Efendic, Adnan; Pugh, Geoffrey T.

Working Paper

Ethnic diversity and economic performance: An empirical investigation using survey data

Economics Discussion Papers, No. 2017-57

Provided in Cooperation with:
Kiel Institute for the World Economy – Leibniz Center for Research on Global Economic Challenges

Suggested Citation: Efendic, Adnan; Pugh, Geoffrey T. (2017) : Ethnic diversity and economic performance: An empirical investigation using survey data, Economics Discussion Papers, No. 2017-57, Kiel Institute for the World Economy (IfW), Kiel

This Version is available at:
https://hdl.handle.net/10419/167690

Economics
The Open-Access, Open-Assessment E-Journal

Discussion Paper
No. 2017-57 | August 23, 2017 | http://www.economics-ejournal.org/economics/discussionpapers/2017-57

Ethnic diversity and economic performance – an empirical investigation using survey data

Adnan Efendic and Geoff Pugh

Abstract
This empirical study is based on nationally representative cross-sectional survey data gathered to investigate the effect of ethnic diversity on individual and household economic performance in Bosnia and Herzegovina (BiH). The complexity of this relationship in the context of this post-conflict country is addressed and investigated by estimating models in which ethnic diversity affects personal and family incomes. The 1992–1995 conflict was ethnically characterized, and harmful for ethnic diversity. Yet, two decades later, we find positive economic consequences of ethnic diversity for individuals and households. After controlling for other influences, the authors estimate that both personal and family incomes are around 10% higher in ethnically diverse than in ethnically homogenous areas. A corollary is that policy makers in this post-conflict country, and in similar environments elsewhere, should take into consideration the economic costs of policies supporting ethnic homogeneity over diversity.

JEL D00 D10 D31
Keywords Ethnic diversity; economic performance; Bosnia and Herzegovina

Authors
Adnan Efendic, ✉ School of Economics and Business, University of Sarajevo, Sarajevo, Bosnia and Herzegovina, adnan.efendic@efsa.unsa.ba
Geoff Pugh, Staffordshire University, Stoke-on-Trent, Great Britain

Citation Adnan Efendic and Geoff Pugh (2017). Ethnic diversity and economic performance – an empirical investigation using survey data. Economics Discussion Papers, No 2017-57, Kiel Institute for the World Economy. http://www.economics-ejournal.org/economics/discussionpapers/2017-57

Received August 7, 2017 **Accepted as Economics Discussion Paper** August 21, 2017
Published August 23, 2017

1. Introduction

Efendic et al. (2015) find that ethnic diversity in the post-conflict environment of Bosnia and Herzegovina (BiH) is beneficial for young businesses. Young companies (entrepreneurs) in local areas that are ethnically diverse have systematically higher growth aspirations in comparison to those in ethnically homogenous areas. These results are important when seen in the context of the cross-country economic literature, as the latter suggests that ethnic heterogeneity may be associated with negative economic outcomes (e.g. Easterly and Levine 1997; Collier 1998; Easterly 2001; Patsiurko et al. 2012). Being motivated by this research and a growing body of literature that investigates the effect of ethnic diversity in economics, we conducted a new survey in the household sector of BiH to investigate whether ethnic diversity of the neighbourhood area is associated with individual and household economic performance. We investigate a country that has been ethnically diverse for centuries (Malcolm 1996). Yet, two decades ago, this ethnically heterogenous composition was changed as a result of the Bosnian war (1992-1995), which involved ethnic cleansing and related mass fatalities (Olzak 2011). The economic outcomes for individuals and families of consequently reduced ethnic diversity – in some if not all areas – remains unknown today.

Thus, the contribution of this study is to uncover the effect of ethnic diversity on economic performance in a society with a recent history of ethnic conflict that structurally

affected the ethnic composition of the country.[1] In comparison to the existing literature our sample is unique. Previously, ethnic diversity has mainly been investigated in the framework of ethnic heterogeneities caused by immigration and inflow of different cultures and traditions into formerly homogenous areas. This research treats the economic consequences of change in the opposite direction; a shift towards homogenisation in much of BiH, which is something new, being enforced largely exogenously by violence (Malcolm, 1996). Thus, the findings from this study have implications for societies facing similar changes. Moreover, while there are already a good number studies at the macro (country) level (e.g. Easterly and Levine 1997; Collier 1998; Alesina and La Ferrara 2005; Montalvo and Reynal-Querol 2005; Patsiurko et al. 2012; Goren 2014), this is the first research, to our knowledge, to investigate the effect of ethnic diversity at the individual and household levels. An advantage of this approach is the much greater variation in ethnic diversity than at aggregate levels. While it is not our intention to explain the contrasting findings of macro and meso-micro studies (discussed later), we conjecture that any relationship between ethnic diversity and economic performance is less likely to suffer from omitted variables bias at the micro than at the existing research dominant macro level analysis. [2]

[1] In the literature reviewed above, many authors (e.g. Alesina and La Ferrara 2005) distinguish ethnic from linguistic and religious groups in their research and analyse these differences separately. In the context of BiH, however, there are no "real" language differences inside the country between different ethnicities. In contrast, the dominant ethnicities in BiH (Bosniacs, Serbs, and Croats) largely correspond to religious differentiations (Muslims, Orthodox, and Catholics respectively).

[2] For example, at the macro level high rates of economic growth favour inward migration potentially causing ethnic diversity. At the micro level of our study – the 'neighbourhood' differences in economic growth might impact travel to work patterns rather than cause people to move home, to 'migrate' to another neighbourhood. In this case, the joint determination of individual economic performance and ethnic diversity by economic growth is more likely at higher than at lower levels of aggregation.

The paper is organized as follows. In the first section we provide background on the 'Post-conflict context of Bosnia and Herzegovina', in which we explain why this country is relevant for such an investigation. The next section, 'The literature on ethnic diversity', suggests that economic performance is affected by ethnic diversity in both negative and positive ways. The Section 'The sample, data and identification strategy' explains the survey design and the data collected for this study. We also discuss the key variables of interest – those measuring individual economic performance and ethnic diversities, including our identification strategy. The following section – 'Variables and model specification' – explains how theoretical concepts are matched to variables derived from survey questions for estimation. This section also provides descriptive statistics on the variables used in the empirical modelling. In 'Estimation and discussion of results' we report the empirical findings, relevant statistical tests and discuss the key results. We conclude by summarizing key empirical findings and considering policy implications.

