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CULTURAL DIVERSITY IN WESTERN ASIA: ECONOMETRIC MODELING OF TRUST AND RANKING BY HOMOGENEITY

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ABSTRACT

The main objective of the research is to discover Western Asian countries in the dimensions of new institutional economics: ethnicity, language, religion and trust. The region significantly overlaps with the Middle East which is growing in population terms. It makes mentioned issues interesting for discussion. In order to evaluate a relationship between 'Ethnicity and Trust', "Language and Trust' and 'Religion and Trust' a correlation and regression analysis is conducted. The author also makes an attempt to determine the influence of these three independent variables on the dependent variable 'Trust'. Additionally, a new complex estimator, consisting of 'Ethnicity', "Language' and 'Religion' fragmentation indices, was created and computed. The complex estimator allows to evaluate cultural diversity of the region - homogeneity or heterogeneity - in terms of ethnicity, language and religion simultaneously, as well as to determine the most trustful societies. Business agents may base their investment-location decisions on the complex estimator as an additional informational criterion of risk reduction.

Contribution/ Originality: The paper contributes the first logical analysis of ethno-linguistic and religious fractionalization and its influence on the level of trust in countries of Western Asian region. We encourage further investigation of Western Asia from the standpoint of other political economy, cultural and social categories.

1. INTRODUCTION

The article dwells on the results of the team serial project, an objective of which is to configure the region of Western Asia in different political economy categories such as population, capital income, human development, economic globalization, trade, foreign direct investment, trust, rule of law and control of corruption and other categories (for example, see publications: (Alhanaqtah, 2016; Alhanaqtah, 2016a; Alhanaqtah, 2016b; Alhanaqtah, 2017a; Alhanaqtah, 2017b). At this stage we are interested in the analysis of the diversity of Western Asian countries in the categories of ethnicity, language and religion. In the previous published research ("Ethno-linguistic and religious fractionalization of Western Asia: political economy approach") we discussed why these three issues remain such sensitive, pointed shortcomings in the data collection and measurement, explained the mechanisms by which these phenomena affect a level of trust in a society as well as configured Western Asian countries in the

categories of ethnicity, language and religion, separately. Through a comparative analysis technique we analyzed the diversity within a target region and showed where it fits in the world spectrum.

The purpose of this research article is to create a complex estimator of cultural diversity based on the categories ethnicity, language and religion. It allows to rank countries by these three categories simultaneously, to determine the most homogeneous and, presumably, the most trustful. For this purpose two mathematical methods - method of places and taksonometric (quasi distance) method - are applied. We also conduct the correlation and regression analysis in order to statistically verify a relationship between trust and three variables - ethnicity, language and religion. Then we use the obtained information to construct different regression models and to opt for the most qualitative so as to explain the change in the trust indicator from three variables. Further, for the best model we conduct econometrical tests and give explanation for the observed results.

Before we dig into the issue we have to introduce ourselves through several questions.

1.1. What Countries are we 'Configuring'?

We investigate 17 countries of Western Asia: Armenia, Azerbaijan, Bahrain, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian Territories, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, United Arab Emirates and Yemen. The total population of Western Asia is 265 million as of 2017 or 0.035 % of world population (Worldometers, 2017), with projection to reach 370 million by 2030 (Maddison, 2007). It corresponds to an annual growth rate of 1.4 %, which is above the world average annual growth rate of 0.9 % (Maddison, 2003). The region significantly overlaps with the Middle East and it is growing in population terms which make issues on ethnicity, language and religion interesting for discussion.

1.2. What are the Variables for Analysis?

We examine data sets on ethnicity, language, religion and trust. We are interested in the categories of ethnicity, language and religion because we hypothesize that they may directly influence the level of trust in a society. Social trust (e.g., (Brown and Uslaner, 2005; Delhey and Newton, 2005; Berggren and Jordahl, 2006)) refers to trust in general and is related to many economic and political issues, such as, for example, better governance (Knack, 2002) economic growth (Knack and Keefer, 1997; Zak and Knack, 2001; Berggren *et al*., 2008) higher rates of subjective wellbeing (Helliwell, 2006) and higher education (Bjørnskov, 2009; Papagapitos and Riley, 2009).

1.2.1. Ethic Fragmentation

Ethnic fragmentation matters from the standpoint of the ways of interaction between different ethnicities, and not from the standpoint of the quantity of ethnicities in the country. Different ethnic groups may have different aspirations that, in turn, might have an impact on society, including political issues. We should mention that the pseudoscience of eugenics and Nazi ideology in 1920th and 1930th (Weindling, 1993; NIOD, 2002; Montalvo and Reynal-Querol, 2005; Bashford and Levine, 2010; Mamdani, 2014; Griffiths, 2016) have casted a dark cloud over almost any neutral discussion of ethnicity, which has become not an abstract concept but a matter of life and death. Despite this, since 1997 the World Bank economists (Easterly and Levine, 1997; Alesina and La Ferrara, 2000; Alesina *et al*., 2003) have started studies of ethno-linguistic fragmentation of the world countries.

