finding efficiency trends with respect to their origins; henceforth we can derive some policy implications and raise questions for further studies.

Second, we are investigating whether we have attracted the expected mix of the students in terms of origin and gender given the country-wide facts, and whether there is a gender disparity as it frequently appears in the literature. We are not investigating, however, whether sufficient number of students are enrolled at the university as we take the number of students enrolled for granted.

Third, by extending our previous study by using a 19 year long panel data set, we aim to, a) test the robustness of our findings over time, b) investigate the trend effects, c) examine the changes in the goodness of fit ($R^2$), and d) get a broader sense of student response to the changes in the Turkish higher education system.

## 2. METHODOLOGY AND DATA

### 2.1 Framework

Our analysis consists of three stages. First we analyze the data in aggregate form, using a heteroskedasticity corrected log-linear regression model with OLS; then repeat the same procedure with two gender-specific datasets, as gender is shown to have significant effect in outcomes (Shank & Beasley, 1998).

Finally, we apply a parametric MOLS analysis in order to analyze whether or not the number of students enrolled in COMU is efficient across time and origin. MOLS is simply a midpoint

solution between OLS and Corrected OLS (COLS), which is a strictly deterministic frontier analysis, leaving no room for stochastic effects, while MOLS is attained with an upward displacement by the estimate of the error term (Fried et al., 2008). MOLS produced very similar results with DEA (Data Envelopment Analysis) in our previous study and can yield results just as good as the Stochastic Frontier Analysis (Aigner et al., 1977; Meeusen & Van den Broeck, 1977) when there is little uncertainty, partially thanks to the panel data employed in this study (Varabyova & Schreyögg, 2013).

### 2.2 Variables and Data

It is only rational to assume that the distance to university city is inversely proportional to one's university preference, which suggests that students are more likely to enroll in closer universities. In literature, there is a clear case to include "distance" as a variable for university preference as shown in numerous studies such as Tatar & Oktay (2006), Briggs & Wilson (2007), Filter (2010), Erol et al. (2012), Gibbons & Vignoles (2012), and Kurt (2013).

Distance to university city alone, however, is not sufficient and other variables such as distance to major cities or hubs also play an important role in student enrolments, as well as the number of successful students from each location (Tatar & Oktay, 2006; Amca, 2011; Kurt, 2013).

Given the general findings of the literature, the independent variables we have included in the analysis to explain the student enrolments from each location are as follows;

a) **Year of Registration** (for trend effects)**:** Different from cross sectional analysis, this variable measures whether there is a positive or negative trend in student enrolments over the years. A positive (negative) value will imply an increasing (decreasing) number of students from all locations.

b) **Distance to university city**: University enrolments should be inversely correlated with the distance to university city, that is, the closer to the university, the more students should enroll. We would, therefore, expect a higher enrolment rate from nearby locations.

c) **Distance to major cities**: University enrolments should be positively correlated with the distance to major cities or hubs, that is, the closer to a major city, the fewer students should enroll in the university (ÇOMÜ). We would expect a lower enrolment rate from locations closer to the major cities. In the analysis, distances to Istanbul and Izmir are found to be statistically and mathematically significant, while distance to Ankara is dropped as it appears ambiguous and not statistically significant.

d) **Number of successful students** (for control): University enrolments should be positively correlated with the number of successful students who pass the university entrance test, that is, the higher number of students pass the university entrance test from a location, the more students should enroll in the university from that location.

e) **Region-specific Dummy variables** (for control)**:** University enrolments may be positively correlated with or skewed towards a certain region, regardless of the distance, that is, a higher number of students will tend to enroll from that region. In the case of ÇOMÜ, only the dummy for the Black Sea Region is found to be statistically significant, while all others are found to be not significant and dropped.

Data used in this study were obtained from ÇOMÜ Registrar's Office, who compiled the archived data from ÇOMÜ Institutional Evaluation System (Kurumsal Değerlendirme Sistemi) in 2019 after a formal request. Data regarding the number of succesful university students is obtained from YÖK while data regarding the distances were obtained from General Directorate of Highways (Karayolları Genel Müdürlüğü).

### 2.3 Model Specification

#### 2.3.1 First & Second Stages

A logarithmic OLS regression is used to estimate the dependent variable at first stage.

$$ln\ Y_{it} = \beta_0 + \beta_1\ ln\ T_{1it} + \beta_2\ ln\ X_{2it} + \beta_3\ ln\ X_{3it} + \beta_4\ ln\ X_{4it} + \beta_5\ ln\ X_{5it} + \beta_6\ D_{6it} + u_{it}$$

where we assume the following notation:

$Y_{it}$: Number of students enrolled from province i, in year t

$T_{1it}$ (Year): Time variable to measure trend effect, for province i, in year t
$X_{2it}$ (Dist_1): Distance to the university city from province i, in year t
$X_{3it}$ (Dist_2): Distance to Istanbul from province i, in year t
$X_{4it}$ (Dist_3): Distance to Izmir from province i, in year t
$X_{5it}$ (OSS): Number of students who passed the OSS Test from province i, in year t
$D_{6it}$ (BlackSea): Dummy variable for Black Sea region for province i, in year t

At the second stage, a similar logarithmic OLS regression is used to estimate the gender-specific dependent variable, with gender-specific variables g: 0 for male, and 1 for female. Note that the distances or the dummy variable do not depend on gender although their coefficients will appear different as the independent variable does depend on gender.

$$ln\ Y_{itg} = \beta_{0g} + \beta_{1g}\ ln\ T_{1it} + \beta_{2g}\ ln\ X_{2it} + \beta_{3g}\ ln\ X_{3it} + \beta_{4g}\ ln\ X_{4it} + \beta_{5g}\ ln\ X_{5it} + \beta_{6g}\ D_{6it} + u_{igt}$$

#### 2.3.2 Third Stage

Technical Efficiency ($\varepsilon_{it}$) of the number of incoming students from each location is defined as;

Using MOLS: $\varepsilon_{it} = ln\ Y_{it} / (ln\ \hat{Y}_{it} + \sigma)$

Using COLS: $\varepsilon_{it} = ln\ Y_{it} / (ln\ \hat{Y}_{it} + \text{Max}\ (e_{it}))$

where σ is the standard deviation of the entire panel data set, and Max ($e_{it}$) is the maximum deviation from the OLS estimator. By definition, COLS envelops all data points via the minimum necessary upward displacement, where a minimum of one data point touches the COLS frontier. MOLS, however, is much more conservative and displaces the OLS line by standard deviation, relating anything in between to stochastic shocks and anything above to technical inefficiency. Both methods are consistent and give the same rankings while the numerical efficiency results will vary.

In the study, we calculate the inefficiency at each data point in time ($\varepsilon_{it}$) but will only report in 5 year periods of each location as there are too many observations to be listed here (81 provinces x 19 years = 1539 observations). Although our focus here is on the MOLS efficiency levels, we will also include the COLS in the graphs for comparison as it envelops the entire data set.

## 3. RESULTS

### 3.1 Regression Analysis for the Aggregate Panel Data

All variables used in the log-linear regression analysis appear both statistically and mathematically significant at 1% confidence interval with a moderately high explanatory power ($R^2 = 0.713$). All variables are robust and take the correct (expected) signs. There is inevitably some degree of collinearity between distance variables as expected but this does not change the big picture as it would also be corroborated in multi-cross section analysis (see Section 3.3).

Due to the existence of heteroskedasticity despite the log linear functional form, we provide both regular OLS and heteroskedasticity corrected GRETL outputs for the model. Unless stated otherwise, the evaluations will be based on the heteroskedasticity corrected results. In either case, all variables take the expected signs and are robust to model type, other variables and years.