2. The post-conflict context of Bosnia and Herzegovina

To investigate the research question of interest – whether ethnic diversity is associated with individual and household economic performance – we focus on Bosnia and Herzegovina, a post-conflict country, which is a particularly appropriate context for such a study. Throughout its one thousand years long history, BiH had been recognized as a multicultural environment, mixing Eastern and Western cultural and religious influences

(Malcolm 1994). Even today, BiH is a multicultural country with a complex ethnic structure, and great variations within the country.

When BiH was part of former Yugoslavia (1945-1992) it was a republic having 4.1 million citizens and being particularly well-known for its multi-ethnic, multi-cultural, multi-religious environment, and as the republic with the highest level of ethnic tolerance (Hodson et al. 1994; Dyrstad 2012). Unfortunately, the Bosnian war (1992-1995), which followed the dissolution of former Yugoslavia, caused a structural break of demographic and ethnic composition within the country; namely, a change from ethnic diversity to ethnic homogeneity in some areas. This was a consequence of large migration movements induced by the war, including outflow of population from BiH (estimated at around 1.2 million over the period 1992-1995) in addition to around 1.0 million internally displaced. Simply said, every second person was forced to leave his or her home (MHHRBiH 2016) because of ethnic conflict over the war period. After the Dayton Peace Agreement was signed in 1995, people started to return; in the following five years it is estimated that around 1.0 million returned to BiH (FMDPR 2011). Accordingly, more than 50% of the current BiH population (3.5 million according to the latest 2013 Census data) migrated during the war period.

This was also the period when a multi-ethnic BiH went through a radical change from ethnically quite tolerant to quite intolerant in just a few years (Dyrstad 2012). Two decades after the Bosnian war, the country still remains highly segregated along ethnic lines, where the three main ethnic groups (Bosniacs, Serbs and Croats) have substantial

autonomy and control over their own ethno-territorial units (Bieber 2010). Yet, in spite of all these changes, there are still a few regions within the country in which ethnic diversity is still preserved and did not change a lot. (In Section 4 below, we present detailed evidence on changes in ethnic diversity between the censuses of 1991 and 2013 across Bosnia's 128 municipalities.) Accordingly, variations in ethnic diversity between different areas – in particular, at the level of micro-units – constitute a fertile terrain for identifying the potential influence of ethnic homogeneity/diversity on the economic performance of individuals and households living in these areas. The following Section reviews the alternative perspectives on this relationship, but these have not yet been tested in the context of the Western Balkan region.

3. The literature on ethnic diversity

The association between different forms of ethnic diversity and economic performance has been the focus of considerable economic research over the last two decades, generally finding that "ethnicity does matter in economics". However, the empirical research supports opposing hypotheses regarding ethnic diversity and economic performance, suggesting both positive and negative effects on outcomes as well as more or less strong and/or significant influences (Constant et al. 2009; Olzak 2011). This may reflect attempts to identify economic consequences of ethnic diversity at different levels of economic analysis – macro (growth and development), meso (sectors and regions) and the micro (firms and individuals) – even though the full heterogeneity of contexts and dimensions of diversity have yet to be researched.

A common theoretical proposition of the diversity literature is that – *ceteris paribus* – greater ethnic diversity increases the probability of ethnic tensions and conflicts (Blimes 2006) which, in turn, have a negative impact on economic incentives and economic performance (Osborne 2000). In this case, ethnic diversities, fractionalisation, conflicts and prejudices can override economic incentives, leading to poor economic choices, policies, outcomes, and political instability. In general, therefore, ethnically polarized societies are more likely to select suboptimal economic policies, which reduces economic prosperity (Easterly and Levine 1997). Accordingly, ethnic diversity is usually associated with poorer economic performance and lower economic growth (Collier 1998; Alesina and La Ferrara 2005; Goren 2014).

A number of empirical studies report a negative effect of ethnic diversity on economic outcomes. Easterly and Levine (1997) focus on ethno-linguistic diversity at the national level and find that ethnic diversity is associated with slow economic growth in Africa. Moreover, the effect of ethnic diversity is negative not only in its direct effect on economic growth, but ethnic diversity partly explains variations in economically relevant indirect indicators such as schooling, political stability, financial systems, foreign exchange markets, government consumption and infrastructure. On this argument, ethnic diversity can exert indirect effects by influencing the operation of channels or policies that affect long-run growth rates. In line with this, Goren (2014) identifies a direct negative effect of ethnic diversity on economic growth in a global sample as well as number of indirect transmission channels through which diversity may affect growth –

namely, schooling, political instability, market distortions, trade openness and the fertility rate. In this vein, Escaleras and Register (2011) find that ethnic diversity and tensions negatively affect the formation of social infrastructure (e.g., public utilities, education, health care), thereby imposing an unnecessary burden on growth and development. Similarly, Alesina et al. (1999) investigate a sample of US cities and find that greater ethnic diversity in US local jurisdictions is associated with higher spending and higher deficits/debt *per capita*, but still with lower provision of the core public goods like education and roads.

Collier (1998) in a cross-sectional study of the effect of ethnic diversity on economic growth finds that maximally diverse societies grow more slowly than do homogenous societies. However, he also finds that diversity is damaging to growth primarily in the context of limited political rights, while this effect is not clearly identified in democratic societies. Easterly (2001) also identifies the negative effect of diversity on economic growth, but the authors report that it is not an isolated effect and might be mitigated by good institutions. Yet Patsiurko et al. (2012) report a negative association between ethnic fractionalization and economic growth for OECD economies. In addition, the authors identify the greater importance of 'ethnic fractionalization' in comparison to other forms of fractionalizations, such as religious and linguistic. Similarly, Montalvo and Reynal-Querol (2005) in their cross-country research likewise find that ethnic polarization has a negative effect on economic development. These authors argue that ethnic polarization reduces investment, increases government consumption and entails a higher probability of civil conflict, which ultimately reduce economic development. Although the above

discussed literature identifies a negative effect of ethnic diversity on economic performance, the perspective of these studies is primarily macro-economic and often focused on indirect influences on economic outcomes (e.g. through its effect on government efficiency and provision of public goods and services).

A different perspective in the literature is that most developed countries and city-regions today are ethnically diverse. Proponents of this approach explain that a diverse ethnic mix may bring various abilities, different experiences, a variety of cultures and traditions, a spectrum of religious beliefs and practices, and multidimensional ways of thinking, which together may lead the whole society towards greater innovation, creativity and economic performance. In this case, ethnic diversity might be considered as an important asset for human development and welfare (Alesina and La Ferrara 2005; Bellini 2012). Ethnic diversity might have positive consequences not only at the national level but, in particular, on the economic success of regions and cities (Jacobs 1961; Gertler et al. 2002) as well as on the productivity of individuals (Ottaviano and Peri 2006) and, accordingly, individual well-being (Akerlof and Kranton 2010).