1.2.2. Language Fragmentation

We analyze language diversity since the core of the problem with fragmentation is communication. Different language groups access different news media and get exposed to different political messages and this enhances cultural differences that inhibit the construction of trust. These factors also affect economic performance not only through the trust mechanism, but also directly by fragmenting markets, raising transaction costs and inhibiting labor productivity. Moreover, in a polarized society the dominant group tends to use its power to shape policies in

its own interests. If sufficiently powerful it may even do so at the expense of property rights and civil rights. Additionally, such dominate groups may promote a 'culture of intolerance' (Griffiths, 2016). None of this is consistent with enhancing trust.

1.2.3. Religion Fragmentation

Religion fragmentation matters because it touches the core of one's existence and might trigger strong and even violent emotions. On the positive side, religious teachings emphasize the benefits of generosity towards others and disapprove of anti-social behavior. Orbel *et al.* (1992) in particular, reports that religious persons are thought to be more cooperative in a prisoner's dilemma experiment. And indeed, there are arguments for a positive effect on trust, mainly based on the idea that religions generally encourage adherents to do well towards others. On the negative side, religious teachings might create a clear divide between the religious and the non-religious (Putnam, 1995; Emerson and Smith, 2000; Guiso *et al.*, 2003; Fox, 2004; Greer *et al.*, 2005; Garcia and King, 2008) which militates against trust creation. We expect that the impact of religion on trust in a society may be greater than the impact of such variables as ethnicity and language. Note, that in our analysis we are looking at societal fragmentation by the criterion of religion, and not for the impact of a specific religion.

1.3. How do we Configure the Region?

In the previous research we used a comparative analysis technique as a methodology of the research (Alhanaqtah, 2017b). We began with ranking the data of all the world economies in ascending order. This way we could see how countries are located in the world on a chosen criterion - ethnicity, language or religion. Then we placed our target region - Western Asia - along the world spectrum. Then we described whether the countries of a target region are at the top, middle, bottom or scattered randomly; whether they are similar or clustered, or diverge radically. We found out that in terms of ethnicity and religion distribution of countries of Western Asia is close to symmetric, with a small value of skewness, i.e. the county-observations deviate mostly towards heterogeneity. In terms of religion the distribution of Western Asian countries is left skewed which means that the vast majority of country-observations deviate towards heterogeneity, i.e. rather fragmented.

After that we analyzed the nature of the *data*. It is worth to be mentioned that ethnicity, language and religion are very difficult concepts to operationalize. As regards the *ethnicity* there are the following problems: legal definition of nationality and ethnicity; difficulties with self-identification; the problem of determination the degree of cultural differences; the context in which the question about ethnicity was asked (political pressures, discrimination, illegality in status, etc.). Concerning the *language* there are the following problems: what is one's mother's tongue in bilingual or multilingual societies; when does a language become a dialect and when does a dialect become a language. As far as the *religion* there is also a problem of measurement of religious diversity: the issue is so personal, as well as it can be insecure to reveal religious affiliation for fear of discrimination; religious institutions tend to consider a member as a member for life, even if a person does not attend a religious institution any longer. Thus, the reliable data is very scarce. Even though the mentioned concepts are contested, the attempts to measure the degree of fragmentation of a society by the ethnic, language and religion criterions have been made.

2. COMPLEX ESTIMATOR AND RANKING OF WESTERN ASIAN COUNTRIES BY THE DEGREE OF HOMOGENEITY

In the research (Alhanaqtah, 2017b) we analyzed the degree of fragmentation of Western Asian countries in three categories *separately* - ethnicity, language and religion - and we discovered the most homogeneous and the most fragmented countries in the region. The objective of the current step is to create a *complex estimator*, based on these three mentioned criterions. The complex estimator will allow us to rank countries of Western Asia by these

categories *simultaneously*. For this purpose the author applies two mathematical methods: a method of places and a taxonometric (quasi distance) method.

2.1. Method of Places

The methodology of the method of places is as follows. We order values of a particular category from the best to the worst (dependent on the meaning of a category, i.e. maximum value is not necessarily the best and vice versa), so that the first place is given to the best value and the last place is given to the worst value. Then we sum up places: $R = \sum_{i=1}^{n} M_i$. The smaller the obtained sum is the better. Thus, the object (a country) with the minimum sum of places is considered the best, i.e. it is given the highest rank.

There are values of the Trust index, Ethnic fragmentation and Religion fragmentation indices, provided by Alesina *et al.* (2003) and Language fragmentation index, provided by The Ethnologue Project (2009) in a Table 1.

