



TÜRKİYE'DE BOŞANMA ORANLARINI ETKİLEYEN FAKTÖRLERİN BETA REGRESYON MODELİ İLE BELİRLENMESİ

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ÖZ

Aile, yaşamda ve toplumda vazgeçilmez bir yere sahip olan en küçük sosyal kurumdur. Aile kurumunun tüm dünyada evrensel olduğuna inanılır. Aile birlik ve bütünlüğünün bozulması, bu kurumun dağılması boşanma olarak adlandırılır. Türkiye'de boşanma oranları gelişmiş batı ülkeleri ile karşılaştırıldığında çok ciddi bir sorun olarak görülmemektedir. Fakat son yıllarda artan boşanma oranları, boşanmanın toplumsal bir sorun olarak tanımlanmasını ve çok boyutlu olarak analiz edilerek buna yönelik politikaların geliştirilmesini gerekli kılmaktadır. Boşanmayı etkileyen birçok faktör vardır. Bu çalışmanın amacı boşanmayı etkileyen faktörlerin belirlenmesinde boşanma oranı ile işsizlik oranı, kaba doğum hızı, kaba evlilik hızı, nüfus artış hızı, gayri safi milli hâsıla, okuma yazma bilmeyenlerin sayısı, yüksek eğitilmiş bireylerin sayısı gibi açıklayıcı değişkenlerin Beta regresyon yöntemine göre modellenmesidir. Çalışmada 2017 yılına ait Türkiye İstatistik Kurumu (TÜİK)'den elde edilen veriler kullanılmıştır. Beta regresyon modelinde bilgi kriterlerinden yararlanılarak uygun link fonksiyonu seçilmiştir. Seçilen probit link fonksiyonu ile Beta regresyon yöntemi kullanılarak parametreler tahmin edilmiştir. Sonuçlar incelendiğinde, kaba evlenme hızı, nüfus artış hızı ve yüksek eğitilmiş bireylerin sayısının boşanma üzerine pozitif bir etkisi, kaba doğum hızı ve okuma yazma bilmeyenlerin sayısının negatif bir etkisi olduğu gözlemlenmiştir.

Anahtar Kelimeler: Boşanma Oranı, Beta Regresyon Modeli, Bilgi Kriteri, TÜİK

DETERMINING THE FACTORS AFFECTING DIVORCE RATES IN TURKEY WITH BETA REGRESSION MODEL

ABSTRACT

Family is the smallest social institution with an indispensable place in life and society. The family institution is believed to be universal all over the world. Divorce is defined as the dissolution of the family. The divorce rate in Turkey is not seen as a serious problem as in the Western countries. However, increasing divorce rates in recent years shows the importance of multi-dimensional analyses and new political developments on divorce. There are many factors that affect the divorce. In this study, the factors affecting divorce that are related with divorce rate, unemployment rate, crude birth rate, crude growth rate, population growth rate, gross domestic product, population were analyzed with beta regression model. The data that used in this study were obtained from Turkish Statistical Institute (TUIK) for the year of 2017. In the beta regression model, the appropriate link function was chosen by using the information criteria. The parameters were estimated by Beta regression method using the selected probit link function. When the results were examined, it was observed that the rate of rough marriage, population growth rate and the number of highly educated individuals had a positive effect on divorce, but the rough birth rate and the number of illiterate people had a negative effect.

Keywords: Divorce Rate, Beta Regression Model, Information Criteria, TÜİK.