Alesina and La Ferrara (2005) argue that more diverse groups with limited abilities can perform better than more homogenous groups of high-ability problem solvers. Hence, individuals involved in more diverse groups, networks and environments can find better solutions to difficult problems, and so become economically more productive. The same authors develop a theoretical framework in which the skills of individuals from different ethnic groups are complementary in the process of production, which in turn increases

productivity. Based on this framework, the authors conduct an empirical investigation using United States (US) data and find that greater ethnic diversity is associated with higher income level of the community under study. Similarly, Jacobs (1961) sees ethnic diversity as the key factor of success of a city and as an engine of urban development. Ottivano and Peri (2006) find that ethnic diversity is associated with higher wages of the resident population in US cities, hence producing a positive effect on the economic performance of individuals. Bellini et al. (2012) conduct similar research focusing on European regions in twelve European Union countries and find consistent results – namely, ethnic diversity is positively correlated with productivity, where causation goes from diversity to productivity.

Related to the positive strand of the literature is Collier et al. (2001) who categorize ethnic diversity into 'dominance' and 'fractionalisation'. The authors find that ethnically diverse societies characterized by ethnic dominance are likely to have worse economic performance, while in diverse societies characterized by ethnic fractionalization this is not necessarily the case, especially in democratic societies. In other words, ethnic diversity is damaging if it takes the form of dominance over fractionalization.

The effects of ethnic diversity appear to be different at different levels of economic analysis (Allesina and La Ferrara 2005); whereas negative effects on economic outcome are prominent in macro-level studies, the literature reporting a positive effect of ethnic diversity is more meso-micro oriented and focused on regions, cities and individuals.

4. The sample, data and identification strategy

In this analysis we investigate responses from the household sector obtained over the period June-October 2012 from a cross-section survey conducted in Bosnia and Herzegovina by a professional agency.[3] The interviews were face-to-face meetings based on CAPI methodology, which resulted in no-missing observations.[4]

Although this is a household survey, we deal with the individual responses (only one individual per household) of adults who are citizens of BiH. Each individual was randomly selected for the interview based on the sample criteria. The targeted sample was 2,000 individuals (effectively, we deal with 2,017 observations) and was designed to be representative of the two entities in BiH (Federation of BiH and Republika Srpska), regions (16), municipalities (141), ethnic groups (Bosniacs, Serbs, and Croats), genders, and urban/rural areas. A unique feature of this dataset is that it was designed to capture information on ethnic diversity and economic performance at the individual level.

Although the survey dataset has no missing values, 'Don't know' or, for some questions, 'Don't wish to answer' responses account on average for 3.5% of responses, while around seven per cent of the sample responded in this way to the questions on ethnic

[3] The survey questions were piloted by the researcher in seven cities (40 individuals) in May 2012. The sample covered both entities and three dominant ethnicities where each ethnicity was the majority in two cities. After piloting, relevant modifications were made to the questions. The survey questionnaire in English translation is reproduced in Appendix A.

[4] CAPI refers to Computer-Assisted Personal Interviewing, which is face-to-face interviewing based on computer technology used to administer the questionnaire. According to Foster and McCleery (1999), a major advantage of CAPI is that it reduces respondent error; and routing errors are eliminated because the script automatically routes to the correct questions. In addition, it ensures that data are generally more complete, can considerably reduce the number of 'non-responses' and, correspondingly, the need for corrective editing.

minority/majority status and family earnings, and 13% to the personal income question. In surveys, 'Don't know' or 'Don't wish to answer' responses are typically relatively high for income and ethnicity variables. Nonetheless, in this survey, the incidence of these responses to the main questions of interest – on personal incomes and on ethnic self-identification and neighbourhood ethnic diversity – is either below or not much higher than five per cent (see Table 1 below). In the imputation literature, this is the level at which simple "listwise deletion" – i.e. omission – is regarded as unlikely to lead to substantial bias, even when the missing values are not necessarily "missing at random".

The second challenge to valid estimation with survey data is to take account of survey design. The survey design for this sample is straightforward: the whole of BiH was stratified into 16 regions (10 covering the Federation of BiH, five the Republika Srpska and one the District Brcko of BiH); then individuals were sampled within each stratum (region). In our case, no Finite Population Correction (FPC) was made. Stratification leads to a tiny increase in precision. However, the disadvantage of this simple design is that it makes no allowance for possible clustering effects in the data. Consequently, in estimating our model we:

a) ignore the stratification, but instead
b) report cluster-robust standard errors to allow for arbitrary patterns of correlation at the level of the 127 municipalities covered by the sample (from 141, some of which have a population as small as a few hundred), and
c) we include full sets of
    - municipality dummies (with one omitted) and

- regional dummies, with Sarajevo as the omitted reference category.

This estimation strategy minimises the possibility of omitted variables related to location and adopts a conservative approach to inference.

The ethnic diversity of the surveyed area can be assumed to be exogenous, because in BiH current ethnic composition within the country was primarily war-induced more than two decades earlier. This is a most important assumption: if valid, we can identify the effect of ethnic diversity on economic performance and offer a secure platform for policy development. To further validate this assumption, we consider two possible sources of endogeneity: namely, omitted influences from the socio-economic environment; and omitted personal characteristics.

There may be characteristics of the socio-economic environment that influence both individual and household economic performance and diversity. If these were to be omitted from the model then their influence would be wrongly attributed to diversity, thereby causing estimates of the diversity effect (if any) to be biased. To control for this possibility, we include dummy variables not only for urban/rural location and region, but also for each municipality. There remains the possibility that the neighbourhood level – to which the survey responses on diversity pertain – has some unobserved characteristics, separate from those at higher levels of aggregation, that both determine economic performance and correlate with diversity. Here, the overriding importance of gaining information on diversity by asking questions in terms that people understood (i.e.

pertaining to their neighbourhood rather than to an administrative unit whose boundaries may not be well understood) took priority over our ability to define controls at levels of aggregation matching our survey responses. However, in the context of a population of around 3.5 million, the municipalities have a mean population of just under 25,000 and so aggregate neighbourhoods with at least some strong similarities suitable for control by municipality effects. Given the lack of data currently available at sub-municipality level, this is a far as we can take this discussion. [5]

In addition, for each of the 128 municipalities we construct a measure of the change in ethnic diversity by comparing data from the last pre-conflict census in BiH (1991) with data from the first post-conflict census (2013). We calculate our index of net change in ethnic diversity as:

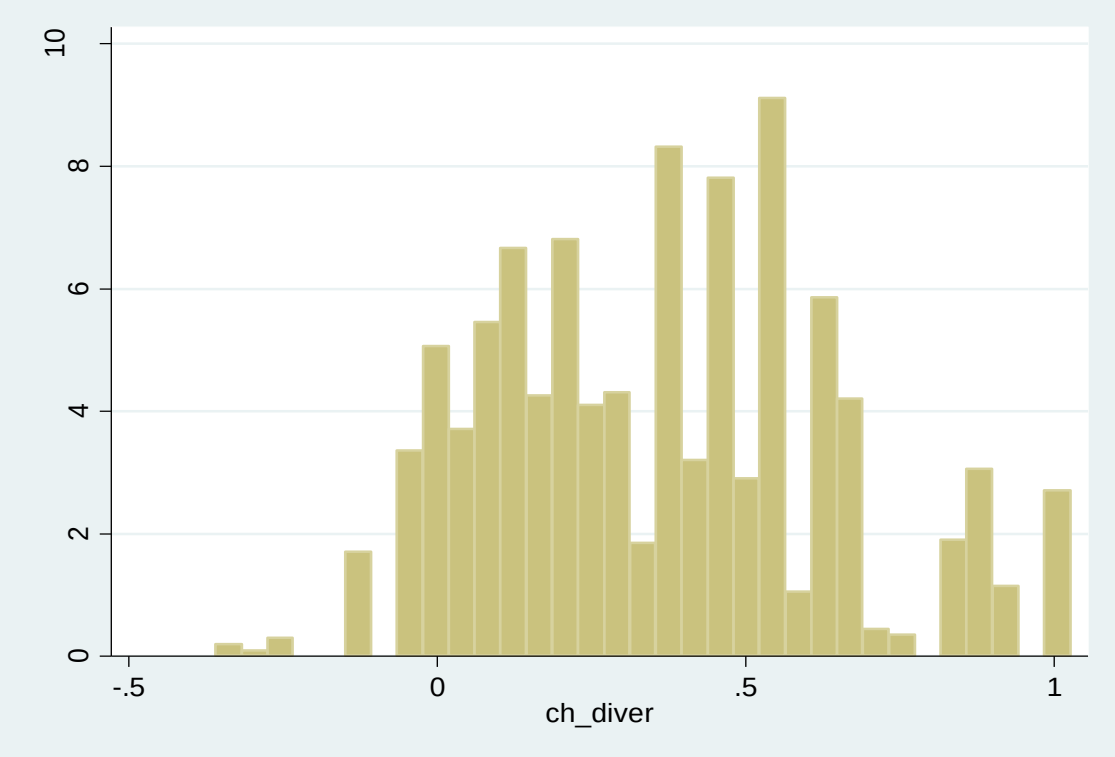
$$\frac{Percentage\ of\ population\ belonging\ to\ the\ dominant\ ethnic\ group\ in\ 2013}{Percentage\ of\ population\ belonging\ to\ the\ dominant\ ethnic\ group\ in\ 1991} - 1$$

Accordingly, zero indicates no change; negative values indicate shifts towards diversity; and positive values indicate shifts towards homogeneity. For example, an index of 0.5 indicates a 50 per cent increase in the share of the largest ethnic community compared to the combined share of all other ethnic communities (say, from 30 percentage points in

[5] Moreover, we found that inclusion of municipality dummies makes no noteworthy difference to the estimated effects of diversity or of any of the control variables. This suggest that omission of dummies at still lower levels of aggregation is unlikely to be a source of substantial bias.

1991 to 45 percentage points in 2013). Figure 1 displays the distribution of our index (*ch_diver*) across all 128 municipalities.

Figure 1. Net changes in ethnic diversity in 128 municipalities before and after the conflict



Source: authors

Only 13 of BiH municipalities recorded an increase in ethnic diversity between the 1991 Census and the 2016 Census, while the other 115 recorded varying degrees of ethnic homogenization. We assume that the whole range of outcomes reflects conflict-induced forced migration: not only were decisions to move determined by ethnicity rather than by the range of economic and other influences typically influencing migration; but also

decisions to stay, where belonging to the majority ethnic group offered "safety". By including this index in our models we control for the variability between those (few) municipalities experiencing little change between pre- and post-conflict times and the many experiencing substantial shifts away from ethnic diversity and towards ethnic homogeneity. In doing so, we also address a potential source of omitted variables bias in the case that previous changes in ethnic diversity are not only related to the current levels of perceived ethnic diversity but also to current levels of economic performance.

Potentially omitted personal characteristics are a corollary of both limits to the feasible length of our questionnaire (with respect to both cost and the patience of respondents) and an inherent limitation of cross-section data (precluding the use of individual fixed effects to control for unobserved and unobservable time invariant influences). Accordingly, to gain an indication of the possibility that our estimates of the income effects of ethnic diversity are unduly influenced by omitted variables bias, we investigate estimates from successively more developed model specifications. To anticipate, we find that the estimated diversity effects are stable with respect to increasing numbers of control variables and supplementary diversity variables (see Section 6 below). While not definitive, this approach at least provides some reassurance that our variable of interest is not simply capturing the influence of personal characteristics omitted from our models.

Accordingly, we specify a direct exogenous effect of ethnic diversity on the economic performance of individuals and households. Based on findings by the general diversity literature at the micro level (Jacobs 1961; Gertler et al. 2002; Ottaviano and Peri 2006;

Bellini 2012) we expect ethnic diversity to have beneficial effects on individual economic performance. Accordingly, we state our main hypothesis:

> *H0: Ethnic diversity in different areas of BiH is beneficial for the economic performance of individuals and their families.*

5. Variables and model specification

The dependent variable, which we use in our modelling procedure, is the economic performance of individuals and families, which we proxy by the total monthly income of respondents. BiH is a country with huge official unemployment (around 30%) and, correspondingly, a substantial amount of income is earned in the grey economy, which is estimated to be around 30% of total economic activity. (We obtain a similar percentage of informally employed respondents.) Accordingly, in order to capture better the economic performance of individuals, we asked participants to report their total monthly income from whatever source, and provide them with a scale of different income categories. The scale had previously been tested and established by the professional research agency based on previous surveys conducted in this country (UNDPBiH 2000-2010). While some of the previous research uses official indicators to proxy the productivity of individuals in the ethnic diversity literature (e.g. Ottivano and Peri 2006; Bellini et al. 2012) our approach, which includes earnings from the informal economy, is more suitable for a BiH sample. Table 1 provides definitions, construction details and descriptive statistics for the dependent and all independent variables in the full sample as

well as in two subsamples differentiated by the variable of interest (*d_diversity*): i.e. into ethnically diversity neighbourhoods (*d_diversity* =1) and ethnically homogeneous neighbourhoods (*d_diversity* =0).