While the impact of trend effects as well as the control variable (number of successful students, OSS) appear the same in the heteroskedasticity corrected model, distance to Çanakkale (Dist_1), distance to İstanbul (Dist_2) and the Black Sea dummy appear to have slightly larger effects though the impact the distance to İzmir (Dist_3) has been somewhat gimped.

**Table 1: Regression Panel Data Results for All Students**

| Model 1a: OLS. using observations 1-1539 | | | | |
|---|---|---|---|---|
| Dependent variable: Totals | | | | |
| Variables | Coefficient | Std. Error | t-ratio | p-value |
| const | -214.429 | 6.165 | -34.78 | <0.0001 |
| Year | 0.107 | 0.003 | 34.93 | <0.0001 |
| Dist_1 | -1.338 | 0.058 | -23.02 | <0.0001 |
| Dist_2 | 0.496 | 0.039 | 12.82 | <0.0001 |
| Dist_3 | 0.424 | 0.038 | 11.15 | <0.0001 |
| OSS | 0.675 | 0.019 | 35.24 | <0.0001 |
| Black Sea (Dummy) | 0.485 | 0.043 | 11.3 | <0.0001 |
| Mean dependent var | 3.914 | | S.D. dep. var | 1.181 |
| Sum squ. residual | 664.60 | | S.E. of regression | 0.659 |
| R-squared | 0.690 | | Adj. R'2 | 0.689 |
| F(6. 1532) | 569.044 | | P-value (F) | 0.000 |
| Log-likelihood | -1,537.595 | | Akaike | 3,089.190 |
| Schwarz | 3,126.562 | | Hannan-Quinn | 3,103.095 |

**Table 2: Regression Panel Data Results for All Students**

| Model 1b: Heteroskedasticity-corrected. using observations 1-1539 | | | | |
|---|---|---|---|---|
| Dependent variable: Totals | | | | |
| Variables | Coefficient | Std. Error | t-ratio | p-value |
| const | -200.039 | 6.165 | -34.78 | <0.0001 |
| Year | 0.100 | 0.003 | 34.93 | <0.0001 |
| Dist_1 | -1.513 | 0.058 | -23.02 | <0.0001 |
| Dist_2 | 0.536 | 0.039 | 12.82 | <0.0001 |
| Dist_3 | 0.536 | 0.038 | 11.15 | <0.0001 |
| OSS | 0.678 | 0.019 | 35.24 | <0.0001 |
| Black Sea (Dummy) | 0.605 | 0.043 | 11.3 | <0.0001 |
| | | | | |
| Mean dependent var | 3.914 | | S.D. dep. var | 1.181 |
| Sum squ. residual | 4718.00 | | S.E. of regression | 1.755 |
| R-squared | 0,713765 | | Adj. R'2 | 0.713 |
| F(6. 1532) | 636.709 | | P-value (F) | 0.000 |
| Log-likelihood | −3045,780 | | Akaike | 6,105.561 |
| Schwarz | 6,142.933 | | Hannan-Quinn | 6,119.465 |

As predicted, distance to Canakkale (Dist_1) is negatively proportional to output and has the strongest impact on the output among the included variables, meaning that a greater number of students is expected from closer locations. Balıkesir and Bursa, as the most sensitive locations, would send 4.45 and 3.03 more students to ÇOMÜ respectively in 2018 for each 1 km drop in distance; which has been increasing from 0.2 in 2000 to 1.3 in 2018 for the overall average. While lower than our previous cumulative results (Bekaroğlu, 2019), these are annual figures, which have been increasing over the years for a variety of reasons, indirectly manifested in terms of distance, such as greater cultural proximity, higher awareness, a greater degree of business or friendly connections, and a greater probability of word of mouth.

Similarly, a smaller number of students is expected to enroll if there is a major city or hub around. As of 2018, Balıkesir and Bursa would send 0.81 and 1.2 fewer students to ÇOMÜ respectively for each km drop to Istanbul, while the overall average has increased from 0.06 in 2000 to 0.38 in 2018. Likewise Balıkesir and Bursa would send 1.8 and 0.9 fewer students to ÇOMÜ respectively for each km drop to Izmir, while the overall average has increased from 0.04 in 2000 to 0.27 in 2018. As expected, Istanbul has a larger impact on the output than Izmir, although this effect is by no means, limited to these two cities and similar effects can be expected around any major city / hub in any part of the country.

Number of successful students at each location is found to be not only statistically significant as expected but also much more robust than the population size of each location, though both are highly correlated.

An interesting result is the relative popularity of ÇOMÜ among students from the Black Sea Region for reasons beyond distance. The dummy variable for the Black Sea Region is the only dummy variable that is both statistically significant and robust, and almost plays as an important role as distance. This might be due to various reasons such as a higher interest from coastal regions by the populace in the Black Sea Region (or other coastal areas in general) among others.

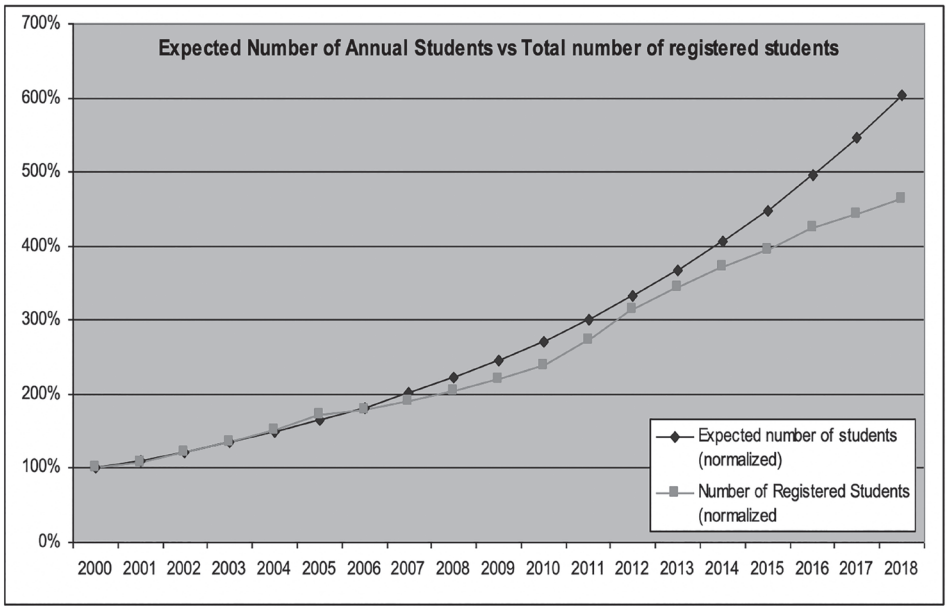
Finally, a positive and statistically significant coefficient for the "year" variable (about 0.1) suggests a consistently increasing number of students from all. Even though this is clearly aligned with the capacity increases across the university over the years (see graph 1), the breakdown of the impact changes from different distances is not yet clear and will be addressed in the section 3.3.

### 3.2 Regression Analysis for the Gender-Specific Data

All variables that are used in the gender-specific log-linear regression analysis appear both statistically significant at 1% confidence interval, with $R^2$ ranging from 68% for males and 75% for females, more or less replicating the results from the regression with combined data. Similarly, all variables are robust and take the correct (expected) signs. Additionally,

the impact of the number of successful students from each location is very similar for both genders. However, there are substantial differences between genders with respect to all other variables (see Table 3 & 4).

