THE IMPACT OF MARRIAGE ON THE FERTILITY LEVEL – THE CASE OF NORTH MACEDONIA

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ABSTRACT

The marriage behavior, i.e., the number of marriages and divorces with all the characteristics of the marring and divorcing couples, along with the fertility level, represent a challenge of studying in the field of population geography because of their great impact in certain segments of the demographic development.
This research analyzes the number of marriages and divorces, all of the qualitative and quantitative characteristics of the marriage behavior, as well as the number of children born within the framework of the marital union, or children born outside marriage. Fertility, the dynamics in the fertility rates, and the impact of marriage on the fertility level were also analyzed, due to their significant role in a society like ours.
The impact of marriage on the fertility level was confirmed by testing the hypotheses set at the beginning of the research. The testing of the one null hypothesis "the marriage behavior has no impact on the fertility level" and the three auxiliary hypotheses were done using the method of linear regression. By testing these hypotheses, a significant scientific fact has been pointed, on which the demographic development in the country should be further based, i.e. one of the foundations in creating family policies.

Keywords: marriage, divorce, fertility, impact, modernization

INTRODUCTION

The interpretation of marriage and its impact on fertility in historical contexts have gone through various stages in their development, but almost always, the forms of marriage have been sharpened up by the social circumstances. The stages in the development of marriage and fertility are usually presented in general because they do not have a strictly defined time frame, given the great influence of local factors [5].
Due to the development of science, technique, and technology, which imposed the fast pace of life, the views of the population towards marriage, family, and the birth of children have largely shifted. In our country, although a little later than in developed countries, attitudes towards marriage and towards the decision if, when, and how many children a family should have, significantly changed. The changes in the marital behavior driven by the demographic transition, which are significantly highlighted in recent years, can be seen in the declining number of marriages, the increasing number of divorces, the reduced number of live births, the declining fertility below the level needed for the so-called "simple generation replacement", the increasing number of nuclear families composed of parents with one child, etc. There is also a large number of informal communities (cohabitations) in the country, for which no records are kept, but we meet every day. However, despite all the changes that occurred, we are still a society in which the marriage is considered as a major institution and the first stage in founding a family,

socially justified and desirable, so its analysis and the analysis of its impact on fertility are of particular importance for the future demographic development.
The purpose of this paper is to improve the study methods, tools, and instruments that can be used in such research, but also to provide thoroughness in the process of creating an idea of the characteristics of marriage and fertility behavior and their linkage in the Republic of North Macedonia.

DATA SOURCES, METHODOLOGY AND LITERATURE REVIEW

The available population data sources allowed a deep and thorough study of the demographic issues and their mutual connection, and thus provided a basis for planning and forecasting future population, economic and overall development. Much of the data is very dynamic given the nature of the processes and the phenomena to which they refer to, so this creates difficulties in monitoring, collecting the latest information, difficulties in their selection and application [2]. Most of the data needed for this research were obtained from the regular annual publication of the State Statistical Office, Natural Population Change where can be obtained data on the number of marriages and divorces and the number of live births, regardless of whether those children were born in or outside the marital union. In order to calculate the needed rates were used census data, but as the last census was conducted in 2002, the lack of data for the recent years was complemented by the population estimates.
The rate, as a relative number that represents the frequency of an event in a given time interval, is one of the most important indicators of certain events. The simplest measure of marriage is the crude marriage rate or the number of marriages in a year per 1,000 population at midyear. The crude marriage rate has disadvantages since it expresses the number of marriages compared to the entire population, including persons younger than 18 years, instead of concentrating on the population at risk, that is, people of marrying age [15]. Also, it must be noted that the crude marriage rate represents the number of marriages, not the number of people getting married [6].
The simplest measure of divorce is the crude divorce rate (CDR), or the number of divorces in a year per 1,000 population at midyear. The crude divorce rates, just looked at are the most widely used measures of the instability of marriage [16], but they have the limitation same as the crude marriage rate. The crude divorce rate expresses the number of divorces compared to the entire population, including children and singles, instead of concentrating on the population at risk, that is, of married people.
The fertility rate is determined in several different ways. Often, fertility rates are determined depending on what we want to emphasize. If we analyze the connection between the number of live births and the total population, it means that we have calculated the crude fertility (birth) rate (CBR (f)). The Total Fertility Rate (TFR), according to the Population Reference Bureau [10], is defined as the average number of children a woman would have if she survived all of her births or reproductive years. Reproductive year's means the age between 15 and 49 years. If that value is 2.1 it means that a basic population reproduction is ensured, i.e. that there is replacement of generations. This value is known as the critical value [14]. Also, an important indicator is the extramarital birth rate, which is defined as the number of extramarital live births per 1,000 live births (EMBR). In order to test the connection between the marriages and