Table 1. Definitions, construction and descriptive statistics of variables

Variables	Explanation of variables (do not know/wish to answer responses excluded, the fourth column contains this information for every variable)	FULL SAMPLE			HOMOGENOUS AREA *d_diversity*=0		DIVERSE AREA d_diversity=1	
		Number of observations	Do not knows	Mean	Number of observations	Mean	Number of observations	Mean
earning	Personal income: 1=0€; 2=0-50€; …; 11-> 1,500 €	1870	7.3%	3.48	758	3.11	1074	3.75
fearning	Family income: 1=0€; 2=0-50€; …; 11-> 1,500 €	1755	12.9%	4.79	716	4.48	1004	5.04
lnearning	Level of personal income: logarithm of *earning*	1870	7.3%	1.04	758	0.91	1074	1.14
lnfearning	Level of family income: logarithm of *fearning*	1755	12.9%	1.42	716	1.33	1004	1.48
age	Age of respondents	2017	0.0%	51.82	825	49.32	1150	53.32
age2	Age of respondents squared	2017	0.0%	2985.61	825	2733.62	1150	3138.12
education	1=no education; 2=elementary;…6=postgraduate	2012	0.2%	3.01	825	2.79	1150	3.17
d_diversity	Ethnic diversity: 1=diverse; 0=homogenous	1975	2.1%	0.58	825	0.00	1150	1.00
d_majority	Self-identification: 1=majority; 0=minority	1857	7.0%	0.79	799	0.87	1034	0.74
d_urban	Geographic area: 1=urban/suburban; 0=rural	2013	0.2%	0.64	823	0.47	1148	0.77
d_female	Gender: 1=female; 0=male	2017	0.0%	0.51	825	0.53	1150	0.50
d_married	Marital status: 1=married; 0=other	2010	0.3%	0.64	824	0.65	1144	0.64
unasana	Unskosanski region=1; 0=other regions	2017	0.0%	0.08	825	0.12	1150	0.06
posavina	Posavina region=1; 0=other regions	2017	0.0%	0.01	825	0.02	1150	0.01
tuzla	Tuzla region=1; 0=other regions	2017	0.0%	0.13	825	0.15	1150	0.10
zenica	Zenicko-dobojski region=1; 0=other regions	2017	0.0%	0.09	825	0.09	1150	0.10
podrinje	Podrinjski region=1; 0=other regions	2017	0.0%	0.01	825	0.01	1150	0.01
centralbih	Srednjebosanski region=1; 0=other regions	2017	0.0%	0.06	825	0.05	1150	0.07
herzegneret	Hercegovackoneretvanski region=1; 0=other	2017	0.0%	0.06	825	0.04	1150	0.07
weshterzeg	Zapadnohercegovacki region=1; 0=other	2017	0.0%	0.02	825	0.04	1150	0.01
canton10	Canton10 region=1; 0=other regions	2017	0.0%	0.02	825	0.01	1150	0.02
banjaluka	Banja Luka region=1; 0=other regions	2017	0.0%	0.17	825	0.15	1150	0.19
doboj	Doboj region=1; 0=other regions	2017	0.0%	0.07	825	0.05	1150	0.08
bijeljina	Bijeljina region=1; 0=other regions	2017	0.0%	0.06	825	0.08	1150	0.05
easternrs	Eastern RS region=1; 0=other regions	2017	0.0%	0.05	825	0.06	1150	0.03
easternherzeg	Easternherzegovina RS region=1; 0=other	2017	0.0%	0.02	825	0.03	1150	0.01
brcko	Brcko region=1; 0=other regions	2017	0.0%	0.03	825	0.02	1150	0.03
sarajevo	Sarajevo region=1; 0=other regions	2017	0.0%	0.13	825	0.07	1150	0.17
ch_diversity	Change of the ethnic diversity of municipalities	1996	1.1%	0.36	816	0.29	1138	0.41
d_ethnicity	Friendship diversity: 1=diverse; 0=homogeneous	1996	1.1%	0.11	816	0.09	1074	0.12

Measuring ethnic diversity is not a straightforward task and it seems that researchers are still searching for an appropriate measure or indicator of ethnicity and diversity. Generally, ethnicity and ethnic groups are slippery concepts (Fearon 2003) and far from straightforward (Posner 2000). Posner (2000), Constant et al. (2009) and Efendic at al. (2011; 2015) use different measures of ethnic diversity obtained from survey data. The survey approach seems promising for our research, bearing in mind that ethnic perceptions are subjective and the product of self-definition (Posner 2000). Accordingly, we followed a practice suggested by Fearon (2003) and asked respondents questions about their ethnic-self-identification and perceptions of the ethnic diversity of their neighbourhoods.

Referring to our main research question, we examine whether the economic performance of individuals and families, proxied by their total monthly income, is affected by the ethnic composition (*d_diversity*) of the areas in which they live. To get a measure of diversity, we asked respondents to describe the level of ethnic diversity in their neighbourhood. Following Efendic et al. (2015), we provided the range of possibilities (1-5): from one ethnicity only in the neighbourhood (1); to the area is very diverse (4); while 5 codes 'do not know' responses. We also accept Haler and Eder (2015) arguments and assume that ethnic diversity can be considered as an independent source of the economic performance of individuals and households. We rely on a dummy variable since the responses are right skewed; 41% of respondents claim to live in a fully homogenous area (category 1), while some 31% live in areas with "small" diversity (category 2).

Accordingly, *d_diversity* is constructed as a dummy variable: =1 (diversity) for categories 2, 3 and 4; =0 (homogeneity) for category 1. [6]

After presenting the main variables of interest, we continue with the model specification and introduce the other control variables.

Our modelling strategy is guided by theoretical reasoning concerning the potential links between ethnic diversity and the economic performance of individuals and households measured by their levels of total monthly income. As theoretical underpinnings of our initial model we rely on the Mincer earning equation (Mincer 1974). The Mincer earning function is a single-equation model that explains earnings as a function of schooling and experience. The equation has been examined in many datasets and it remains one of the most widely used specifications in empirical economics (Lemieux 2006), and supports a wide range of augmented models. Typically, the logarithm of earnings is modelled as the sum of years of education and a quadratic function of years of potential experience. This is our platform for augmentation with our variables of interest.

We estimate a personal income model with the following baseline specification:

$$\ln earning_i = \hat{\beta}_1 + \hat{\beta}_2 \cdot age_i + \hat{\beta}_3 \cdot age^2{}_i + \hat{\beta}_4 \cdot educat_i + \hat{\beta}_5 \cdot d\_diversity_i + X \cdot \hat{\beta}_K + \hat{u}_i$$

(Equation 1)

[6] Estimation of our preferred model with separate dummy variables for each category – omitting category 1 as the base – yields statistically significant estimates for categories 2 and 4, which, however, are not statistically different from one another. Category 3 accounts for only 6% of the observations and was not statistically significant. Hence, we chose to define the variable of interest in binary terms.