1. Introduction

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One of the main problems of the modern age is the change in the family, especially the marital relations. Divorce, which is the end point of a certain process that develops over time, and is also a social problem encountered in all countries of the world causes disintegration of family unity and emerge of individualism. Divorce is as old as the conjugal community. The right to divorce is restricted by certain laws and traditions but never removed in societies that accepted marriage as a conjugal community. When the results of the divorce are examined in terms of women and men, the social, cultural and institutional arrangements of the country bring significant differences in both the labor market and their positions (Kalmijn, 2004). The reason behind the sharp increase in divorces can be urbanization, the economic independence of women in active business life, the erosion of traditions, the more individualistic and liberties of people. As a result of these developments and changes, the rise of divorce events has become interesting situation among researchers. The divorcement is organized in different periods with changing rules in every society. The Turkish Civil Code gives equal rights to women and men in divorcement cases. The economic and developmental levels, cultural and traditional structures of countries are the main determinants of divorce. The number of studies on the cause of divorce is increased due to the changes in social. There are many studies about divorcement in literature. Wagner and Weiß (2006) found a positive relationship between pre-marital co-existence and risk of divorce in Europe. Smith, Maas and Tubergen, (2012), underlined that couples with culturally diverse ethnic origins had a higher risk of divorce. Liyun et al. (2018) used spatial statistics to analyze social causes affecting the spatial distribution of divorce rates in various provinces of China. They concluded that the social impact, particularly the third-level industrial share of GDP, had a significant impact on the divorce rate, that family cohesion had a significant negative impact on the divorce rate and that ethnic traditions had a significant impact on the divorce rate. Odah et.al. (2018) used a two-stage prediction model (Heckman) to identify the variables affecting the divorce rates of families in Iraq. Başkaya and Unal (2017), revealed the spatial of divorce rates in Turkey. Pamukcu et al. (2014) modelled the divorce rates in Turkey, between the years 2001-2009, with Generalized Poisson, Quasi-Poisson and Negative Binomial Regression. They found that Negative Binomial Regression was appropriate for their divorcement data. Doğan (2016) developed an attitude scale in his study in order to investigate the factors affecting divorce. In the study, descriptive factor analysis was applied to the data and the results were collected under 4 factors. This factor has been named as conformist, religious, anti-violence and media influence. Yıldırım (2004) concluded that there is an inverse relationship between divorce and education. Kiral (2018) estimated the rough divorce rates using the Markov chain model. Markov models were created for the divorce rates of 27 European Union countries. Aw and Cabral (2019) used the spatial Durbin model to determine spatial spillovers of divorce in Senegal. According to the results, the rate of illiteracy and the average age at marriage affected the rate of divorce in Senegal. Sohail et al. (2018) showed the reasons for divorce by using 3 different machine learning algorithms. In this study, factors affecting divorce rates in Turkey are modeled with beta regression method and data from TUIK were used. In the beta regression model, the appropriate link function was selected by using the information criteria and the parameters were estimated by using the model. The article is organized as follows.

In section 2, the Beta Regression model is defined. In section 3, beta regression model applied to divorce rate. Finally, the results are summarized and discussed.

2. Material and Method

2.1. Beta Regression Model

Beta distribution that is in the range of (0,1) is a flexible distribution that commonly used to model random variables which have ratio and percentage values. Ferrari and Cribari-Neto (2004) described the beta regression model when the dependent variable was distributed as beta. The beta density is given by

$$f(y; p, q) = \frac{\Gamma(p+q)}{\Gamma(p)\Gamma(q)} y^{p-1} (1-y)^{q-1}, \quad 0 < y < 1 \quad (1)$$

Where $\Gamma(\cdot)$ is the gamma function, $p, q > 0$.

Ferrari and Cribari-Neto (2004) proposed a different parameterization with $\mu = \frac{p}{p+q}$ and $\phi = p + q$:

$$f(y; \mu, \phi) = \frac{\Gamma(\phi)}{\Gamma(\mu\phi)\Gamma((1-\mu)\phi)} y^{\mu\phi-1} (1-y)^{(1-\mu)\phi-1} \quad (2)$$

$0 < y < 1$, $0 < \mu < 1$ and $\phi > 0$, $y \sim B(\mu, \phi)$ and $E(y) = \mu$, $\text{Var}(y) = \mu(1-\mu)/(1+\phi)$

μ is the mean of the response variable and ϕ can be interpreted as a dispersion parameter, for fixed μ .

Let y_1, y_2, \dots, y_n be independent random variables each $y_t \sim B(\mu_t, \phi_t)$, $t = 1, \dots, n$

$$g(\mu_t) = \sum_{i=1}^k x_{ti} \beta_i \quad (3)$$

where $\beta = (\beta_1, \beta_2, \dots, \beta_k)^T$ represent unknown regression parameters. $x = (x_{t1}, x_{t2}, \dots, x_{tk})$ denotes fixed covariates. $g(\cdot)$ shows the link function which strictly monotonic and twice differentiable. It is possible to choose link functions between several functional forms such as logit, probit, complimentary log-log etc. (McCullough, and Nelder, 1989).