Table-1. Trust, Ethnicity, Language and Religion fragmentation indices

Country	Trust	Ethnicity	Religion	Language
Armenia	21,2	0,1272	0,4576	0,125
Azerbaijan	32,8	0,2047	0,4899	0,457
Bahrain	-	0,5021	0,5528	0,663
Georgia	38,2	0,4923	0,6543	0,582
Iraq	66,7	0,3689	0,4844	0,728
Israel	48,3	0,3436	0,3469	0,665
Jordan	26,4	0,5926	0,0659	0,496
Kuwait	59,2	0,6604	0,6745	0,556
Lebanon	29,5	0,1314	0,7886	0,161
Oman	-	0,4373	0,4322	0,702
Palestinian Territories	42,4	-	0,3095	0,208
Qatar	42,9	0,7456	0,095	0,608
Saudi Arabia	105,8	0,18	0,127	0,626
Syrian Arab Republic	-	0,5399	0,431	0,527
Turkey	10,2	0,32	0,0049	0,394
United Arab Emirates	-	0,6252	0,331	0,777
Yemen	81,7	-	0,0023	0,578
mean ($\bar{x}$)	35,606	0,369	0,368	0,520
standard deviation (σ)	30,513	0,232	0,240	0,196

Note: '-' means there is no data.
Source: Author's calculation in MS Excel based on data from Alesina *et al.* (2003); TEP (2009); World Values Survey (2015).

In accordance with the algorithm of the method of places we construct a matrix with places (Table 2). Concerning Ethnic, Language and Religion fragmentation indices, the lower the values the better (a society is considered to be more homogeneous), so we give the first place to the country with the lowest value, considering every index separately.

The Table 2 shows that Turkey has the lowest value of sum of places (13). Thus, Turkey is the most culturally homogeneous country in the region. Among leaders in terms of homogeneity are also Armenia, Saudi Arabia, Jordan and Lebanon. The least homogeneous society is Kuwait, followed by Bahrain, UAE and others.

Table-2. Ranking of Western Asian countries (Method of places)

Country	Ethnicity	Religion	Language	Sum of places	Rank
Armenia	1	11	1	13	**2**
Azerbaijan	4	13	5	22	5
Bahrain	10	14	13	37	12
Georgia	9	15	10	34	10
Iraq	7	12	16	35	11
Israel	6	8	14	28	7
Jordan	12	3	6	21	4
Kuwait	14	16	8	38	13
Lebanon	2	17	2	21	4
Oman	8	10	15	33	9
Palestinian Territories	-	6	3	9	-
Qatar	15	4	11	30	8
Saudi Arabia	3	5	12	20	**3**
Syrian Arab Republic	11	9	7	27	6
Turkey	5	2	4	11	**1**
United Arab Emirates	13	7	17	37	12
Yemen	-	1	9	10	0

Note: '-' means there is no data.
Source: Author's calculation in MS Excel based on data from Alesina *et al.* (2003); TEP (2009); Easterly and Levine (1997).

2.2. Taxonometric Method

In the next step we are going to conduct an analysis with the help of the taxonometric (quasi distance) method. The methodology of the method is as follows. We rank $m = 17$ countries of Western Asia by $n = 3$ indicators (ethnicity, language, religion). Then the set of all values of the indicators can be represented as a matrix:

$$X = \begin{pmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ \dots & \dots & \dots \\ x_{17,1} & x_{17,2} & x_{17,3} \end{pmatrix}$$

Since all indicators are of different nature we have to standardize them. Thus, we replace the matrix X by the matrix Z, computing z-score:

$$z_{ij} = \frac{x_{ij} - \overline{x_i}}{\sigma^2},$$

where $\overline{x_{ij}}$ is the mean value of a particular indicator for 17 countries and σ^2 is squared standard deviation.

$$Z = \begin{pmatrix} z_{11} & z_{12} & z_{13} \\ z_{21} & z_{22} & z_{23} \\ \dots & \dots & \dots \\ z_{17,1} & z_{17,2} & z_{17,3} \end{pmatrix}$$

The next step involves the formation of a 'standard country', which is a hypothetical country with the best values of indicators. For this purpose the smallest value of every indicator is selected in every column, because for all three indicators the smaller value is considered to be the better value in terms of homogeneity of a society. Characteristics of the "standard country" are a row-matrix:

$$\begin{pmatrix} z_1^{standard} & z_2^{standard} & z_3^{standard} \end{pmatrix}$$

In the next step we calculate the quasi distance (R) from a country's values to a 'standard country's' values:

$$R_j = \sum_{i=1}^{17} \left(z_{ij} - z_i^{standard} \right)^2$$

Choosing the 'best' country is carried out by the *method of least squares*: a country with the minimum value of R is considered to be the 'best', i.e. the highest score will be received by a country with the minimum 'distance' from the 'standard country'. The best country is the most homogeneous in terms of ethnicity, language and religion.