**Graph 1: Normalized Comparison of Expected and Registered Number Students**




All distance variables have much larger impacts for males compared to females. Distance to Çanakkale (Dist_1), though negatively proportional regardless of gender, is much stronger for males than females with coefficients -1.61 vs. -1.41 respectively. Similarly, the impact of distances both to Istanbul (0.65 vs. 0.44) and to İzmir (0.69 vs. 0.37) are much stronger for males than females (though the heteroskedasticity correction somewhat exaggerates the impact from İzmir). In other words, exactly like we had discovered in our previous study, the distances in general have a much greater effect on male students in their decision making. In essence, males appear to be more calculating of and dependent on the distance (see Table 5).

Additionally, trend effects also have a larger effect for males compared to females (0.109 vs 0.091), implying a greater increase of males over the years. The impact of the Black Sea region dummy, on the other hand, is much stronger for females than males (0.68 vs. (0.54), which reveals a greater motivation for females to travel longer distances, especially towards coastal and possibly the Western Regions.

**Table 3: Regression Panel Data Results for Male Students**

| Model 2a: Heteroskedasticity-corrected, using observations 1-1539 | | | | |
|---|---|---|---|---|
| Dependent variable: Males | | | | |
| Variables | Coefficient | Std. Error | t-ratio | p-value |
| const | -219.415 | 5.960 | −36.81 | <0.0001 |
| Year | 0.109 | 0.003 | 36.68 | <0.0001 |
| Dist_1 | -1.612 | 0.063 | −25.73 | <0.0001 |
| Dist_2 | 0.645 | 0.045 | 14.44 | <0.0001 |
| Dist_3 | 0.690 | 0.042 | 16.28 | <0.0001 |
| OSS | 0.675 | 0.019 | 34.89 | <0.0001 |
| Black Sea (Dummy) | 0.542 | 0.040 | 13.68 | <0.0001 |
| | | | | |
| Mean dependent var | 3.213 | | S.D. dep. var | 1,177 |
| Sum squ. residual | 5237.114 | | S.E. of regression | 1.849 |
| R-squared | 0.678 | | Adj. R’2 | 0.675 |
| F(6. 1532) | 534.187 | | P-value (F) | 0.000 |
| Log-likelihood | −3126.105 | | Akaike | 6266.210 |
| Schwarz | 6303.582 | | Hannan-Quinn | 6280.115 |

**Table 4: Regression Panel Data Results for Female Students**

| Model 2b: Heteroskedasticity-corrected, using observations 1-1539 | | | | |
|---|---|---|---|---|
| Dependent variable: Females | | | | |
| Variables | Coefficient | Std. Error | t-ratio | p-value |
| const | -182.134 | 5.539 | −32.88 | <0.0001 |
| Year | 0.091 | 0.003 | 33.09 | <0.0001 |
| Dist_1 | -1.412 | 0.0341 | −41.46 | <0.0001 |
| Dist_2 | 0.439 | 0.033 | 13.17 | <0.0001 |
| Dist_3 | 0.371 | 0.032 | 11.71 | <0.0001 |
| OSS | 0.694 | 0.019 | 36.16 | <0.0001 |
| Black Sea (Dummy) | 0.683 | 0.042 | 16.17 | <0.0001 |
| | | | | |
| Mean dependent var | 3.213 | | S.D. dep. var. | 1.177 |
| Sum squ. residual | 5237.114 | | S.E. of regression | 1.849 |
| R-squared | 0.678 | | Adj. R’2 | 0.675 |
| F(6. 1532) | 534.187 | | P-value (F) | 0.000 |
| Log-likelihood | -3126.105 | | Akaike | 6266.210 |
| Schwarz | 6303.582 | | Hannan-Quinn | 6280.115 |

**Table 5: Comparison of Male & Female Coefficients**

| Variables | Totals | Males | Females | Females / Males |
|---|---|---|---|---|
| constant | 200.039 | 219.415 | 182,134 | - |
| Year | 0,09995 | 0,10874 | 0,09111 | 83,8% |
| Dist_1 (-) | 1,51315 | 1,61208 | 1,41197 | 87,6% |
| Dist_2 | 0,53556 | 0,64542 | 0,43902 | 68,0% |
| Dist_3 | 0,53597 | 0,68992 | 0,37090 | 53,8% |
| OSS | 0,67791 | 0,67532 | 0,69426 | 102,8% |
| Black Sea | 0,60528 | 0,54235 | 0,68340 | 126,0% |

### 3.3 Further Analysis on the Cross Sectional Data

As we mentioned earlier, the student capacities of state universities, as illustrated by the trend effects in the ÇOMÜ case, have increased over time, soaking up the excess demand; however, it is unclear from the trend effects alone how the increase in capacities have changed the student composition and their origins.

Deep diving into the cross sectional data and analysing each year separately gives opportunities, a) to test the robustness of our model for each year, b) to better understand the trends and distinguish how the impact of each variable has changed over time. Therefore we have run 19 separate cross sectional regression analysis for each of the given year (2000-2018) and obtained the following results.

First of all, as shown in Table 6a, the cross sectional coefficients for each variable are highly consistent with their panel data equivalents although there are some differences and variations over time. (Note that the cross sectional analysis is missing the year variable for trend effects). In essence, we can suggest that the panel data coefficients are closer to the upper bound values, and even closer in the heteroskedasticity corrected model.

Secondly, Table 6b provides the proportional values of the same table relative to the maximum value of each variable. Colored cells in both tables (6a and 6b) are the maximum values for any given variable. Also as illustrated in Graph 2, we do not see a clear trend for Distance to Çanakkale (Dist_1) while we see rather clear increasing trends for both Distance to İstanbul (Dist_2) and Distance to İzmir (Dist_3) variables. In other words, the trend effects are mainly associated with Dist_2 and Dist_3 variables, rather than Dist_1. Further regression analysis with regards to the trends for Dist_2 and Dist_3 somewhat confirms this with p-values less than 0.1 (see Appendix, Table 11).

**Table 6a: Coefficients by Year (Nominal Values)**

| Values / Years | 2000 | ..01 | ..02 | ..03 | ..04 | ..05 | ..06 | ..07 | ..08 | ..09 | ..10 | ..11 | ..12 | ..13 | ..14 | ..15 | ..16 | ..17 | ..18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R'2 | 0.73 | 0.70 | 0.68 | 0.61 | 0.66 | 0.66 | 0.66 | 0.60 | 0.67 | 0.66 | 0.63 | 0.62 | 0.65 | 0.62 | 0.63 | 0.60 | 0.62 | 0.61 | 0.62 |
| Adj. R'2 | 0.72 | 0.68 | 0.66 | 0.59 | 0.63 | 0.63 | 0.64 | 0.57 | 0.65 | 0.64 | 0.60 | 0.59 | 0.63 | 0.59 | 0.60 | 0.57 | 0.59 | 0.58 | 0.59 |
| Dist_1 (-) | 1.17 | 1.09 | 1.60 | 1.55 | 1.48 | 1.35 | 1.43 | 1.41 | 1.22 | 1.36 | 1.33 | 1.33 | 1.32 | 1.35 | 1.39 | 1.38 | 1.38 | 1.31 | 1.27 |
| Dist_2 | 0.52 | 0.37 | 0.54 | 0.40 | 0.42 | 0.41 | 0.48 | 0.47 | 0.45 | 0.51 | 0.50 | 0.55 | 0.56 | 0.57 | 0.60 | 0.58 | 0.60 | 0.58 | 0.60 |
| Dist_3 | 0.11 | 0.12 | 0.44 | 0.43 | 0.46 | 0.36 | 0.51 | 0.52 | 0.40 | 0.44 | 0.41 | 0.46 | 0.42 | 0.49 | 0.48 | 0.47 | 0.46 | 0.48 | 0.48 |
| OSS | 0.87 | 0.74 | 0.84 | 0.78 | 0.73 | 0.70 | 0.72 | 0.74 | 0.69 | 0.70 | 0.68 | 0.68 | 0.67 | 0.67 | 0.66 | 0.62 | 0.64 | 0.59 | 0.59 |
| Black Sea | 0.50 | 0.30 | 0.50 | 0.59 | 0.58 | 0.58 | 0.60 | 0.51 | 0.44 | 0.50 | 0.56 | 0.50 | 0.57 | 0.47 | 0.53 | 0.50 | 0.43 | 0.38 | 0.37 |

* Maximum values for each variable are colored.

