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## **WHAT INFLUENCES ETHNICALLY MIXED MARRIAGES OF ROMANIANS?**

**Abstract.** *This study examines the impact of economic, social and cultural factors on the share of ethnically mixed marriages in the total number of marriages in Romania. Such an analysis is important given that the share of ethnically mixed marriages in the total number of marriages for a majority group represents an integration indicator. The analysis is based on exhaustive anonymized microdata from the 2011 Population and Housing Census, as well as other indicators published by the Romanian National Institute of Statistics, including number of pupils per 1000 inhabitants, number of students per 1000 inhabitants and energy consumption per 1000 inhabitants. Time series from 1950 to 2011 were used. The Johansen co-integration was employed to capture the long run effect of the examined factors on the share of ethnically mixed marriages in the total number of marriages. The results showed a positive effect of the examined factors on the share of mixed marriages. Additionally, the results suggest that the –1989 Romanian Revolution had a significant influence on the evolution of mixed marriages*

**Keywords:** *ethnically mixed marriages, interethnic marriages, marriage, ethnic groups, unit root, cointegration .*

**JEL Classification: J12**

### **1. Introduction**

The share of ethnically mixed marriages (between a person belonging to a minority group and a person belonging to the majority group) in the total number of marriages of the majority group is considered a minority integration indicator (Song, 2009), hence the importance of studying this phenomenon. The evolution of the share of ethnically mixed marriages in total number of marriages is influenced by economic, social and cultural factors. This paper aims to analyse the influence of these factors through several types of variables: two variables regarding educational attainment, one variable capturing economic development and one dummy variable that captures the difference in the social dynamic before and after the 1989 Romanian Revolution. The variables regarding educational attainment

were included in the analysis, because the educational level of a population incorporates all three aspects (Hărăgus, 2014). The educational level of the population will be measured through the number of pupils per 1000 inhabitants, as a measure of universal and compulsory education (as used by Dribe, 2011) and the number of students per 1000 inhabitants (as used by Lehrer and Chiswick, 1993) and (Andrei, Bourbonnais, Oancea and Mirica, 2020). The economic environment, especially in uncertain times, strongly influences the decision to marry (Schellekens and Gliksberg, 2012). One of the most important indicators of economic stability is energy consumption (Hirsh and Koomey, 2015) and this indicator was included in our analysis.

The present study contributes to the existing demographic literature by establishing the effects of economic, social and cultural factors upon ethnically mixed marriages. Moreover, it presents an econometric analysis of long time series using exhaustive data from the 2011 Population and Housing Census in Romania, instead of samples.

## **2. Data and methods**

Data regarding ethnically mixed marriages were obtained from the microdata of the 2011 Population and Housing Census in Romania. These data are anonymized records of persons included within the typical resident population. For each person, data on the marital status, year of marriage, place of residence and ethnicity were recorded. As ethnicity was not mandatory in the census form, we considered only those who voluntarily declared their ethnicity, further referred to as *population*. These data were used in the present study either for data segmentation or for calculating several indicators. For each year of marriage between 1950 and 2011 and for each type of area of residency, we determined the total number of marriages and the number of ethnically mixed marriages for Romanians, who constitute 88.9% of the population. Next, the share of the ethnically mixed marriages by type of area of residency and ethnicity was calculated as the number of ethnically mixed marriages divided by the total number of marriages. Data regarding the other three indicators (number of pupils/1000 inhabitants, number of students/1000 inhabitants and the energy consumption/1000 inhabitants) are official data published by the Romanian National Institute of Statistics (see the Romanian Yearbooks from 1961, 1971, 1975, 1981 1984, 1986, 1993, 1995, 1997 and the Tempo Online Database). We created a dummy variable for time, which was designed to capture the socio-economic changes that occurred after the Romanian Revolution: 1 for the 1950 to 1989 period and 0 for the period after 1989. Moreover, for 1950-2011, a variable regarding the internal rate of changes in residency for persons aged 15 to 19, years, 20 to 24 years and 25 to 29 years was defined using the 2015 edition of the Demographic Yearbook of Romania. We choose these three exogenous variables because young persons in Romania witnessed important changes of residency before and after 1989 (Andrei and Mirica, 2019).