In accordance with the described algorithm the following computations were conducted. The matrix X is based on the values represented in the Table 1. The values of the matrix Z are represented in the Table 3.

Table-3. *Z*-matrix

Country	Ethnicity	Religion	Language
Armenia	-1,041	0,374	-2,02
Azerbaijan	-0,707	0,509	-0,325
Bahrain	0,574	0,77	0,726
Georgia	0,532	1,192	0,313
Iraq	0	0,486	1,058
Israel	-0,109	-0,086	0,736
Jordan	0,964	-1,254	-0,126
Kuwait	1,256	1,276	0,18
Lebanon	-1,023	1,75	-1,836
Oman	0,295	0,269	0,925
Palestinian Territories	-1,589	-0,241	-1,596
Qatar	1,623	-1,133	0,445
Saudi Arabia	-0,814	-1	0,537
Syrian Arab Republic	0,737	0,264	0,032
Turkey	-0,211	-1,507	-0,647
United Arab Emirates	1,104	-0,152	1,308
Yemen	-1,589	-1,518	0,292

Source: Author's calculation in MS Excel.

Based on *Z*-matrix we compute the row-matrix for the 'standard country':

$$\left(-1{,}589^{Standard}_{Ethnicity} \quad -1{,}518^{Standard}_{Religion} \quad -2{,}020^{Standard}_{Language}\right)$$

Then we compute quasi distances (R) from a country's values to 'standard country's' values. The results of computations are represented in the Table 4.

Table-4. Ranking of Western Asian countries (Taxonometric method)

Country	Quasi distance, *R*			Country's rank		
	Weight of the indicator 'Religion'			Weight of the indicator 'Religion'		
	0,33(3)	*0,4*	*0,5*	*0,33(3)*	*0,4*	*0,5*
Armenia	3,88	1,52	1,87	**2**	**2**	**2**
Azerbaijan	7,76	2,74	2,97	4	4	6
Bahrain	17,46	5,76	5,67	13	12	13
Georgia	17,28	5,92	6,16	12	13	14
Iraq	16,01	5,21	5,01	10	11	10
Israel	11,84	3,76	3,47	7	6	6
Jordan	10,17	3,06	2,56	5	5	4
Kuwait	20,74	7	7,14	15	15	15
Lebanon	11,03	4,38	5,43	6	8	11
Oman	15,42	4,94	4,65	9	9	9
Palestinian Territories	1,81	0,71	0,86	-	-	-
Qatar	16,54	4,98	4,17	11	10	8
Saudi Arabia	7,41	2,25	1,92	**3**	**3**	**3**
Syrian Arab Republic	12,79	4,16	3,99	8	7	7
Turkey	3,79	1,14	0,95	**1**	**1**	**1**
United Arab Emirates	20,2	6,25	5,52	14	14	12
Yemen	5,35	1,6	1,34	-	-	-

Note: '-' means there is no data.
Source: Author's calculation in MS Excel.

In this step we computed quasi distances (R) in three ways:

(1) all three indicators - Ethnicity, Language and Religion - are weighted equally, 33.3(3) %;

(2) Indicator 'Religion' has a weight 40 %, while indicators 'Language' and 'Ethnicity' have equal weights of 30 %;

(2) Indicator 'Religion' has a weight 50 %, while indicators 'Language' and 'Ethnicity' have equal weights of 25 %.

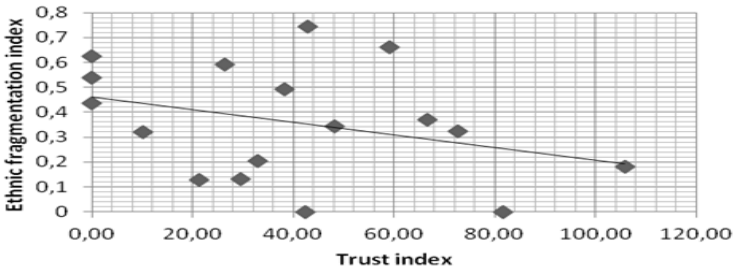
The reason for this *simulation* is as follows. In societies where religion is experienced as an important factor in daily life, factor of religion might be more influential on the level of trust than factors of ethnicity or language. Indeed, in Muslim societies, which are the majority in the Western Asia, religion is embedded into daily life and serves as an important determinant of trust.

Besides ranks, an additional question of interest was: whether there are distinctions in countries' ranks if we change the weight of a factor 'Religion'. The results of analysis showed that irrespectively of the weight of a factor 'Religion' the leaders in the region are Turkey, Armenia and Saudi Arabia, followed by Azerbaijan and Jordan. These countries are the most homogeneous in terms of ethnicity, language and religion and, presumably, are the most trustful. The lowest rank belongs to Kuwait, preceded by UAE and Bahrain, as the least homogeneous countries in Western Asia. Due to different weights of the factor 'Religion' countries' ranks in the middle of a sample are slightly different. The results obtained by the taxonometric method correspond to the results obtained by the method of places.