**Table 6b: Coefficients by Year (Relative Values)**

| Values / Years | 2000 | ..01 | ..02 | ..03 | ..04 | ..05 | ..06 | ..07 | ..08 | ..09 | ..10 | ..11 | ..12 | ..13 | ..14 | ..15 | ..16 | ..17 | ..18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R Square | 1.00 | 0.95 | 0.93 | 0.83 | 0.89 | 0.89 | 0.90 | 0.82 | 0.92 | 0.90 | 0.86 | 0.84 | 0.89 | 0.84 | 0.85 | 0.82 | 0.84 | 0.83 | 0.84 |
| Adj. R'2 | 1.00 | 0.95 | 0.92 | 0.82 | 0.88 | 0.88 | 0.89 | 0.80 | 0.91 | 0.90 | 0.84 | 0.82 | 0.88 | 0.82 | 0.84 | 0.80 | 0.83 | 0.81 | 0.83 |
| Dist_1 | 0.73 | 0.68 | 1.00 | 0.97 | 0.93 | 0.84 | 0.89 | 0.88 | 0.77 | 0.85 | 0.83 | 0.83 | 0.83 | 0.84 | 0.87 | 0.86 | 0.86 | 0.82 | 0.80 |
| Dist_2 | 0.86 | 0.62 | 0.89 | 0.67 | 0.70 | 0.68 | 0.81 | 0.78 | 0.75 | 0.86 | 0.84 | 0.91 | 0.93 | 0.95 | 1.00 | 0.97 | 1.00 | 0.96 | 0.99 |
| Dist_3 | 0.22 | 0.24 | 0.85 | 0.84 | 0.90 | 0.70 | 0.99 | 1.00 | 0.77 | 0.86 | 0.80 | 0.89 | 0.81 | 0.96 | 0.93 | 0.92 | 0.89 | 0.94 | 0.93 |
| OSS | 1.00 | 0.85 | 0.97 | 0.89 | 0.85 | 0.81 | 0.83 | 0.85 | 0.80 | 0.80 | 0.78 | 0.79 | 0.77 | 0.77 | 0.76 | 0.72 | 0.73 | 0.68 | 0.68 |
| Black Sea | 0.83 | 0.49 | 0.83 | 0.98 | 0.96 | 0.97 | 1.00 | 0.85 | 0.74 | 0.83 | 0.93 | 0.84 | 0.94 | 0.78 | 0.88 | 0.84 | 0.72 | 0.63 | 0.62 |

* Maximum values for each variable are colored.

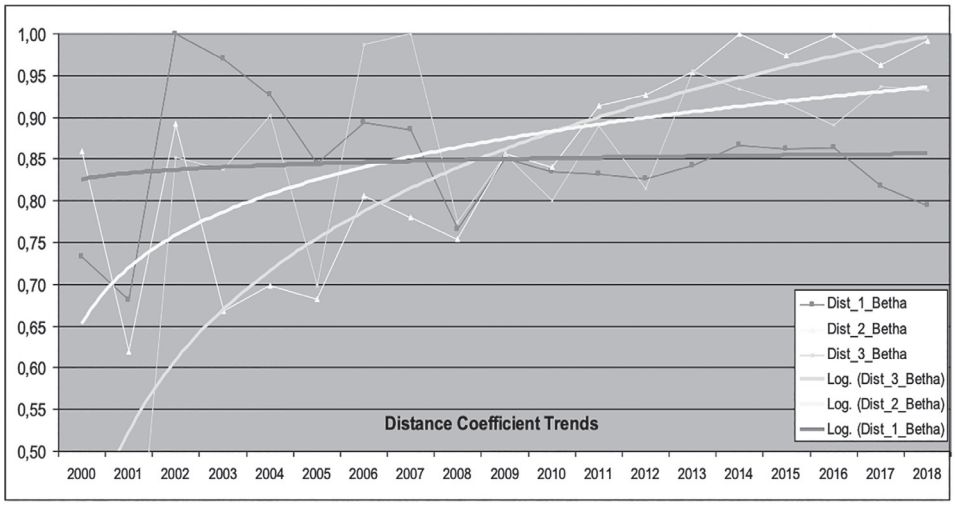
Finally, Table 7 provides us the variations in the p-values and the statistical significance of the variables. As shown on the table, only a handful of the early data are found to be statistically insignificant. 86 out of 90 variable points have p-values less than 5%, and mostly less than 1%. After 2004, not only all variables are statistically signifcant at 5%, but also Dist_1 and OSS are always significant even at 1% level and the significance of all variables has increased over time.

**Table 7: P-Values by Year**

| P values | 2000 | ..01 | ..02 | ..03 | ..04 | ..05 | ..06 | ..07 | ..08 | ..09 | ..10 | ..11 | ..12 | ..13 | ..14 | ..15 | ..16 | ..17 | ..18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dist_1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dist_2 | 0.00 | 0.02 | 0.00 | 0.06 | 0.02 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dist_3 | 0.46 | 0.43 | 0.02 | 0.04 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OSS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Black Sea | 0.01 | 0.09 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 |

* P-values greater than 0.1 are colored in red, and less than 0.05 are colored in green

**Graph 2: Normalized Comparison of Distance Coefficient Trends by Year**




### 3.4 Efficiency Analysis and Panel Data Estimates

#### 3.4.1 Efficiency without Time Trends

In order to see the impact of time trends, it would be extremely helpful to visualize the data with and without time trends. Graph 3 and Graph 4 depict the estimates regarding the log-linear regression analysis (OLS), in addition to the MOLS and COLS estimates. It is obvious from the graph (and the panel data analysis) that there is an upward trend regardless of the efficiencies of the individual units. Efficiency here can be calculated by using either the MOLS or the COLS frontier.

Despite the numerical differences, the ranking would not change as the difference is merely down to whether or not random shocks are considered. While the entire gap is assigned to inefficiency in the COLS case, MOLS assigns some of this to random shocks, depending on the variance of the data. However, it would be wrong to calculate efficiency figures without taking the obvious trend effects into account.