In Equation 1, the dependent variable is $lnearning_i$ and denotes the respondent's level of personal income in logarithmic form; subscript i is the index for cross-section observations. The Mincer equation coefficients to be estimated include $\hat{\beta}_1$ as the intercept term; $\hat{\beta}_2$ and $\hat{\beta}_3$ are the coefficients to be estimated for variables capturing age (age_i) and squared age (age^2_i) of respondents; $\hat{\beta}_4$ estimates the effect of different levels of education ($education_i$) in the model; and $\hat{u}_i$ is the error term with standard characteristics.

The initial Mincer equation is augmented with our variable of interest, a dummy variable *d_diversity*. $\hat{\beta}_5$ estimates the effect of ethnic diversity on personal income. This variable measures whether the respondents' area is ethnically homogenous (0) or diverse (1) (Table 1). It provides sufficient contrast, since some 42% of the surveyed areas are reported to be ethnically homogenous.

We include also a vector (X) of control variables that might be important influences on earnings, including: *d_urban*, a dummy variable capturing whether the surveyed area is urban or rural (official indicators for BiH suggest that average earnings are generally higher in urban than rural areas); *d_female*, coding the gender of respondents (official sources also report that gross earnings of male respondents are higher than of female respondents) and *d_married*, coding whether respondents are legally married (important in the distinction between our individual and household models and because 'married

men are expected to work more years over their lifetime than married women and hence have higher wages while for single men and women wages are roughly similar'; Ibrahim, 2017, p.56); and *d_majority*, a dummy measuring self-identification of respondents as belonging to the minority or majority ethnic group. Since BiH is a post-ethnic conflict country, we capture ethnic status according to whether individuals perceive themselves as belonging to the minority or to the majority ethnic group. Fearon (2003) reports that around 70% of countries in the world have an ethnic group that accounts for the absolute majority; however, that is not the case for BiH. In the context of BiH it is important to control for majority/minority status within the country not least because each of the three constituent ethnicities appear to be in some parts of the country a majority while, in others, a minority. Accordingly, at the individual level, there may be variations in economic variables depending on self-reported majority/minority status, which is often identified as important in empirical research (e.g. Efendic et al. 2010; Vanhoutte and Hooghe 2012). If there is discrimination based on ethnic minority-majority status (e.g. minorities sometimes experience more problems in finding employment, hence might have systematically lower economic performance-income), this variable should capture this effect.

Finally, we include dummy variables for each surveyed region (there are 16 regions that we control in all specifications) and municipality (there are 127 municipalities that we control to check the robustness of the main model).

6. Estimation and discussion of results

In accord with our argument that current levels of ethnic diversity/homogeneity are largely the exogenous outcome of conflict, we estimate a single equation model by Ordinary Least Squares (OLS). Before we interpret our estimates, we check standard model diagnostics for functional form (the Ramsey test), multicollinearity (the Variance Inflation Factor – VIF) and joint significance (the Wald test). The results of these tests and checks are reported in Table 2 and confirm the validity of fundamental features of our modelling strategy.

Table 2. OLS estimates (cluster-robust)

	Mincer base specification		**Mincer specification with ethnic diversity**		**Fully specified diversity personal income model**		**Preferred diversity personal income model**		**Diversity family income model**		**Model 4 + index of change in municipal diversity**		**Model 6 + diversity of friendship networks**	
	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**		**Model 6**		**Model 7**	
Variable	**Coeff.**	**P>|t|**	**Coeff.**	**P>|t|**	**Coeff.**	**P>|t|**	**Coeff.**	**P>|t|**	**Coeff.**	**P>|t|**	**Coeff.**	**P>|t|**	**Coeff.**	**P>|t|**
Mincer's variables														
age	0.02	0.000	0.03	0.000	0.03	0.000	0.03	0.000	-0.01	0.005	0.02	0.000	0.03	0.000
age²	-0.01	0.001	-0.01	0.000	-0.01	0.000	-0.01	0.000	0.01	0.067	-0.01	0.000	-0.01	0.000
education	0.22	0.000	0.18	0.000	0.18	0.000	0.19	0.000	0.15	0.000	0.19	0.000	0.19	0.000
Diversity variables														
d_diversity	-	-	0.09	0.018	0.08	0.039	0.09	0.025	0.08	0.008	0.08	0.042	0.08	0.044
ch_diversity	-	-	-	-	-	-	-	-	-	-	0.02	0.704	0.02	0.713
d_ethnic_friend	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.768
Control variables														
d_urban	-	-	-	-	0.09	0.025	0.09	0.024	0.15	0.000	0.09	0.022	0.09	0.022
d_female	-	-	-	-	-0.18	0.000	-0.17	0.000	0.01	0.706	-0.17	0.000	-0.17	0.000
d_majority	-	-	-	-	0.02	0.674	0.05	0.209	0.06	0.067	0.05	0.216	0.05	0.212
d_married	-	-	-	-	-0.09	0.031	-0.09	0.012	0.08	0.011	-0.09	0.021	-0.08	0.022
MODEL DIAGNOSTICS														
Regional dummies included (16):	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Municipal dummies included (126):	No		No		Yes		No		No		No		No	
Number of observations	1,865		1,825		1,692		1,713		1,588		1,673		1,673	
R-squared	0.16		0.18		0.24		0.20		0.19		0.18		0.18	
Ramsey RESET test	Prob > F = 0.10		Prob > F = 0.16		Prob > F = 0.10		Prob > F = 0.37		Prob > F = 0.07		Prob > F = 0.40		Prob > F = 0.43	
Mean VIF	4.71		4.47		12.64		4.47		4.45		4.43		4.31	
The Wald test	Prob > F = 0.00		Prob > F = 0.00		Prob > F = 0.00		Prob > F = 0.00		Prob > F = 0.00		Prob > F = 0.00		rob > F = 0.00	
Source: Authors' calculations using STATA 14 (STATA 12, StataCorp, Texas, USA).														

All variables in the initial Mincer equation (Model 1) are statistically significant and estimated with the expected sign. Education has a highly significant positive effect in the model, while experience has a similarly positive effect but with a decreasing rate. After we augment the initial model with diversity and other control variables, these 'core' effects continue to appear with the same respective signs and similar magnitudes. This indicates the robustness of our model. Model 2 introduces our variable of interest but without the control variables, while the base model (Model 3) includes Mincer's variables, diversity and other controls, including (15) regional and (126) municipal dummies. However, our preferred, fully-specified individual earnings function is Model 4 (without municipal dummies that greatly increase the VIF); and for the family earnings function Model 5. We now interpret these results.