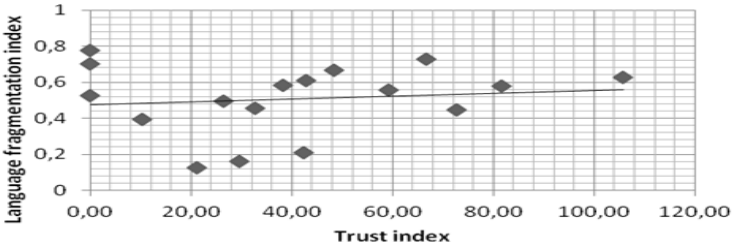
3. CORRELATION BETWEEN ETHNICITY, LANGUAGE, RELIGION AND TRUST

The theory presumes that the more homogeneous the society the higher the level of trust. In this stage we are going to verify statistical relationship between trust and three variables - ethnicity, language and religion.

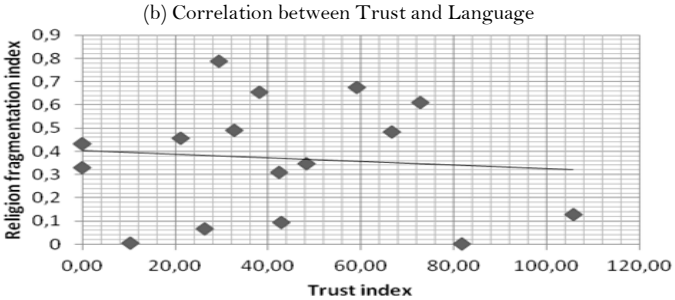
In the first step we start with calculation of a linear correlation coefficient (Figure 1).



(a) Correlation between Trust and Ethnicity



(b) Correlation between Trust and Language



(c) Correlation between Trust and Religion

Figure-1. Correlation between variables

Source: Author's calculation in MS Excel.

The value of the linear correlation coefficient between the variables 'Trust' and 'Ethnicity' is -0.334, between 'Trust' and 'Language' the value is 0.125, between 'Trust' and 'Religion' the value is -0.097. The results demonstrate weak linear relationship between the Trust index and corresponding variables (indices), or its absence.

4. REGRESSION ANALYSIS

In the second step we opt for the most qualitative model in order to explain the change in the Trust index from three variables - ethnicity, language and religion.

Since the linear relationship in pairs 'Trust' - 'Ethnicity', 'Trust' - 'Language' and 'Trust' -'Religion' is weak, we take logarithms of each variable to make a relationship more linear and to estimate a regression model with the help of a linear function. Additionally, logarithmized data allows us to conduct an analysis in percentage terms. The graphics with logarithmized and non-logarithmized pairs of variables are in Figure 2.