[10] https://www.prb.org/glossary/

the number of births was used the linear regression [11] as one of the fundamental statistical and machine learning techniques. The linear regression is a basic and commonly used type of predictive analysis for finding relationship between two continuous variables. In our case, one is predictor or indepen¬dent variable (number of marriages) and the other is response or dependent variable (number of births).

Marriage and fertility in North Macedonia have been the subject of research in a number of scientific geographical papers. Of special importance is the paper dedicated to the analysis of the birth rate of the population in the Republic of Macedonia in 2004 [21], the one about the population structure according to the marital status in 2005 [22], the paper about the characteristics of the population fertility in 2007 [18], the two papers in 2009 [19], [20], with the focus on certain characteristics of the marital communities in the Republic of Macedonia, i.e. papers on ethnically homogeneous and heterogeneous marriages, by Madzevikj. In 2016 [1], Apostolovska Tosevska and Gorin published a paper on the dynamics in the volume and age of the female reproductive population in the Republic of Macedonia. Marriages and divorces have been analyzed in the papers by Ljakoska et al., in 2018 [15], [16], and 2019, [11], [13], while the fertility and the reproductive behavior were analyzed in 2018 [3], (Apostolovska Toshevska et al., about the reproductive behavior of the female population in the only Roma governed community), in 2019 [12], [17] (childbearing outside marriage, and the municipalities by the scope of women in childbearing age (Ljakoska, 2019)), while in 2020, were analyzed the changes in the reproductive behavior of women (Ljakoska, 2020) [14].

Changes in the numbers and rates of marriages, divorces and live births

The population structure according to the marital status is considered as one of the basic demographic indicators precisely because of its impact on fertility rates and generation change [4]. Hence, the marital status of the population, with all its characteristics and specifics, is a great challenge for research, because it largely reflects on the demographic development of the country. Marriage as an institution is still associated with the creation of the family as one of the most important sociological forms and pillars of society [15], in fact, marriage is a social framework of reproduction [5].

The research of marriage rate is important precisely because of the dependency of the reproduction rates and the marital behavior. The fertility level is largely determined by the frequency of marriages because the largest number of births are still realized within the marital unions [5]. Therefore, marriage is defined as a social institution with the task to control the adults' sexual behavior in order to regulate reproduction [7].

The analyzed period, from 1971 till 2015, is characterized by significant changes regarding the issue of marriage, i.e. changes in terms of the number of marriages. These changes were most felt in the last twenty years when the number of marriages significantly decreased (in 2015, the number of marriages was 15.5% lower than in 1987, the year with the highest recorded values).

Another change, in the series of demographic changes that our society is facing today, is, of course, the increasing number of divorces. The issue of divorce is particularly important, and the fact that their number is increasing is particularly worrying, especially since it is becoming an integral part of the society more and more and reflects on all the processes of the population, especially fertility.