The level of education has the highest positive effect in the models. On average, there is approximately a 19% higher income reported by more educated individuals in comparison to those who are less educated. A positive association between education and individual earnings confirms the importance of investment in education for later economic performance. The experience of respondents affects earnings as well. Older respondents report higher incomes. However, the relationship is not linear but is subject to decreasing returns.

Ethnic diversity of the surveyed areas has a statistically significant positive effect on earnings. This is a robust finding across all the models reported in Table 2. Respondents living in more diverse areas, on average and holding all other factors constant, report nine

percent higher personal income in comparison to those individuals living in ethnically homogenous areas. Moreover, this finding holds for family income as well (Model 5). It is striking that the sign, size and statistical significance of the estimated effect of our variable of interest are all stable as we add first our control variables and then additional diversity variables to our model. Although (as we argue in Section 4 above) limits to the feasible length of our questionnaire together with an inherent limitation of cross-section data mean that we cannot control for all possible influences on income, the robustness of our estimates with respect to model specification provides reassurance that the influence of ethnic diversity is not an artefact of omitted variables bias. Accordingly, the evidence does not reject the stated hypothesis. Our estimates suggest that the effect of ethnic diversity has an economically substantial effect, which should not be ignored by policy makers. Finally, the validity of this finding is suggested by its consistency with Efendic et al. (2015) who report a positive effect of ethnic diversity in the business sector of the BiH economy.

The gender of respondents is a significant influence on income, with women on average – and holding all other factors constant – reporting a 17% smaller income than men. This is consistent with official indicators that record lower earnings for women. However, the estimated effect is higher than is suggested by official statistics, which is consistent with our strategy of capturing the effect of the unobserved economy. Accordingly, this finding implies that there might be income inequality based on gender in the informal economy as well, which could be an important issue for further investigation. The urban/rural area difference also exerts quite an important effect, suggesting that respondents and families

living in urban areas report higher incomes than those in the urban areas. Finally, the significantly negative effect of marital status on personal income (Model 4) contrasts with the significantly positive effect on family income (Model 5). This may reflect the ability of unmarried respondents to work more and thus have higher personal income, while personal income is only one source of family income. These distinctly different estimates also indicate that the survey questions on income have given rise to valid responses.

To check the robustness of our preferred specification, we augment Model 4 with two new dimensions of ethnic diversity. First, Model 6 includes our index of change of the ethnic composition of each municipality (described above). The purpose of this variable is to control for the possibility that economic outcomes are influenced not only by current ethnic diversity but also by changes in the recent past. Together with this variable, Model 7 includes a dummy variable to indicate whether respondents' friendship networks are diverse or homogeneous.[7] This is intended to control for the possibility that what matters for economic outcomes may be individual preferences expressed in the choice of friends rather than the ethnic diversity in respondents' social environment. The estimates reported in Table 2 show that neither of these variables proves to be a statistically significant influence on personal income, while the results discussed above are unaffected (i.e. there are no changes in sign or even noteworthy changes in the statistical significance or estimated size of the reported effects). Further investigation included additionally specifying a dummy variable for 15 municipalities in which the dominant ethnic group

[7] Homogeneous (=0) means no friends from other ethnicities; diverse (=1) means at least one friend from another ethnic group.

changed between the two censuses, and specifying interaction (moderating) effects between each of these new variables and our variable of interest. In no case did these robustness checks reveal either new information or noteworthy changes to the results so far discussed. We applied the same procedures to Model 5 and arrived at the same conclusions.[8]

7. Conclusion

We collected nationally representative cross-sectional survey data to investigate the effect of ethnic diversity on individual and household economic performance in Bosnia and Herzegovina. This relationship in the context of this post-conflict country is addressed and investigated by estimating models in which ethnic diversity affects personal and family incomes. The literature review establishes that ethnic diversity can have positive or negative effects on economic performance, and that different findings in this respect might be associated with the level of analysis (micro, meso or macro). Our findings are consistent with most of the micro-focused literature: ethnic diversity of neighbouring areas is not an economic threat but is rather associated with positive outcomes – higher incomes – for individuals and families. The last conflict in BiH (1992-1995) was ethnically characterized and harmful to the ethnic heterogeneity of this society. Still, two decades later, this study reveals positive economic consequences of ethnic diversity for individuals and households. After controlling for other influences, we estimate that incomes for both individuals and households (families) are almost ten percent higher as

[8] The estimates referred to in this paragraph are not reported but are available on request.

a result of living in ethnically diverse rather than in ethnically homogeneous neighbourhoods (respectively, 9% and 8%).

Bosnia and Herzegovina has been a multicultural environment for more than 1,000 years (Malcolm 1994), and our findings suggest that this authentic diversity is economically beneficial for its individuals and families. This finding should be interpreted in the context of our sample, bearing in mind that ethnic diversity often has been investigated in the framework of ethnic heterogeneities caused by immigration and inflow of different cultures and traditions into formerly homogenous areas. By implication, policies and initiatives supporting ethnic homogeneity over diversity – currently present in this long lasting ethnically diverse society – harm the economic performance of individuals and households. A corollary is that policy makers in this post-conflict country, and in similar environments elsewhere, should promote ethnic diversity and, across the broad range of public policies, take into consideration the negative effect of ethnic homogeneity. This finding and its corresponding policy implication are consistent with previous research reporting that the business sector in BiH benefits from ethnically diverse surrounding neighbourhoods.

Finally, our main concern remains the assumption that the validity of these estimates and their value as a platform for policy depends on identifying a causal connection between local ethnic diversity and personal/family incomes rather than merely a noteworthy correlation. Our identification strategy rests on the assumption that at the time of our survey local ethnic diversity had been overwhelmingly and exogenously determined by a

recent history of ethnic conflict. We argue that the decisions of both "movers" and "stayers" had been dominated by their ethnicity – fear of violence and seeking after safety determining both moving and staying, depending on location – rather than the usual processes of selection and/or self-selection that may influence decisions to move or to stay. The analytic corollary is that we can address the effects of ethnic diversity on economic outcomes at the micro level without the usual need for instruments and control functions, which can conflict with the typical limitations of survey questionnaires and cross-sectional data, or require longitudinal data, which is typically infeasible due to project duration and cost. Of course, in the context of a cross-section survey researchers cannot be sure that every possibility of endogeneity bias has been addressed. We see this as the main limitation of this study.