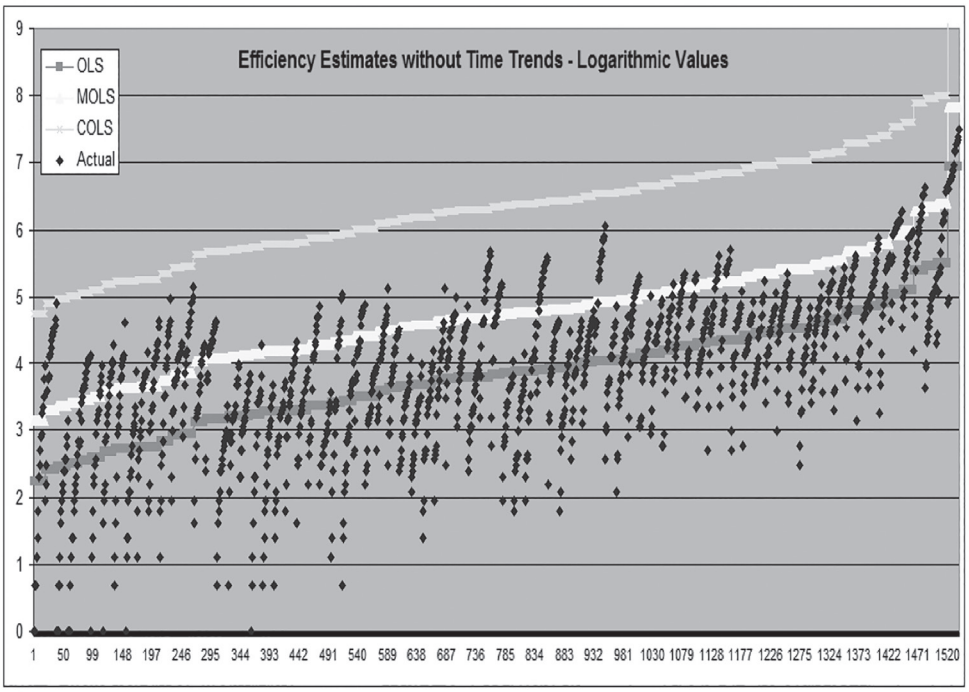
The average efficiency without time trends appears to be 82.5%, only to rise to 85.4% with time trends included, which might seem like a subtle difference but the individual variations in efficiency is concealed by the averages. A deeper look into graph 5 reveals that the lack of trend effects under-estimates the efficiency of the earlier years (51.4% vs. 66.7% for 2000) while over estimating the latter years (101.8% vs. 88%). Please see Appendix, Table 12 for a comparison of regression analyses with and without time effects.

### 3.4.2 Efficiency with Time Trends

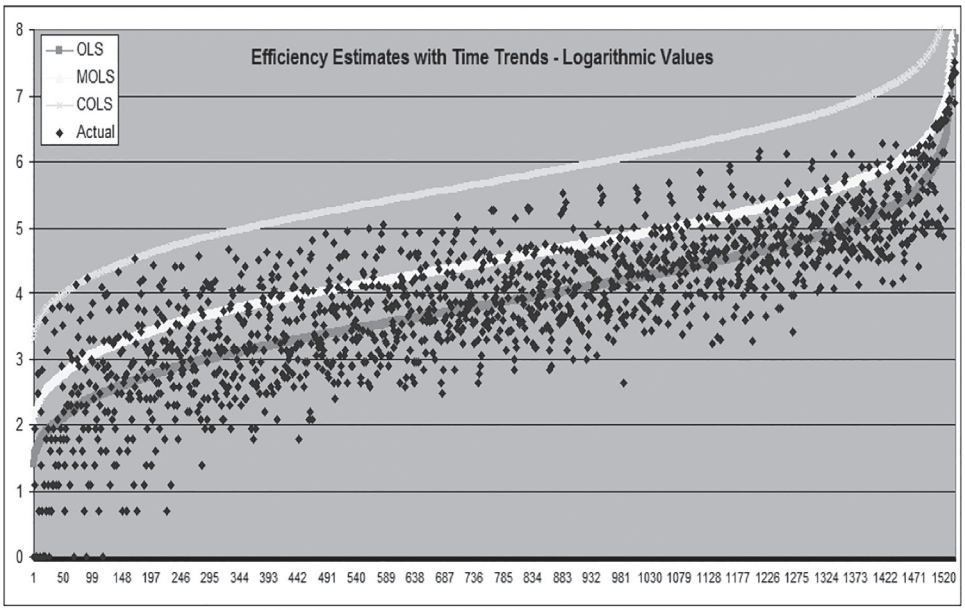
The inclusion of time variable in the panel data has a drastic impact in the analysis, as clearly seen from the graph 3 and 4, increasing the explanatory power ($R^2$) of the model from 0.45 (see Appendix, Table 12) to aforementioned 0.69. This is important not only to better explain the changes over time but also to be able measure the efficiency correctly as it would be fallacious to expect the same number of students from a certain location every year, which depends on the time frame and the trend effects.

We measure an overall increase in the efficiency levels from 67% in 2000 to 88% in 2018 (see graph 5) or from 2000-2004 average of 76.5% to 2015-2018 average of 85.4% (see graph 6). This implies a better composition of students, or one that better fits with the model estimates. This is at least partially expected; as the university's recognition improves, it starts to reach so called uncharted territories and attract a more balanced mix of students.

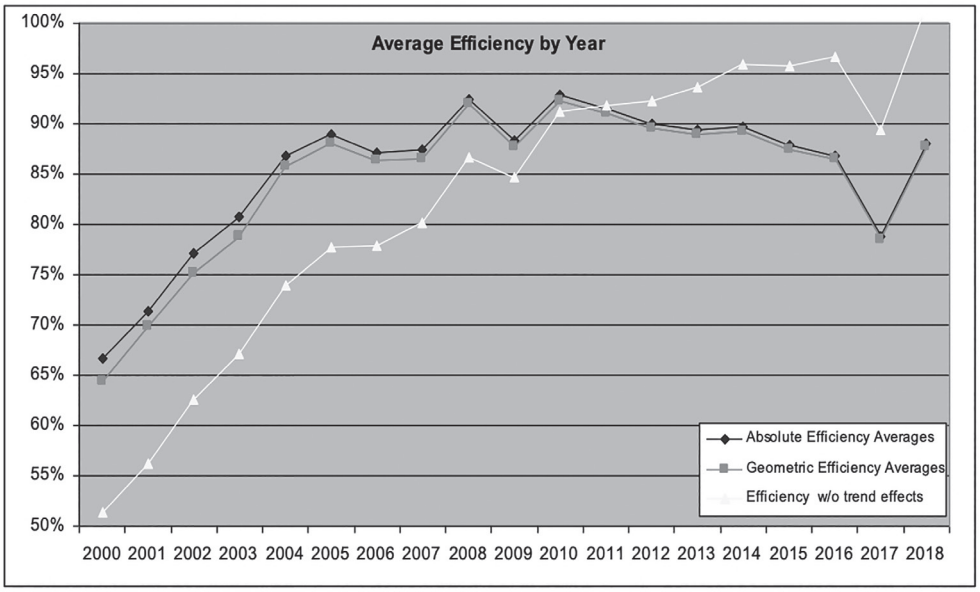
**Graph 3: Efficiency Estimates without Time Trends – Logarithmic Values**



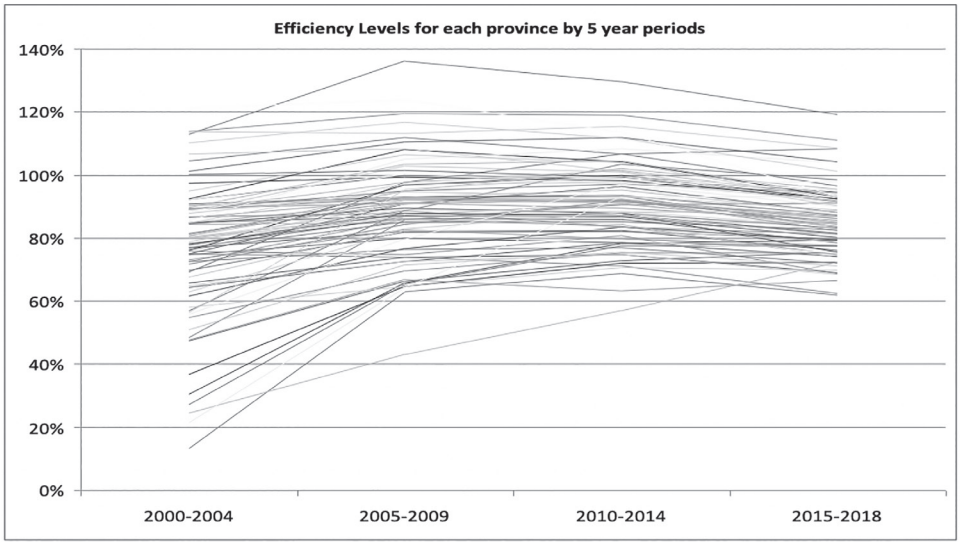
**Graph 4: Efficiency Estimates with Time Trends – Logarithmic Values**




**Graph 5: Average Logarithmic Efficiency Levels by year**



**Graph 6: Efficiency Levels for each province by 5 year periods**




* There are too many provinces to list on graph 6 above, which only intends to give the reader an idea about the range of efficiency trends over 5 year periods..