[11] https://realpython.com/linear-regression-in-python/
https://towardsdatascience.com/linear-regression-detailed-view-ea73175f6e86

Table 1. Trend in the number of marriages, divorces and live births in the period 1971-2015

Year	Marriages	Divorces	Live Births		
			Total	Inside Marriage	Outside Marriage
1971	14739	463	37904	35475	2429
1972	14903	580	38187	35755	2432
1973	15105	1053	37479	35112	2367
1974	15118	1072	38383	36011	2372
1975	15554	1270	39579	36972	2607
1976	15023	1066	39810	37220	2590
1977	15601	822	38930	36358	2672
1978	15702	776	38790	36320	2470
1979	16122	816	39407	36995	2412
1980	16145	890	39784	37369	2415
1981	16303	911	39488	37103	2385
1982	16606	911	39789	37399	2390
1983	16404	747	39210	36876	2 334
1984	16054	886	38861	36476	2385
1985	16335	817	38722	36177	2545
1986	16326	1017	38234	35829	2405
1987	16799	811	38572	36015	2557
1988	16380	861	37879	35259	2620
1989	15842	951	35927	33403	2524
1990	15688	749	35401	32883	2518
1991	15311	496	34830	32379	2451
1992	15354	578	33238	30806	2432
1993	15080	636	32374	29739	2635
1994	15736	612	33487	30628	2859
1995	15823	710	32154	29524	2630
1996	14089	705	31403	28813	2590
1997	14072	1021	29478	26864	2614
1998	13993	1027	29244	26467	2777
1999	14172	1045	27309	24638	2671
2000	14255	1325	29308	26440	2868
2001	13267	1448	27010	24203	2807
2002	14522	1310	27761	24787	2974
2003	14402	1405	27011	23996	3015
2004	14073	1645	23361	20495	2866
2005	14500	1552	22482	19687	2795
2006	14908	1475	22585	19763	2822
2007	15490	1417	22688	19837	2851
2008	14695	1209	22945	20137	2808
2009	14923	1287	23684	20792	2892
2010	14155	1720	24296	21338	2958
2011	14736	1753	22770	20119	2651
2012	13991	1926	23568	20826	2742
2013	13982	2045	23138	20513	2625
2014	13813	2210	23596	20890	2706
2015	14186	2200	23075	20545	2530

Source: SSO [8], [23]

The phenomenon of divorce is particularly interesting to study from a demographic point of view, because it affects a whole range of population-related processes, and especially emphasizes their impact on the fertility level [10]. In the analyzed forty-five-year period, a total of 20,226 divorces were registered, which means that slightly less than 100,500

persons gained the status of a divorced person. On average, about 450 divorces were registered each year. The highest number of divorces was registered in 2014, i.e. 2210, which is almost five times the number in the year with the lowest number of registered divorces (1971 - 463 divorces recorded).