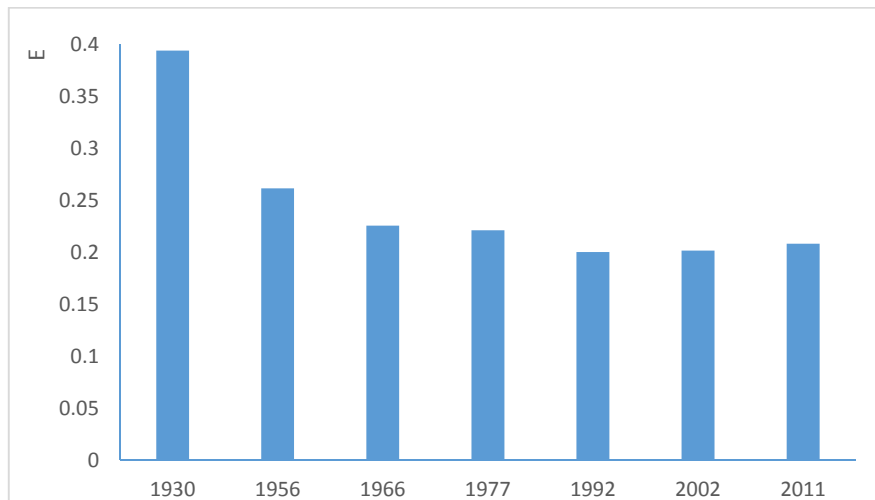
Over time, namely during the 1912-2011 period, the ethnic structure of the Romanian population changed significantly. At the population census of 19 December 1912, for a population of 7,235,000 and an area of 130177 km<sup>2</sup> (the area of Romania), the most important three ethnic groups were Romanians (93.5%), Hungarians (1.0%) and Austrians (0.6%). At the census of 21 February 1956, the country's population included 17,485,285 persons, the area of the country amounted to 237500 km<sup>2</sup>, and the most important three ethnic groups were as follows: Romanians (85.76%), Hungarians (9.08%) and Germans (2.0%). At the last population census, the ethnic structure consisted of Romanians (88.92%), Hungarians (6.50%), Romas (3.29%) and other ethnic groups (1.29%).

Over the 1912-2011 period (2011 was the year when the last census was conducted that allowed an evaluation of the population's structure according to the ethnic group), the degree of ethnic concentration increased. In order to assess the degree of ethnic concentration, the following entropy was calculated:

$$E = -\sum_{i=1}^n y_i \log y_i \quad (1)$$

where  $y_i$  is the share of the ethnic group in the population registered at the census and  $n$  is the number of ethnic groups for which data were recorded at a census.

Figure 1 presents the values of the entropy calculated based on the data belonging to the censuses that were organised during the period concerned.



**Figure 1. The entropy of the distribution of Romania's population by ethnic group at the population censuses of the 1930-2011 period**

Regarding the data series related to the share of ethnically mixed marriages, the number of pupils per 1000 inhabitants, the number of students per 1000 inhabitants and the energy consumption per 1000 inhabitants we assessed

whether or not they were stationary and we analysed the type of non-stationarity. In this respect, the ADF (Dickey and Fuller, 1979) and Phillip-Perron (Phillips and Perron, 1988) tests were used. In order to analyse the co-integration of these variables, we used the Johansen co-integration test (Johansen and Juselius, 1990) to assess the long-term trend for the series with the same integration order.

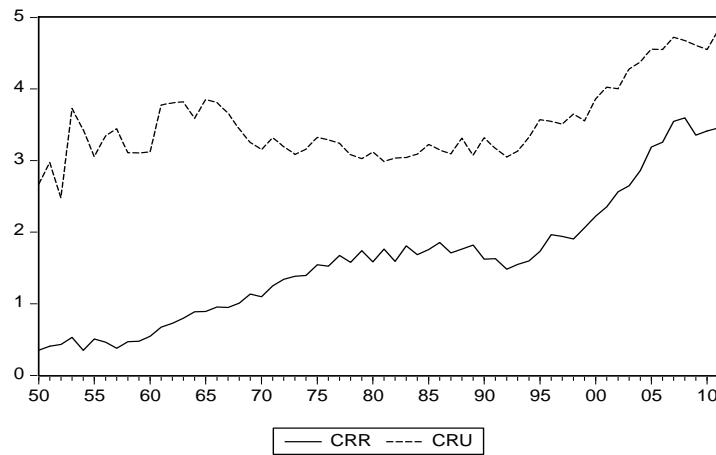
Next, we analysed the long-term factors affecting ethnically mixed marriages only for the majority, the Romanian ethnic group. Therefore, the influence of the various factors on the share of ethnically mixed marriages in urban and rural areas was analysed according to the following model:

$$Y_t = \alpha + \beta t + \mu_1 x_{1t} + \mu_2 x_{2t} + \mu_3 x_{3t} + \mu_4 D_t \quad (2)$$