### 3.5 Efficiency Analysis with Respect to Student Composition

Table 8 lists the top 10 provinces measured in MOLS, ranked by 2015-2018 averages, accompanied with their geographical zones. The overwhelming majority of these locations are from Eastern Anatolia. Graph 7 also illustrates the efficiency levels with color coding where darker provinces are more efficient. It should be noted that higher efficiency does not necessarily imply higher number of students but rather higher than expected number of students, given the independent variables. Therefore, we see a relatively high demand from a) Eastern Anatolia starting from Ardahan all the way to Yozgat, b) Black Sea, starting from Giresun up to Kastamonu, c) Nearby provinces, especially the Aegean. The common characteristics of these places are that they are either nearby and/or coastal provinces or they have a harsh climate with relatively lower (perceived) development level.

Table 9 lists the bottom 10 provinces in MOLS, ranked by 2015-2018 averages, accompanied with their geographical zones. Even though the table appears diverse in terms of origin, a closer look at graph 7 reveals a rather different picture. A fairly contiguous area containing most of Central Anatolia, East of Aegean, Mediterranean, and Southeastern Anatolia send fewer students than expected. The common characteristics of these regions are that they are highly conservative and mostly landlocked provinces with the exception of Mediterranean provinces. The existence of Ankara, Konya, Adana, and Antalya most likely plays a significant role to attract students away from Çanakkale.

**Table 8: Locations with the Highest Efficiency Levels**

| | Province | 2000-2004 | 2005-2009 | 2010-2014 | 2015-2018 | Region |
|---|---|---|---|---|---|---|
| 1 | Ardahan | 113.1% | 136.3% | 129.6% | 119.3% | Eastern Anatolia |
| 2 | Kars | 113.7% | 119.5% | 118.9% | 110.9% | Eastern Anatolia |
| 3 | Manisa | 113.9% | 113.4% | 115.4% | 108.6% | Aegean |
| 4 | Ağrı | 69.3% | 97.7% | 106.8% | 108.3% | Eastern Anatolia |
| 5 | Erzurum | 101.2% | 110.6% | 111.9% | 104.3% | Eastern Anatolia |
| 6 | Muş | 85.6% | 105.2% | 108.2% | 104.1% | Eastern Anatolia |
| 7 | Sivas | 110.3% | 116.7% | 111.7% | 101.3% | Central Anatolia |
| 8 | Bitlis | 57.2% | 88.8% | 103.5% | 98.6% | Eastern Anatolia |
| 9 | Van | 55.9% | 79.7% | 97.2% | 97.9% | Eastern Anatolia |
| 10 | Erzincan | 104.5% | 111.9% | 106.8% | 96.7% | Eastern Anatolia |

**Table 9: Locations with the Lowest Efficiency Levels**

| | Province | 2000-2004 | 2005-2009 | 2010-2014 | 2015-2018 | Region |
|---|---|---|---|---|---|---|
| 72 | Aksaray | 36.8% | 64.6% | 72.0% | 72.3% | Central Anatolia |
| 73 | Kırıkkale | 72.5% | 76.4% | 76.8% | 72.0% | Central Anatolia |
| 74 | Yalova | 51.1% | 71.5% | 75.5% | 71.3% | Marmara |
| 75 | Osmaniye | 58.2% | 64.7% | 70.8% | 69.7% | Mediterranean |
| 76 | Bolu | 65.8% | 74.0% | 74.8% | 69.1% | Black Sea |
| 77 | Isparta | 75.9% | 74.8% | 80.8% | 68.9% | Mediterranean |
| 78 | Uşak | 64.8% | 72.7% | 74.7% | 68.6% | Aegean |
| 79 | Karaman | 47.8% | 66.8% | 63.4% | 66.7% | Central Anatolia |
| 80 | Burdr | 75.0% | 74.0% | 71.1% | 62.4% | Mediterranean |
| 81 | Hakkari | 13.5% | 62.9% | 68.7% | 62.0% | Eastern Anatolia |

**Graph 7: Efficiency Averages, Color-Coded by Province**


* Darker colors imply higher efficiency.

# 4. CONCLUSION & DISCUSSION

## 4.1 Concluding Remarks and Limitations of the Study

Distances to both the university city and other major cities, (which were depicted as İstanbul and İzmir in the study) appear statistically significant, robust and mathematically substantial for both genders, accounting for about 70% of the variation in the regression analysis. Distances can also be viewed as direct or indirect proxies for job opportunities, cultural proximity, networking, word of mouth, travelling opportunities etc. in one's decision making process. While distance to university city is the most important distance factor as expected, distance to other major cities also matter often proportional with their sizes and overall attraction level.

The use of a panel data set, thanks to the time dimension, has revealed positive trend effects. Additional analysis on 19 separate cross sectional data sets suggests that in fact the impact of distances have ever been increasing from 2000 to 2018, masquerading as trend effects. While the impact of distance to university city shows no signs of increasing, the impact of distances to major cities, namely İstanbul and İzmir in the study, have been consistently increasing. This is an incredibly crucial point providing evidence for increasing student diversion from state universities to other cities, especially with the establishment of many new universities in the 2000-2018 time frame, which needs to be further investigated.

Not all students are influenced the same way, however. Female students are much less sensitive to distances or time trends. In other words, female students appear to be much more likely than their male peers to get away from their immediate communities and have a comparatively higher predisposition to move farther. While distance has a similar effect overall on both genders and the impact of distances increases for both genders, females are also more resistant to trend effects. It seems like female students are more prone to gain their freedom away from home, possibly from cultural norms and social expectations.

Efficiency analysis suggests that there are certain patterns regarding the student origins arriving at ÇOMÜ. Regions that send more than expected number of students include neighboring provinces which are physically and culturally closer, the Black Sea Region, also located along the coast line, and Eastern Anatolia, where people are more likely to embrace a more liberal and potentially more prosperous community. More conservative Central Anatolian provinces, on the other hand, send far fewer students than predicted. The existence of cultural barriers or major hubs around the region such as Ankara, Konya, Antalya and Adana might be contributing factors, which needs to be further investigated, possibly with survey techniques and conjoint analysis.

One outstanding result of the study is the increasing efficiency of the student composition over time from 67% in 2000 to 88% in 2018, which implies a more balanced and consistent

combination of students. This is partially expected since the student mix will be gradually balanced over time as the recognition and popularity of the university increases. However, capacity gains might also have contributed to this result as students from a more diverse and larger pool will have a chance to attend university, which needs to be further investigated. It should be noted that the lack of the time dimension to capture of the trend effects exaggerates the efficiency gains, rendering panel data crucial for such analysis.