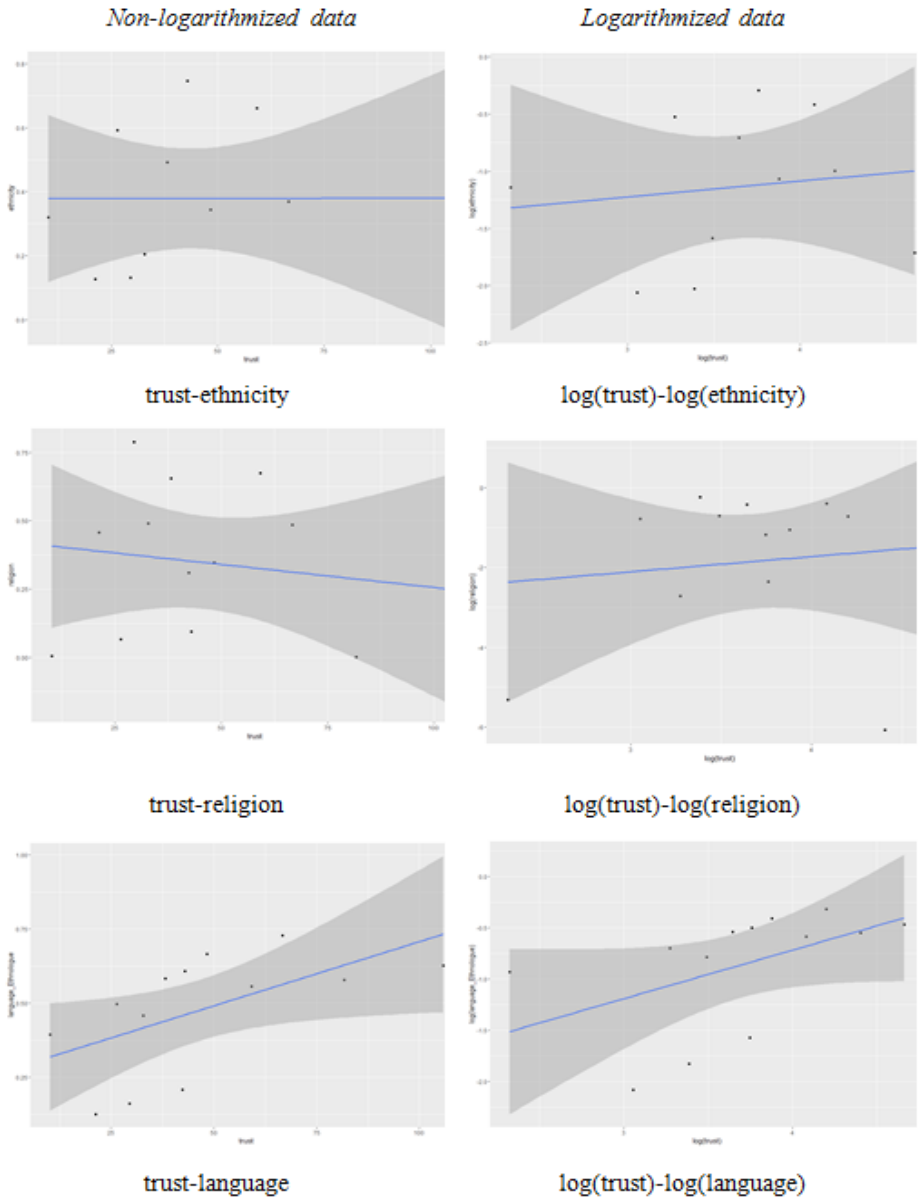


Figure-2. Graphics for logarithmized and non-logarithmized pairs of variables
Source: Author's calculation in R-Studio (R-script is in Appendix).

In the third step we estimate a linear model where the predictive variable is 'Trust' and regressors are 'Ethnicity', 'Language' and 'Religion'. Summary statistics is in the Table 5.

Table-5. Summary statistics for the estimated model for 'Trust'

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	4.34409	0.31152	13.945	2.31e-06 ***
log(ethnicity)	-0.35058	0.28006	-1.252	0.2508
log(religion)	0.23585	0.08459	2.788	0.0270 *
log(language_Ethnologue)	0.92705	0.30058	3.084	0.0177 *

Note: *: significant at 5%; ***: significant at <1%.
Source: Author's calculation in R-Studio (R-script is in Appendix).

The statistics shows that *Intercept* is significant ($\alpha < 1\%$), coefficients by *log(religion)* and *log(language)* are significant ($\alpha = 5\%$), coefficient by *log(ethnicity)* is insignificant. Since six observations were deleted from a sample due to missingness, but in the theory it is presumed a relationship between the trust and the ethnicity, we consider it is reasonable to include the variable 'Ethnicity' into the model (initial model):

$$\log(trust) = 4.344 - 0.350\log(ethnicity) + 0.236\log(religion) + 0.927\log(language)$$

At the same time we may compare alternative models and choose the best one based on the following criterions: coefficient of determination (R^2), adjusted coefficient determination (R^2_{adj}), informational criteria ACAICE (*AIC*) and Schwartz (*BIC*) and residuals squared sum (*RSS*). The initial and alternative models:

Model 1 (initial): $log(trust) = log(ethnicity) + log(religion) + log(language)$

Model 2: $log(trust) = log(religion) + log(language)$

Model 3: $trust = log(ethnicity) + log(religion) + log(language)$

Model 4: $trust = log(religion) + log(language)$

Model 5: $trust = ethnicity + religion + language$

Model 6: $trust = religion + language$

In models 2, 4 and 6 we excluded the variable *log(ethnicity)* as insignificant. Summary statistics for six alternative models is represented in a Table 6.

Table-6. Summary statistics for six alternative models

Criterion	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
R-squared	0.7	0.3	0.6	0.3	0.5	0.3
R-squared adjusted	0.6	0.2	0.4	0.1	0.3	0.2
Deviance (RSS)	1.1	3.1	2892.9	6062.1	3287.7	5535.3
AIC	16.0	26.3	102.5	124.8	103.9	123.6
BIC	18.0	28.5	104.5	127.0	105.9	125.9
number of observations	11	13	11	13	11	13

Source: Author's calculation in R-Studio (R-script is in Appendix).

The results of comparative analysis show that our initial model (Model 1) is relatively the best: R^2 and R^2_{adj} are the highest (70 % and 60 %), sum of squared errors (*RRS*) is much lower than in other models (1.1), informational criterions *AIC* and *BIC* are the lowest too (16 and 18). Thus, we opt for the Model 1 for further econometric tests.