References

Akerlof, G. A., & Kranton, R. (2010). Identity Economics: How Identities Shape Our Work, Wages, and Well-Being. Princeton: Princeton University Press.

Alesina, A., & La Ferrara, E. (2005). Ethnic diversity and economic performance. Journal of Economic Literature, 43(3), 762-800.

Alesina, A., Baqir, R., & Easterly, W. (1999). Public goods and ethnic divisions. The Quarterly Journal of Economics, 114(4), 1243-1284.

Bellini, E., Ottaviano, G. I., Pinelli, D., & Prarolo, G. (2012). Cultural diversity and economic performance: evidence from European regions. In Geography, Institutions and Regional Economic Performance (pp. 121-141). Berlin: Springer Berlin Heidelberg.

Bieber, F. (2010). Bosnia and Herzegovina since 1990. In S. P. Ramet, Central and Southeast European Politics Since 1989 (pp. 311-328). Cambridge: Cambridge University Press.

Blimes, R. J. (2006). The indirect effect of ethnic heterogeneity on the likelihood of civil war onset. The Journal of Conflict Resolution, 50(4), 536-547.

Collier, P. (1998). The political economy of ethnicity. WPS 98-8, University of Oxford.

Collier, P., Honokan, P., & Moene, K. (2001). Implications of ethnic diversity. Economic policy, 16(32), 128-166.

Constant, A. F., Gataullina, L., & Zimmermann, K. F. (2009). Ethnosizing immigrants. Journal of Economic Behavior & Organization, 69(3), 274-287.

Dyrstad, K. (2012). After ethnic civil war - Ethno-nationalism in the Western Balkans. Journal of Peace Research, 49(6), 817-831.

Easterly, W. (2001). Can institutions resolve ethnic conflict. Economic Deveopment and Cultural Change, 49(4), 687-706.

Easterly, W., & Levine, R. (1997). Africa's growth tragedy: policies and ethnic divisions. Quarterly Journal of Economics, 112(4), 1203–1250.

Efendic, A. (2010). Institutions and Economic Performance in Transition Countries - With Special Reference to Bosnia and Herzegovina. Saarbrücken: Lambert Academic Publishing.

Efendic, A., Mickiewicz, T., & Rebmann, A. (2015). Growth aspirations and social capital: Young firms in a post-conflict environment. International Small Business Journal, 33(5), 537-561.

Efendic, A., Pugh, G., & Adnett, N. (2011). Confidence in formal institutions and reliance on informal institutions in Bosnia and Herzegovina - An empirical investigation using survey data. Economics of Transition, 19(3), 521-540.

Escaleras, M., & Register, C. A. (2011). Natural disasters and foreign direct investment. Land Economics, 87(2), 346-363.

Fearon, J. D. (2003). Ethnic and cultural diversity by country. Journal of Economic Growth, 8(2), 195-222.

Foster, E., & McCleery, A. (1999). Computer assisted personal interviewing: A method of capturing sensitive information. IASSIST Quarterly, 23(2), 26-38.

Gertler, M., Florida, R., Gates, G., & Vinodrai, T. (2002). Competing on creativity: placing Ontario's cities in North American context. A report prepared for the: Ontario Ministry of Enterprise, Opportunity and Innovation and the Institute for Competitiveness and Prosperity.

Goren, E. (2014). How ethnic diversity affects economic growth. World Development, 59(July 2017), 275-297.

Haler, M., & Eder, A. (2015). Ethnic Stratification and Economic Inequality Around the World – the End of Explatation and Esclusion?. Farham: Ashgate.

Hodson, R., Sekulic, D., & Massey, G. (1994). Who were the Yugoslavs? Failed sources of a common identity in the former Yugoslavia. American Sociological Review, 59(1), 83-97.

Ibrahim, A. (2017). Social, Human and Job Characteristics as the Determinants of Wages and Gender Disctrimination in Syria. PhD Thesis, Brunel University London.

Jacobs, J. (1961). The Death and Life of Great American Cities. New York: Random House.

Lemieux, T. (2006). Jacob Mincer A Pioneer of Modern Labor Economics. New York: Springer.

Malcolm, N. (1994). Bosnia – A Short History. London: Macmillan.

Mincer, J. (1974). Schooling, Experience and Earnings. New York: Columbia University Press.

Montalvo, J., & Reynal-Querol, M. (2005). Ethnic diversity and economic development. Journal of Development Economics, 76(2), 293–323.

Olzak, S. (2011). Does globalization breed ethnic discontent?. The Journal of Conflict Resolution, 55(1), 3-32.

Osborne, E. (2000). Multiculturalism, and ethnic conflict: A rent-seeking perspective. Kyklos, 53(4), 509-526.

Ottaviano, G., & Peri, G. (2006). Rethinking the gains of immigration on wages: theory and evidence from the US. NBER Working Paper No. 12497.

Patsiurko, N., Campbell, J. L., & Hall, J. A. (2012). Measuring cultural diversity: ethnic, linguistic and religious fractionalization in the OECD. Ethnic and Racial Studies, 35(2), 195-217.

Posner, D. (2000). Measuring ethnic identities and attitudes regarding inter-group relations: Methodological pitfalls and a new technique. A memo prepared for LiCEP2, University of Pennsylvania: 20-22 October.

UNDP. (2000-2010). Early Warning System BiH (quarterly and annual surveys). Sarajevo: UNDP BiH.

Vanhoutte, B., & Hooghe, M. (2012). Do diverse geographical contexts lead to diverse friendship networks? A multilevel analysis of Belgian survey data. International Journal of Intercultural Relations, 36(3), 343-352.

Appendix A. Survey questionnaire (questions used in this study)

INDICATORS	No.	Formulation of questions (adapted to the local language)
Ethnic diversity	1.	How would you describe the level of ethnic diversity in your neighbourhood: a. There is only one ethnicity b. Small number of people from other ethnicities c. Larger number of other ethnicities d. There is a large diversity (i.e., it is very mixed)
Minority v.v. Majority ethnic status	2.	In the area where you live (street or village) is your ethnic group with which you identify yourself the minority or majority (Minority, Majority)
Ethnic diversity of networks	3.	What percentage of your friends belongs to an ethnic group other than your own;_____%
Total monthly income of the respondent	4.	Denoted in KM, what was your total income last month including all sources of income: (scale)
Total monthly income of the family	5.	Denoted in KM, what was the total income of your family last month including all sources of income: (scale)
Age	6.	How old are you?
Gender	7.	What is your gender?
Marital status	8.	What is your marital status?
Education	9.	What is your highest level of education?
Area	10.	urban –city, suburb, rural- village
Municipality	11.	Municipality: _____