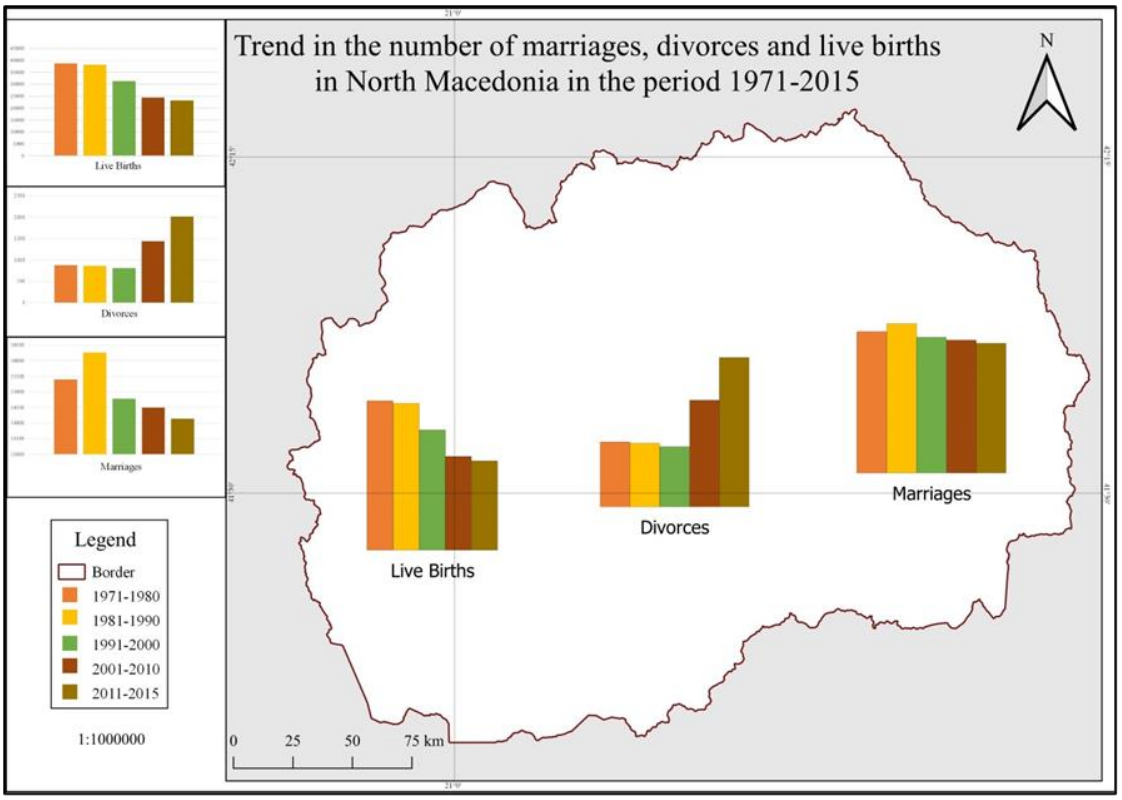

Figure 1. Trend in the number of marriages, divorces and live births in the period 1971-2015

These demographic changes were followed by the continuous decrease of the total number of live births, expressed in absolute and relative terms, which at the state level started since the mid-nineties of the last century, and with certain oscillations, continues until nowadays. These changes are accompanied by the increasingly present division of marriage and parenthood, which is reflected in the changed share of children born in and outside marriage.

The number of children born inside marriage follows the trend of the total number of live births, i.e. it decreases, while the number of children born out of wedlock does not show any significant changes in the period we are analyzing.

However, the analysis of the rates much more clearly indicates to all the changes that have occurred. Therefore, the crude marriage rate is directly conditioned by the number of marriages. The greater the number of marriages is, the higher the marriage rate will be and vice versa [9], [4]. Thus, the crude marriage rate in the country, following the reduced number of marriages decreased from 8.9‰ at the beginning of the analyzed period, to 6.8‰ at the end of that period. The crude divorce rate increased three times in the period from 1971 to 2015, i.e. the value of 0.3‰ increased to 1.1‰ in 2015.