$Y_t$  – the share of ethnically mixed marriages for the Romanian ethnic group, computed for the urban and rural area respectively;  $x_{1t}$  – the average number of pupils/1000 inhabitants,  $x_{2t}$  – the average number of students per 1000 inhabitants,  $x_{3t}$  – the average consumption of energy in industry/1000 inhabitants, and  $D_t$  – dummy variable with values equal to 1 for 1950 to 1989 and 0 for 1990 to 2011.

### 3. Results and discussions

Figure 2 presents the data series for the share (in %) of ethnically mixed marriages in rural (CRR) and urban areas (CRU). As one can observe, the gap between the series in urban and rural areas declined between 1960 and 1989 while between 1990 and 2003 the gap registered yearly variations between 1.43% and 1.83%, only to start declining again in 2002, reaching 1.09% in 2008.



**Figure 2. The share of ethnically mixed marriages in Romania for the Romanian ethnic group by area of residency; Source: designed by the authors**

Table 1 presents the results of the ADF and Phillip-Perron tests for the share of ethnically mixed marriages in the total number of marriages. The two time series regarding the Romanian ethnic group are Difference Stationary and are integrated of first order.

Table 2 presents the results of the unit root tests for data series regarding the number of pupils, the number of students and the energy consumption in industry. Because after 1990 different economic and social behaviors occurred, the energy consumption in industry stationarity was studied separately for the 1950-1989 and 1990-2011 periods. The results show that the data series regarding pupils is non-stationary and integrated of first order, while the series regarding the number of students is Trend Stationary. For the energy consumption in industry, the series is integrated of first order for the 1950-1989 period and it is stationary for the 1990-2011 period.

Next, the Johansen test for co-integration was applied for the examined series. This procedure establishes whether or not there is a co-integration relationship and produces a long run estimation. The results presented in Table 3 show that there is only one co-integration relationship between the examined variables, for both rural and urban areas. The long run estimation for the share of the ethnically mixed marriages in the total number of marriages for the Romanian ethnic group was performed under the following assumptions: only one lag was kept within the vector model; a linear deterministic trend was incorporated in the model; three exogenous variables measuring the internal rate of changes in residency for persons aged 15 to 19, years, 20 to 24 years and 25 to 29 years were included in this model.

Tables 5 and 6 present the results of Johansen tests for co-integration for the series regarding the rural and urban areas, respectively. The results show that economic development, as measured by increased energy consumption, had a positive contribution to the evolution of ethnically mixed marriages in the case of the Romanian ethnic group, both in urban and rural areas.

The results also show that expanding the educational system through increasing the number of pupils and students had a positive impact on the share of ethnically mixed marriages in rural as well as urban areas. This result is in line with other studies in the scientific literature (see for example Hărăgus, 2014).

As one can observe, the results show a negative trend in the evolution of the share of ethnically mixed marriages in the total marriages for the Romanians living in rural areas, while the dummy variable capturing the two important periods in the Romanian history is significant. In order to explain this complex phenomenon, one should note that Herman and Campbell (2012) pointed out that ethnically mixed marriages are more easily accepted by persons with a higher educational level. Before 1989, there was a significant increase in the educational attainment of people living in rural areas (Ganzeboom and Nieuwbeerta, 1999), followed by a decrease after the Romanian Revolution (OECD, 2017). A similar result for the trend and the dummy variable was evident for the urban areas. One

possible explanation is that cohabitation is increasingly preferred to marriage (Mureşan, 2008) and educated women living in urban areas have the most positive attitude towards this way of life (Hoem et al. 2013).

**Table 1. Unit root for data series regarding the share of ethnically mixed marriages in the total number of marriages by ethnic group, source: designed by the authors**

Variable	ADF test			Phillip-Perron test	
		Lag	Model		Model
	Romanian ethnic group – rural area				
Level	3.21 (0.999)	1	No trend and constant	3.18 (0.99)	No trend and constant
First difference	-4.27 (0.00)	2	Constant	-8.99 (0.00)	Constant
	The share of ethnically mixed marriages in the total number of marriages for the Romanian ethnic group living in rural areas is a Difference Stationary process integrated of first order.				
	Romanian ethnic group – urban area				
Level	0.88 (0.90)	1	No trend and constant	1.46 (0.96)	No trend and constant
First difference	-10.64 (0.00)	1	No trend and constant	-10.63 (0.00)	No trend and constant
	The share of ethnically mixed marriages in the total number of marriages for the Romanian ethnic group living in urban areas is a Difference Stationary process integrated of first order.				