2.2. Information Criteria

There are many information criteria used in the selection of statistical models. In this study, we used the most popular information criteria. Akaike's Information Criteria (AIC) was developed by Akaike (1974) and by Bayesian Information Criteria (BIC) Schwarz (1978). The best performed model is selected as a fit model when the it has the minimum information criteria among all the other.

$$\text{AIC} = -2\ln L + 2d$$

$$BIC = -2\ln L + d\ln n$$

Here, L is the value of the likelihood, d is the total number of parameters and n is the sample size.

3. Application

In this study, level-2 data were used for 26 regions for the year 2017. All data are compiled from “<http://tuik.gov.tr/PreTabloArama.do?metod=search&araType=vt>”. The features of the variables are given in Table 1. R software's 3.5.2 version was used to analyze the data. Factors affecting divorce rates were determined by using “betareg” package in R software.

Table 1. Description of the variables

Variable	Description
y (response variable)	Divorce rate (%)
x_1	Unemployment rate (% of GDP)
x_2	Crude birth rate (%)
x_3	Crude marriage rate (%)
x_4	Population growth rate (%)
x_5	Gross domestic product (GDP-per capita)
x_6	The number of illiteracy
x_7	Number of higher education population

Table 1 shows the description of the response variable and explanatory variables. The explanatory variables were chosen among several indicators that may have potential influence on the divorce rates.

Selection of appropriate link function in the beta regression model can greatly improve the model fit (Dunder et. al. 2015; Aktaş and Unlu, 2017).

The information criteria (AIC and BIC) for different link function in beta regression model are shown in Table 2.

Table 2. Information criteria for different link function in beta regression model

Link function	AIC	BIC
Logit	-116.025	-104.702
Probit	-116.028	-104.705

cloglog	-115.762	-104.439
Cauchit	-104.526	-93.203
Loglog	-115.459	-104.137
Log	-115.370	-104.048

Probit was the link function that gives the smallest information criteria are given Table 2.

Table 3. Coefficients for the Beta regression model

Coefficient	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-2.07E+03	4.02E+02	-5.147	2.65E-07***
x1	-2.04E+00	6.76E+00	-0.301	0.7634
x2	-5.68E+01	9.39E+00	-6.048	1.47E-09***
x3	2.63E+02	5.69E+01	4.626	3.73E-06***
x4	9.35E+00	4.36E+00	2.144	0.032*
x5	5.42E-04	5.73E-03	0.095	9.25E-01
x6	-2.19E-03	9.70E-04	-2.260	2.38E-02*
x7	1.36E-04	8.11E-05	1.677	0.0445 *

Table 3 shows the coefficients of Beta regression model where the link function is selected as probit. According to the beta regression model; crude birth rate, crude marriage rate, population growth rate, the number of illiteracy and number of higher education population significant effect on divorce rates.

4. Conclusion and Discussion

The divorce rate in Turkey is not seen as a serious problem as in the Western countries. However, increasing divorce rates in recent years shows the importance of multi-dimensional analyses and new political developments on divorce. In this study, the factors affecting divorce that are related with divorce rate, unemployment rate, crude birth rate, crude growth rate, population growth rate, gross domestic product, population were analyzed with beta regression model.

The obtained results revealed that crude birth rate, crude marriage rate, population growth rate and education are significantly related with divorce rates. Based on the beta regression coefficients, we conclude that the increment of crude marriage rate, population growth rate and number of higher education population have a positive influence on the divorce. Besides that, crude birth rate and the number of illiteracy have a negative influence on the divorce.

When the results were examined, a decrease in the rate of divorce is observed if the birth rate in the country is increased. According to this result, it may be concluded that it is relatively difficult to take divorce decision for individuals who want to have children or who have children. It is also seen that as the number of illiterate people increases, the rate of divorce decreases. The number of illiterate people in rural areas is higher in other regions. Therefore, the low rate of divorce in rural areas can be explained by the higher number of illiterate people and this result is quite compatible with the literature (Yıldırım, 2004). On the other hand increasing of divorce rate is an expected situation when the marriage rate and the rate of population growth is increase. As the number of higher education population increases, the rate of divorce increases. Recently, it is observed that people who have a higher education tend to divorce more than others. Being an educated individual can be seen as a facilitating divorce for both sexes. It was observed that individuals with higher education level exhibited a more positive attitude towards divorce (Uğur, 2014).

In the light of these results, it is seen that the findings obtained for the factors affecting the divorce are quite compatible with the literature.

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