Table 2. The Crude Marriage, Divorce and Fertility Rate, the TFR and the EMBR

Year	CMR	CDR	CBR (*f*)	TFR	EMBR
1971	8.9	0.3	22.9	-	64.1
1972	8.9	0.3	22.7	-	63.7
1973	8.9	0.6	22	-	63.2
1974	8.7	0.6	22.2	-	61.8
1975	8.9	0.7	22.5	-	65.9
1976	8.4	0.6	22.3	-	65.1
1977	8.6	0.5	21.5	-	68.6
1978	8.6	0.4	21.1	-	63.7
1979	8.7	0.4	21.2	-	61.2
1980	8.5	0.5	21.1	-	60.7
1981	8.5	0.5	20.6	-	60.4
1982	8.6	0.5	20.5	-	60.1
1983	8.3	0.4	19.9	-	59.5
1984	8.1	0.5	19.5	-	61.4
1985	8.1	0.4	19.2	-	65.7
1986	8.0	0.5	18.7	-	62.9
1987	8.1	0.4	18.7	-	66.3
1988	7.8	0.4	18.1	-	69.2
1989	7.5	0.5	17	-	70.3
1990	7.4	0.4	16.6	-	71.1
1991	7.5	0.2	17.1	-	70.4
1992	7.5	0.3	16.2	-	73.2
1993	7.3	0.3	15.7	-	81.4
1994	8.1	0.3	17.2	2.23	85.4
1995	8.0	0.4	16.3	2.13	81.8
1996	7.1	0.4	15.8	2.07	82.5
1997	7.0	0.5	14.8	1.93	88.7
1998	7.0	0.5	14.6	1.90	95.0
1999	7.0	0.5	13.5	1.76	97.8
2000	7.0	0.7	14.5	1.88	97.9
2001	6.5	0.7	13.3	1.73	103.9
2002	7.1	0.6	13.7	1.80	107.1
2003	7.1	0.7	13.3	1.77	111.6
2004	6.9	0.8	11.5	1.52	122.7
2005	7.1	0.8	11.0	1.46	124.3
2006	7.3	0.7	11.1	1.46	125.0
2007	7.6	0.7	11.1	1.46	125.7
2008	7.2	0.6	11.2	1.47	122.4
2009	7.3	0.6	11.5	1.52	122.1
2010	6.9	0.8	11.8	1.56	121.7
2011	7.2	0.9	11.1	1.46	116.4
2012	6.8	0.9	11.4	1.51	116.3
2013	6.8	1.0	11.2	1.49	113.4
2014	6.7	1.1	11.4	1.52	114.7
2015	6.8	1.1	11.1	1.50	109.6

Source: SSO [8], [23].

Declining births also means reducing fertility rates, which are crucial for the replacement of generations. From once high values that ranged up to 3.5 children per woman of fertile age, in recent years, these values have not even reached the value that can ensure a simple population reproduction, i.e., 2.1 children per woman. "According to Peter Mc Donald, when the fertility of the population falls below the 'magic' level of 1.5 children per

woman, it is rare and difficult to rehabilitate, that is, to notice an increase in the fertility rate" [24]. Therefore, what is most worrying is the constantly reducing total fertility rate, which is below the value of 2.1 since 1997 and continues to decrease, which indicates that there is no renewal of the population in the country. The only rate with increased values is that of births outside marriage.

The fertility level is under the critical value of 2.1 for several decades and is the main cause for depopulation and pronounced population aging. The main goal of sustainable demographic development is the stationary population, a population in which the next generation will be the same size as the existing one. Unfortunately, with values like this, the existence of the population in North Macedonia is in question.

The impact of marriage on the fertility level in the Republic of North Macedonia

The fact that with the decreased number of marriages there was a decreased number of births shows their mutual connection, but how strong this connection is, can be shown only after testing the hypotheses set in the text below. If these hypotheses prove true, they would constitute new scientific facts. The testing and proving of the hypotheses were performed using the method of linear regression and the statistical software (Python 3.5), and data from the vital statistics and authors' calculations. Thus, wanting to prove the impact of marriage on fertility in the Republic of North Macedonia, we set one null and three auxiliary hypotheses.

The null hypothesis "Marriage has no impact on the fertility level" aims to prove if the level of fertility is largely determined by the frequency of marital unions for the simple reason that most of the births occur within the marital unions.

The influence of the number of marriages in the period 1971-2015, on the number of live births in the same period, was tested using the linear regression method. That way we tried to describe the dependence between the independent variable x (number of marriages) and the dependent variable y (number of live births). We evaluated the parameters in the model using the method of least squares.

In the linear regression model:

$$y = \beta_1 x + \beta_0,$$

with the least-squares method, the obtained scores were (β_0)ˆ=-0,0005062 and (β_1)ˆ=5,4702 . The positive (β_1)ˆ value shows that the number of marriages has a positive effect on the number of live births. From the many parameters obtained, we can distinguish the coefficient of determination R^2 and the p - value. Using p<0,05 as a rule to reject the hypothesis that marriages have no impact on the number of live births (fertility level), we can conclude that the number of marriages significantly affects the number of live births. The value R^2=0,553 of the coefficient of determination shows that 55.3% of the variation in the number of live births is caused by the variation in the number of marriages.