**Table 2. Unit root tests for the independent variables, source: designed by the authors**

Variable	ADF test			Phillip-Perron test	
		Lag	Model		Model
$x_1$	-1.27 (0.88)	2	Trend	-0.92 (0.95)	Trend
First difference – $x_1$	-4.38 (0.00)	1	Trend	-4.38 (0.00)	Trend
	$x_1$ is a Difference Stationary process integrated of first order.				

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$x_2$	-4.15 (0.00)	7	Trend	-	-
First difference – $x_2$	-2.09 (0.03)	1	No trend and constant	-2.33 (0.02)	No trend and constant
$x_2$ is a Trend Stationary process.					
$x_3$ 1950 – 1989	2.18 (0.48)	2	Trend	-2.33 (0.41)	Trend
1990 – 2011	-2.85(0.00)	1	No trend and constant	-3.25(0.00)	No trend and constant
First difference – $x_3$ 1950 – 1989	-2.21 (0.20)	2	Constant	-4.96 (0.00)	Constant
1990 – 2011	-4.47 (0.00)	1	No trend and constant	-4.47 (0.00)	No trend and constant
$x_3$ is a Difference Stationary process integrated of first order for the 1950-1989 period and a Difference Stationary process integrated of order zero for the 1990 – 2011.					

**Table 3. Co-integration test result for rural area, source: designed by the authors**

Null hypothesis	Trace statistics	Critical values (0.05)	Max-Eigen Statistic	Critical values (0.05)
$r = 0$	89.15179	88.80380	41.36054	38.33101
$r \leq 1$	47.79125	63.87610	18.22729	32.11832
$r \leq 2$	29.56395	42.91525	13.96241	25.82321
$r \leq 3$	15.60154	25.87211	11.79960	19.38704
$r \leq 4$	3.801937	12.51798	3.801937	12.51798

**Table 4. Co-integration test result for urban area, source: designed by the authors**

Null hypothesis	Trace statistics	Critical values (0.05)	Max-Eigen Statistic	Critical values (0.05)
$r = 0$	96.59596	88.80380	40.52682	38.33101
$r \leq 1$	56.06915	63.87610	27.06955	32.11832
$r \leq 2$	28.99959	42.91525	12.62536	25.82321
$r \leq 3$	16.37423	25.87211	11.94883	19.38704
$r \leq 4$	4.425399	12.51798	4.425399	12.51798

**Table 5. Long run results for rural area, source: designed by the authors**

Variable	Coefficient	Std. Error	t - statistics	Prob.
$x_{1t}$	0.028133	0.00676	4.161690	0.0001
$x_{2t}$	0.132960	0.02323	5.723461	0.0000
$x_{3t}$	1.125660	0.20036	5.618167	0.0000
trend	-0.026086	0.01521	-1.715060	0.0924
$D_t$	1.844960	0.30870	5.976557	0.0000

**Table 6. Long run results for urban area, source: designed by the authors**

Variable	Coefficient	Std. Error	t - statistics	Prob.
$x_{1t}$	0.098049	0.02324	4.218980	0.0001
$x_{2t}$	0.268040	0.07848	3.415431	0.0012
$x_{3t}$	3.124910	0.68722	4.547181	0.0000
trend	-0.149192	0.05231	-2.852070	0.0062
$D_t$	5.036800	1.07582	4.681826	0.0000



#### 4. Conclusions

This study analysed key economic, social and cultural factors and their relationship with the ethnically mixed marriages of Romanians in Romania. The analysis was based on exhaustive data from the Population and Housing Census in 2011 and official data published by the Romanian National Institute of Statistics.

The study revealed that the numbers of pupils per 1000 inhabitants, the number of students per 1000 inhabitants as well as the energy consumption in industry per 1000 inhabitants have a positive influence on the share of ethnically mixed marriages in the total number of marriages for Romanians. Moreover, the 1989 Romanian Revolution had a significant influence on the evolution of ethnically mixed marriages. These results apply to both rural and urban areas. Future studies using these dataset could also examine how the degree of ethnic fragmentation affects the share of ethnically mixed marriages in the total number of marriages.

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