## 4.2. Discussion and Policy Implications

First of all, we have found out the efficiency level of student composition has been increasing, which is a welcome development, even if it is partially expected as the recognition of the university increases. Whether capacity gains have contributed to this and whether this is a welcome change is yet to be investigated. This is particularly tied to rapidly expanding number of universities, opening the college education to unprecedented numbers of high school graduates.

A few interesting points are raised in this study. Distances are confirmed to be major contributing factors to the student mix, at an increasing rate, which is a crucial finding, providing strong evidence for student diversion from state universities to major cities thanks to the establishment of many new and especially private universities.

The study provides strong evidence for a tight connection between Çanakkale and the Black Sea Region, and possibly between the coastal regions, which begs for a further survey based investigation on the issue and subsequent socioeconomic policies. Similar questions can be raised for the Eastern Belt from Ardahan to Yozgat; are they simply rushing towards the West for cultural and economic reasons, or is there a more complicated answer to this phenomenon?

Central Anatolia, on the other side of the coin, relatively more prosperous than the East and surrounded by culturally and geographically closer to major hubs such as Ankara, Adana and Antalya, has fewer incentives to rush to the West for immigration. The lack interest in those provinces, which may rise due to the differences in cultural norms, requires further investigation to yield a better understanding of the student composition. Even more interestingly, the trend has been increasingly apparent in recent years.

Finally, gender differences regarding distances persist over the years and at an increasing rate. Females are less likely to be affected by increasing distances, which results in higher relative diversity among females than males both in socioeconomic and geographical terms. Persistent government policies favoring female students' education seems to have only widened the education and diversity gap between genders. Given the already achieved 50% parity in education, it would be socially more beneficial to focus on genuinely equal opportunities for both genders.

# MESAFENİN DEVLET ÜNİVERSİTELERİ KAYITLARI ÜZERİNDEKİ ETKİSİ: PANEL VERİ ANALİZİ

## 1. GİRİŞ

2000-2018 yılları arasında, Türkiye'deki toplam üniversite sayısı 90'dan 211'e çıkarken özel üniversite sayısı da 22'den 80'e yükselerek %38 gibi görülmemiş bir orana ulaşmıştır. Her ne kadar özel yüksek eğitim kurumu sayısı hızla artmış olsa da, devlet okullarının hala ağırlıklarını korudukları görülmektedir. 2018'de kayıtlı yaklaşık 3.8 milyon öğrencinin % 84.2'sinin, 2000 yılındaki %96.7 oranına göre azalmış olsa da, hala devlet okullarında okudukları görülmektedir (Yükseköğretim Bilgi Yönetim Sistemi, 2020). Dolayısıyla özellikle büyük devlet üniversitelerinde okuyan öğrenci kitleleri ve kökenlerinin iyi anlaşılıp analiz edilmesi, resmin tamamının görülmesi açısından büyük önem arz etmektedir.

Kaynaklar ve zaman kısıtlı olduğunda yapılması gereken, hem Türkiye'nin dört bir yanından hem de yurt dışından öğrenci çekme potansiyeli olan büyük bir devlet üniversitenin değerlendirilmesidir. Neyseki Çanakkale Onsekiz Mart Üniversitesi (ÇOMÜ)'nün kamuya açık ve öğrencilerin kökenleri hakkında bilgiler veren istatistikleri mevcuttur. Bu bilgiler, ülkenin farklı bölgeleri arasındaki bağlantılar hakkında önemli bilgiler almamızı ve farklı sorular sorabilmemizi mümkün kılmaktadır.

2018 itibariyle ÇOMÜ'ye kayıtlı öğrencileri konu alan önceki çalışmamızdaki (Bekaroğlu, 2019) üç temel amacımız şunlardı: a) herhangi bir kökenden, mesafeye bağlı olarak, bir devlet üniversitesine yönelik öğrenci mobilitesiyle ilgili doğrudan bağlantıları bulmak, b) cinsler arasındaki potansiyel farklılıkları ve sonuçlarını değerlendirmek, c) belli bir kökenden beklenen sayıda öğrenci gelip gelmediğini araştırmak. 2000-2018 yılları arası panel veri seti ile genişlettiğimiz bu makalemizde, zaman değişkenini de modele katarak hem sonuçların sağlamlığını hem de trend etkilerini öçmeyi amaçlamaktayız.

## 2. LİTERATÜR

Üniversite seçim sürecine dair ilk kapsamlı çalışma, Lewis and Morrison'ın 1975'te geliştirdiği çalışması (Beswick'in 1989) iken üniversite tercihlerini sistematik olarak ilk ele alan, üç aşamalı modeliyle Chapman (1981) olmuştur. Türkiye'de bu konudaki en kapsamlı çalışma ise, geniş bir literatür taraması da içeren Cati ve arkadaşları (2016)'na ait bir alan çalışmasıdır. Üniversite tercihlerini etkileyen pek çok faktör ve bunları inceleyen çok sayıda çalışma mevcuttur (örneğin Kallio, 1995; Moogan ve arkadaşları, 1999; Soutar & Turner, 2002; Akar, 2012). Bu faktörler arasında, kurumun ünlülük derecesi, finansal yardım (burs/kredi vs.) seviyesi ve maliyetler, akademik atmosfer, barınma seçenekleri, mevki ve uzaklık, açık alanlar, iş fırsatları, kampüs hayatı ve sosyal fırsatlar sayılabilir (Cati ve arkadaşları, 2016).

Hooley & Lynch (1981), İngiltere'de üniversite tercihini etkileyen 6 temel faktör sayar: uygun alanların oluşu, mevki, üniversitenin tipi ve ünü, evden uzaklığı ve eş-dost tavsiyeleri. Baird (1967) ile Bowers & Pugh (1972) yüksek akademik standartları en önemli öğrenci tercihi olarak belirtirken, Amca (2011), Türkiye'deki en önemli faktörleri, mezuniyet sonrası iş olanakları, mezuniyet başarı oranı, okul maliyetleri, üniversite şehrinin maliyeti, coğrafi konum ve sosyal hayat kalitesi olarak sıralar.

Gibbons ve arkadaşları (2002), Tatar & Oktay (2006), Dunnett ve arkadaşları (2012), Kurt (2013), and Erol ve arkadaşları (2013) gibi birçok yazar, üniversite şehrine olan mesafeyi, tutarlı bir şekilde en önemli faktörlerden birisi olarak anarken Çiftçi ve arkadaşları (2011) üniversitenin şehir merkezine uzaklığına da değinir. Çokgezen (2012), Amca (2011), ve Kurt (2013) gibi diğer yazarlar, bir yandan Türk ve yabancı öğrencilerin üniversite tercihleri arasında pek bir fark bulamazken, diğer yandan üniversitenin, İstanbul, Ankara gibi büyük bir şehir ve iş merkezi etrafı ya da yakınında olmasına vurgu yaparlar.

Filter (2010) doktora tezinde, cinsler arasında üniversite tercihleri konusunda bir fark bulamazken, Shank ve arkadaşları (1998) ile Dunnett ve arakadaşları (2012) cinsler arası, ciddi farklılıklar olduğu ve erkeklere kıyasla, kız öğrencilerin, evlerine daha yakın ve/veya daha gelişmiş ve büyük şehirlere yakın üniversiteleri tercih ettiklerini belirtirler. Cullen ve arkadaşları (2016) da, sadece kız öğrencilerin tercihlerini ele aldıkları çalışmalarında, erkeklerden farklı olarak, akademik program kalite ve çeşitliliğinin ön plana çıktığını vurgular.