If we evaluate that the number of live births depends on the number of marriages with the line of linear regression given by:

$$y=-0,0005062x+5,4702,$$

then, the ratio between the observed real values and the predicted ones looks like the one in figure 2.

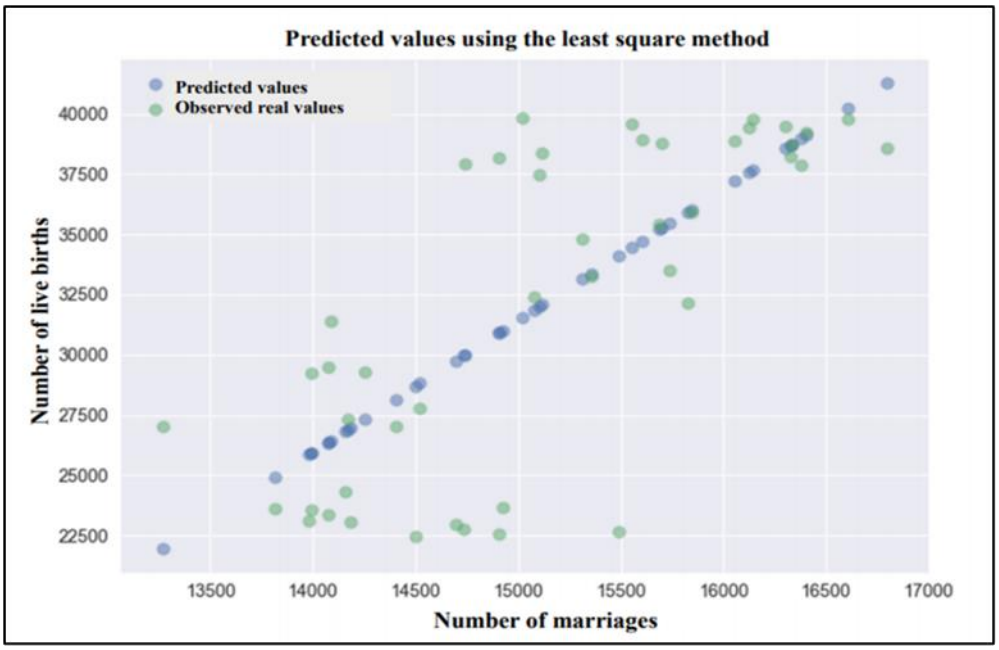

Figure 2. The ratio between the observed real and predicted values for the number of marriages and the number of live births in the period 1971-2015

Rejecting the null hypothesis means that the first auxiliary hypotheses, which is also connected to the impact of marriages on births "The marriage rate decreases, and so did the fertility rate", is accurate. Thus, knowing that marriage affects births, it is to be expected that the lower the number of marriages is, the lower the number of live births will be.

In today's "modern age", when economic independence is constantly strengthening and the sense of responsibility towards the partner is decreasing, it is much easier for the spouses to decide to end the marriage. Therefore, the second auxiliary hypothesis emerged, "The number of divorces increases as well as the divorce rate."

The changes can be shown using a graph for the number of divorces and the crude divorce rate in the period from 1971 to 2015 (Figure 3)