5. ECONOMETRIC TESTS

In the fourth step we test a hypothesis for some *linear restrictions simultaneously*. The null hypothesis (H_0) implies that the whole regression is insignificant:

$$H_0 = \begin{cases} \beta_{\log(ethnicity)} = 0\ (first\ restriction) \\ \beta_{\log(religion)} = 0\ (second\ restriction) \\ \beta_{\log(language)} = 0\ (third\ restriction) \end{cases}$$

The alternative hypothesis (H_a) implies that at least one of three β-coefficients is significant (non-zero) so the whole regression is considered to be significant. The null hypothesis is verified with the help of the Wald test based on the algorithm of the F-test (Table 7).

Table-7. Econometric tests

Econometric test	test-statistic	p-value
Wald test	5.911	0.02478 *
RESET test	1.1334	0.3927
Breusch-Pagan test	5.587	0.1335
Durbin-Watson test	1.540138	0.26

Source: Author's calculation in R-Studio (R-script is in Appendix).

At 5 % level of significance null hypothesis is rejected (p-value is 0.02478). Thus, at least one of the β-coefficients is not equal to zero, and omission of coefficients is not reasonable. The regression model is significant.

If we have observations, then, in order to verify whether significant variables were omitted or not, we use F-test (Wald test). However, it can be a situation when we have to include variables into the model, for which we do not have observations at all.

Thus, in the fifth step we verify whether we have *omitted regressors* in the model, for which we don't have observations. The null hypothesis (H_0) implies that the model is correct: we included exactly those variables that must have been included. There are not any omitted regressors. The alternative hypothesis (H_a) implies that there are unknown omitted regressors. The null hypothesis is verified with the help of Ramsey (RESET) test (Table 7). The results of computations show that null hypothesis is not rejected (p-value is 0.3927) at all levels of significance. Alternatively, RESET-test statistic is more than F-critical point statistic (1.1334<5.786), thus, H_0 is not rejected. The regression model does not contain unknown omitted regressors.

In the sixth step the presence of *multicollinearity* (linear relationship between regressors) in the model has been verified. We have computed variance inflation factors (VIF). VIF for log(ethnicity) is 1.99, VIF for log(religion) is 1.04 and VIF for log(language_Ethnologue) is 1.94. The results show that there is no multicollinearity in the model because all variance inflation factors are less than a normative 10.

In the seventh step the presence of *heteroscedasticity* (variance of residuals is not constant for every observation) in the model has been verified (Table 7). The null hypothesis (H_0) in the Breusch-Pagan test implies that there is no heteroscedasticity in a model. Since p-value is high (more than $\alpha = 10\%$), then null hypothesis is not rejected. The model does not have a problem of heteroscedasticity of residuals.

In the eighth step the presence of *autocorrelation* (whether residuals are correlated between observations) in the model has been checked. For this purpose Durbin-Watson test for the autocorrelation of the first order has been fulfilled (Table 7). The Durbin-Watson test showed that there is no autocorrelation of the first order in the model (p-value is rather high so null hypothesis on absence of autocorrelation is not rejected).

All conducted econometric tests showed that the regression model is adequate to the data.

6. CONCLUSIONS

In the research we discovered the region of Western Asia in three dimensions of cultural economics: ethnicity, language and religion. Even though the ethnicity, language and religion are very difficult concepts to operationalize, they are interesting for discussion. We conducted the correlation and regression analysis in order to evaluate a relationship between 'Ethnicity' and 'Trust', "Language' and 'Trust' and 'Religion' and 'Trust', as well as the influence of these three independent variables on the dependent variable 'Trust'. We also created and computed a new complex estimator which allowed evaluating cultural diversity of the region via ranking the countries by the categories of ethnicity, language and religion simultaneously. The results of analysis are largely influenced by statistical data, collection and measuring of which have some drawbacks. Nevertheless, the research was conducted based on the latest available statistical data. The major outcomes are as follows:

- We created and computed a complex estimator with the help of two methods: method of places and taksonometric (quasi distance) method. Both of them revealed that Turkey is the most homogeneous country in the region, in terms of ethnicity, language and religion, taken simultaneously. Among leaders in terms of homogeneity are also Armenia and Saudi Arabia. In accordance with the method of places Jordan and Lebanon occupy 4th place; in accordance with the taxonometric method Jordan occupies the 5th place while Azerbaijan occupies the 4th. The least homogeneous society is Kuwait, followed by Bahrain, UAE and other countries. On balance, the results obtained by the taxonometric method correspond to the results obtained by the method of places.
- We suppose that a variable 'Religion' has a greater influence on the variable 'Trust' because in Muslim society religion is experienced as an important factor in daily life. Thus, in the taxonometric method we conducted simulation of quasi distances in three ways: (1) all three indicators - ethnicity, language and religion - are weighted equally, 33.3(3) %; (2) indicator 'Religion' has taken with the weight 40 %, while indicators 'Language' and 'Ethnicity' have been taken with equal weights of 30 %; (3) indicator 'Religion' has been taken with the weight 50 %, while indicators 'Language' and 'Ethnicity' have been taken with equal weights of 25 %. The results of analysis showed that irrespectively of the weight of a factor 'Religion' the leaders in the region are Turkey, Armenia and Saudi Arabia, followed by Azerbaijan and Jordan. These countries are the most homogeneous in terms of ethnicity, language and religion and, presumably, are the most trustful. The lowest rank belongs to Kuwait, preceded by UAE and Bahrain, as the least homogeneous countries in Western Asia. Due to different weights of the factor 'Religion' countries' ranks in the middle of a sample are slightly different.
- The analysis demonstrates weak linear relationship between the Trust index and a corresponding variable, or its absence. It could be due to the scarcity of qualitative data, as well as the relationship could be non-linear. Since in the theory it is hypothesized that there is a relationship between the variables, we conduct an analysis by taking logarithms of each variable in order to make a relationship more linear and estimate alternative models with the help of a linear function. Additionally, logarithms allow us to operate with the data in percentage terms.
- We estimated a linear model in order to explain the change in the dependent variable 'Trust' from three independent variables - 'Ethnicity', 'Language' and 'Religion'. Withal, we compared alternative models and opted for the best one based on criterions: coefficient of determination (R^2), adjusted coefficient determination (R^2_{adj}), informational criterions ACAICE (AIC)/Schwartz (BIC) and residuals squared sum (RSS). The results of comparative analysis showed that our initial model (Model 1) is relatively the best.
- For the best model we conducted econometric tests: F-test (Wald test), RESET test, tests to detect the presence of multicollinearity (VIF), heteroscedasticity (Breusch-Pagan test) and autocorrelation of the first order (Durbin-Watson test). All econometric tests showed that the model is adequate to the data and it may be used to explain the variability of the variable 'Trust'.

In the research work we reported first results on ethno-linguistic and religious fractionalization of Western Asia and its influence on the level of trust in a country. We also created a new complex estimator, based on three variables, in order to rank countries of interest by the criteria of homogeneity and to determine the most trustful societies.

7. APPENDIX: R-SCRIPT FOR DATA PROCESSING

```
# Creation of a data set
trust<-c(21.2,32.8,NA,38.2,66.7,48.3,26.4,59.2,29.5,NA,42.4,42.9,105.8,NA,10.2,NA,81.7)
ethnicity<-
c(0.1272,0.2047,0.5021,0.4923,0.3689,0.3436,0.5926,0.6604,0.1314,0.4373,NA,0.7456,0.18,0.5399,0.32,0.6252,NA)
religion<-
c(0.4576,0.4899,0.5528,0.6543,0.4844,0.3469,0.0659,0.6745,0.7886,0.4322,0.3095,0.095,0.127,0.431,0.0049,0.331,0.0
023)
language_Ethnologue<-
c(0.125,0.457,0.663,0.582,0.728,0.665,0.496,0.556,0.161,0.702,0.208,0.608,0.626,0.527,0.394,0.777,0.578)
Data<-data.frame(country,trust,ethnicity,religion,language_Ethnologue,language_Desmet)
summary(Data)
# Packages
install.packages("psych")
install.packages("dplyr")
install.packages("ggplot2")
install.packages("memisc")
library("psych")
library("dplyr")
library("ggplot2")
library("memisc")
# Graphics for logarithmized and non-logarithmized pairs of variables (Figure 2)
qplot(data=Data,trust,ethnicity)+stat_smooth(method="lm")
qplot(data=Data,trust,religion)+stat_smooth(method="lm")
qplot(data=Data,trust,language_Ethnologue)+stat_smooth(method="lm")
qplot(data=Data,log(trust),log(ethnicity))+stat_smooth(method="lm")
qplot(data=Data,log(trust),log(religion))+stat_smooth(method="lm")
qplot(data=Data,log(trust),log(language_Ethnologue))+stat_smooth(method="lm")
# Scripts for six alternative models (Table 5, Table 6)
m1<-lm(data=Data,log(trust)~log(ethnicity)+log(religion)+log(language_Ethnologue))
m2<-lm(data=Data,log(trust)~log(religion)+log(language_Ethnologue))
m3<-lm(data=Data,trust~log(ethnicity)+log(religion)+log(language_Ethnologue))
m4<-lm(data=Data,trust~log(religion)+log(language_Ethnologue))
m5<-lm(data=Data,trust~ethnicity+religion+language_Ethnologue)
m6<-lm(data=Data,trust~religion+language_Ethnologue)
mtable(m1,m2,m3,m4,m5,m6)
# Test for some linear restrictions simultaneously (Table 7)
install.packages("lmtest")
library("lmtest")
waldtest(m1)
```

```
# Test for omitted regressors (Table 7)
resettest(model)
# Multicollinearity test (Table 7)
install.packages("car")
library("car")
vif(model)
# Heteroscedasticity test (Table 7)
bptest(model)
# Test for autocorrelation of the first order (Table 7)
dwt(model)
#End of R script
```

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