Daha yakın tarihlerde yapılan iki çalışmadan, Gulluce ve arkadaşları (2016), fakülte çapında gerçekleştirdikleri ve prestij, fırsat, kampüs, bilgi, mevki ve ekonomiden oluşan altı boyutlu bir anket ile farklı nüfus kesimlerine göre değişiklik gösteren sonuçlar alırken Ilgan ve arkadaşlarının (2018), yeni gelen üniversite öğrencileriyle, üniversitenin popülaritesi, konumu ve tesislerinin yanısıra cinsiyet, sosyoiktisadi altyapı ve üniversite sınav sonuçları da içerecek benzer bir çalışmaya imza attıkları görülmektedir.

Son olarak, 2018 yılında mevcut kayıtlı öğrencilere dair yatay kesit verisi kullanan bir önceki çalışmamız (Bekaroğlu, 2019), mesafelerin öğrenci tercihleri üzerindeki etkisini ele alarak, a) üniversite şehrinin yanısıra diğer büyük şehirlere olan mesafelerin öğrenci tercihlerinin 2/3'ünü açıklayabildiğini, b) öğrenci tercihleri ve tepkileri konusunda cinsiyetler arasında ciddi farklar olduğunu, c) denize kıyısı olmayan ve görece muhafazakar iller ÇOMÜ'yü daha az tercih ederken, görece yakın illerin, Karadeniz ve Doğu illerinin beklenenin üzerinde tercih ediliğini ortaya koymuştur.

## 3. METODOLOJİ VE VERİ

Analizimiz 3 aşamadan oluşmaktadır. Öncelikle eldeki veriler tümleşik halde, log-linear OLS regresyon modeliyle analiz edilmiş; daha sonra veriler, cinsiyetlere göre ayrılarak aynı

prosedür cinsiyet spesifik verilere uygulanmıştır (zira Shank & Beasley (1998)'nin de gösterdiği gibi, cinsler arasında ciddi farklılıklar kaçınılmazdır. Son olarak, ÇOMÜ'yü tercih eden öğrenci kitlesinin, kökenlerine göre etkin bir dağılım gösterip göstermediklerini analiz etmek için, parametrik etkinlik analiz yöntemlerinden birisi olan, regresyon tabanlı MOLS (Modified OLS) tekniği uygulanmış ve bir diğer benzer teknik olan COLS (Corrected OLS) ile kıyaslanmıştır.

Bir önceki çalışmamızda (Bekaroğlu, 2019), kullandığımız Veri Zarflama Analizi (Data Envelopment Analysis, DEA) de, MOLS'a çok yakın sonuçlar verdiği için uygulama gereği duyulmamıştır. Her ne kadar rastsallığa yer vermesede bu yötemler, belirsizliğin az olduğu durumlarda, rastsallığa izin veren bir diğer resresyon tabanlı etkinlik analizi olan SFA (Stochastic Frontier Analysis) kadar iyi sonuçlar üretebilmektedir (Aigner et al., 1977; Meeusen & Van den Broeck, 1977), özellikle de panel veri kullanıldığında (Varabyova & Schreyögg, 2013).

Çalışmada kullanılan veriler,

a) ÇOMÜ'ye kayıt yılı (trend etkilerinin analizi için)

b) Üniversite şehrine (Çanakkale) olan mesafe

c) Büyük şehirlere (İstanbul ve İzmir) olan mesafe

d) Üniversite sınavında başarılı öğrenci sayısı (kontrol değişkeni)

e) Bölgelere has kukla değişkenler (sadece Karadeniz kuklası kullanıldı)

Kullanılan veriler üç ayrı kaynaktan elde edildi. ÇOMÜ'ye dair veriler, ÇOMÜ öğrenci işleri dairesinin Kurumsal Değerlendirme Sistemi arşivlerinden resmi izin ile elde edilirken, başarılı öğrenci sayıları, YÖK Bilgi Sisteminden, iller arası mesafeler ise Karayolları Genel Müdürlüğü'nden elde edilmiştir.

## 4. BULGULAR VE SONUÇ

Hem üniversite şehrine (Çanakkale) hem de büyük şehirlere (İstanbul ve İzmir) olan mesafelerin, her iki cins için de istatistiki açıdan önemli olduğu ve regresyon analizindeki varyasyonun yaklaşık % 70'ini açıklayabildiği görülmektedir. Buradaki mesafeler, üniversite tercihleri yapan öğrenciler için iş fırsatları, kültürel yakınlık, iş bağlantıları, seyahat imkanları, söylentiye dayalı bilgi gibi değişkenlerle alakalı temsil değişken (proxy) olarak da görülebilir.

Analizde panel veri kullanımı pozitif trend etkilerini ortaya koymaktadır. 19 yıllık ilave yatay kesit analizleri de, mesafelerin etkisinin gittikçe arttığını, bir nevi trend etkisi şeklinde giz-

lendiğini ortaya koymaktadır. Üniversite şehrine olan mesafenin etkisi değişmiyorken, büyük şehirlerin etkisi gittikçe artmakta ve muhtemelen de bu şehirlerde (İstanbul ve İzmir gibi) açılan yeni üniversiteler, öğrencileri devlet üniversitelerinden caydırmaktadır.

Tüm öğrencilerin aynı şekilde etkilenmediği, kız ve erkekler arasında ciddi farklılıklar olduğu görülmektedir. Mesafeler, her iki cinsi de ters orantılı olarak etkiliyor olsa da, kız öğrenciler, beklenilenin tersine mesafeler ve trend etkilerinden erkeklere göre çok daha az etkilenmektedirler. Diğer bir deyişle mesafeler arttıkça, kız öğrencilerin uzak şehirlere gitme ihtimali, erkeklere göre daha az düşmektedir.

Buradaki en önemli politika çıkarımı, kız öğrencileri üniversitelere yönlendirmeyi amaçlayan devlet politikaları yerine gerçekten eşitlikçi ve kız-erkek ayırımı yapmayan devlet politikalarına odaklanılmasıdır, zira üniversitelerde fırsat eşitliğine çoktan ulaşıldığı görülmektedir. Diğer yandan trend etkilerinin kız öğrencileri daha az etkilemesinin sebebi, özellikle erkeklerin ağırlıklı olarak tercih ettiği ikinci öğretim bölümleri ve teknik meslek yüksek okullarının açılması olabilir.

Çanakkale'ye beklenilenin üstünde öğrenci gönderen yerler, coğrafi ve kültürel olarak yakın olan illerin yanı sıra, Karadeniz Bölgesi, denize kıyısı olan iller ve daha liberal bir kültürü kucaklama potansiyeli yüksek Doğu illeri sayılabilir. Diğer yandan daha muhafazakar İç Anadolu ve etrafı beklenilenin çok altında öğrenci göndermektedir. Tabi burada Ankara ve Konya'nın çekim gücünün etkisi olabilir.

Öğrenci kompoziyonu etkinliğinin 2000'de % 67'den 2018'de % 88'e çıktığı görülmektedir ki bu, daha dengeli ve tutarlı bir öğrenci yapısı anlamına gelmektedir. Bu sonuç, üniversitenin bilinirliği ve popülaritesi arttıkça kısmen beklense de, üniversite kapasite ve öğrenci sayılarının da bunda rol oynadığı düşünülebilir. Analizde bulduğunuz diğer bulgu da, trend etkilerinin hesaba katılmamasının etkinlik kazançlarını abarttığını, dolayısıyla panel veri analizinin büyük önem taşıdığını göstermektedir.

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|---|---|---|
| Fikir veya Kavram / *Idea or Notion* | Araştırma hipotezini veya fikrini oluşturmak / *Form the research hypothesis or idea* | Can BEKAROĞLU |
| Tasarim / *Design* | Yöntemi, ölçeği ve deseni tasarlamak / *Designing method, scale and pattern* | Can BEKAROĞLU |
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