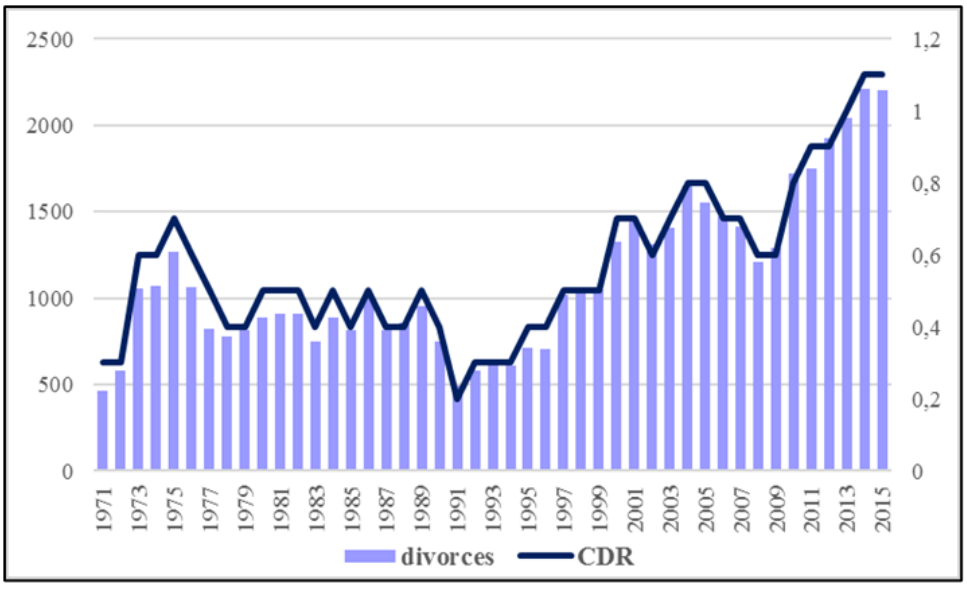

Figure 3. Number of divorces and crude divorce rate in the period 1971 - 2015

In figure 3 can be noticed that the number of divorces increased by almost five times in the period we are analyzing, while the divorce rate increased by almost four times. The increase in the divorce rate is due to the increased number of divorces, but also due to the changes in the total population.
The third auxiliary hypothesis refers to the change in the number of live births and births outside marriage, "The number of live births decreases, while the number of children born outside marriage increases".
In times of reduced number of marriages and increased number of divorces, it is to be expected that the number of live births will be reduced. On the other hand, the new opinions and attitudes on marriage and family are the reason for the increased number of single-parent families, which affects the increase in the number of children born outside marriage, especially the increase of their share in the total number of live births.

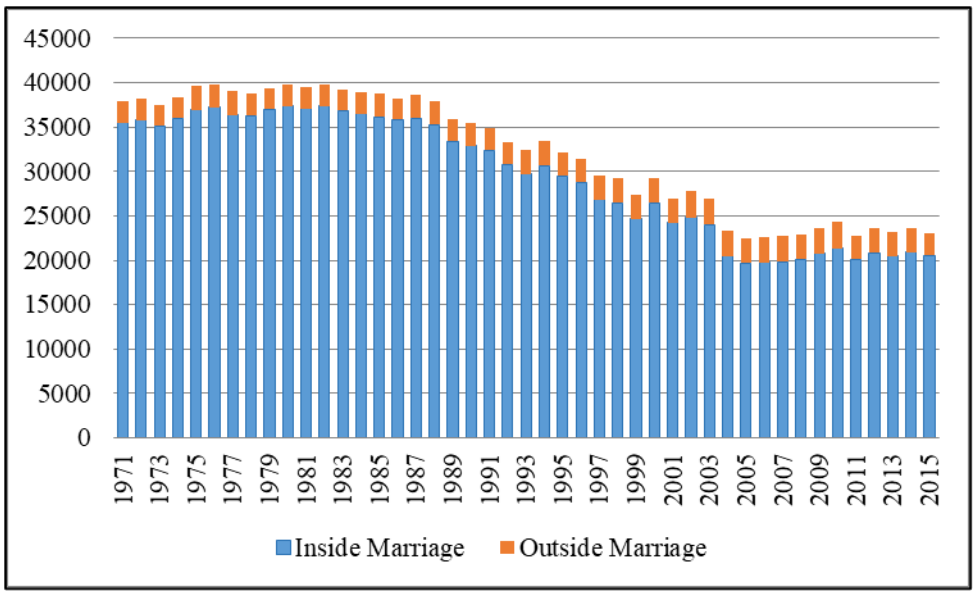

Figure 4. Number and percentage share of children born in a marriage union and outside marriage in the period 1971 - 2015

The number of children born outside marriage in the period we were analyzing has increased slightly. On the other hand, the share has grown, but not as a result of the increased number of children born outside marriage, but as a result of the declining number of children born within the marriage unions, which came as a consequence of the declined number of marriages and the increased number of divorces. The share of children born outside marriage has almost doubled in the last 45 years. This fact only proved the third auxiliary hypothesis as accurate.

CONCLUSION

The major social changes have significantly influenced the changes in the opinions and attitudes of individuals regarding marriage and starting a family. For some people, especially the older generations, the idea of postponing marriage and parenthood is unacceptable, while for others it is something natural and a feature of the "modern life".
The results of the analysis indicate that marriage, although one of the oldest institutions of the human race, in the post-transition phase that has affected our society, gradually lost its importance. The future of marriage becomes uncertain. Marriage is no longer

predictable because its future is in the "competence" of the spouses themselves, and not in religion, tradition or society [5]. In the time of change and modernization, the individual becomes self-sufficient and in some way selfish. No one wants to lose their privacy, people are usually unwilling to change their habits, share the living space, or lose economic independence [25], hence it can be concluded that the impact of individual behavior is twice more greater than the sum influence of the biological factors. However, when it comes to having a child, despite the new attitudes on life and the new types of informal communities, in most countries, even in the most developed, most children are still born within the marital union [10].

The analysis of the number of marriages, clearly shows that their number has decreased significantly in this, almost half a century. Among the main reasons, besides changed attitudes, it must be mentioned the reduction of the marrying age population, which can further on take a part in the demo-reproductive processes in the country [22].

On the other hand, the number of divorces has increased significantly. This trend in divorces was expected if we take into account all the other changes related to the second demographic transition such as the emancipation of women and persons higher education, the involvement of women in the labor market and their greater independence, parental support if the partners want to divorce, which was not the case in the past (today, divorced women often return to their parents' home after the divorce), but also the openness of the society to accept such a change in marital behavior, without condemning it.

What is most worrying, however, is the declining number of live births, which has dropped by approximately 40% over a period of 45 years, as well as the declining TFR rates that have been below the critical value of 2.1 in the country for the last twenty years. Of the total number of live births, a larger decrease is observed in the number of children born in a marriage union, while the number of children born outside marriage showed some small, insignificant changes. Hence, we can freely say that what Vasić noted in 2007 [25], "Women are increasingly opting for parenthood outside of marriage because they do not want to give up parenting, but at the same time do not want to lose economic independence and privacy, or simply do not think that they can live with a partner" is obviously present in North Macedonia as well.

This research was completed by testing the hypotheses, i.e. by rejecting the null hypothesis that "Marriage has no impact on the fertility level" which proves that in fact there is an impact of marriage on fertility and the variations in the number of live births, in 55 3% are conditioned by the variations in the number of marriages. Rejecting the null hypothesis meant accepting the first auxiliary hypothesis according to which "The marriage rate decreases, and so did the fertility rate", starting from the fact that the marriages and fertility rates are influenced by the number of marriages and births and if the number is decreasing, the rates are decreasing as well. The following two auxiliary hypotheses concerning divorce and children born out of wedlock were also accurate.

The obtained results are a clear indication that marriage and fertility are interrelated in a so-called "vicious cycle" and it is necessary to activate all competent institutions, the Government, the local-self-government and the scientific community in order to create a strategy to encourage young people to get married, to raise the births and fertility rates, but also to raise the level of economic and overall development. The results of the tested hypotheses are scientific facts on which could be based any population policy. Only this way, the population policy will be properly integrated in the society, it will be consistent and it will get a special mark so it can be implemented even where it is considered impossible.

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