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ANALYSIS OF THE RELATIONSHIP BETWEEN UNEMPLOYMENT AND SELF-EMPLOYMENT IN OECD COUNTRIES

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Abstract

There is a large number of works related to the analysis of the relationship between unemployment and self-employment. In our work, based on the collected data from 2000 to 2020. for 38 OECD countries, the relationship between self-employment and the unemployment rate was analysed. Research methods: to identify and assess the closeness of the relationship between the data on unemployment and self-employment, the Spearman's parametric correlation coefficient was calculated. In order to group countries by indicators of self-employment and unemployment, the method of hierarchical cluster analysis was used, followed by visualization of the dendrogram. Research results: Spearman's correlation between self-employment and unemployment was 0.3 (significance at 0.01). This suggests that there is a weak direct relationship between the two categories. This dependence is valid for indicators for all countries as a whole, however, the situations of different countries are not the same: in Israel, Poland, Germany, Brazil, Russia, Chile, the correlation indicator is large and statistically significant, in others it is small and statistically insignificant. There is also a feedback from the following countries: Portugal, Turkey, Italy.

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1. Introduction

Self-employment as an institution was consolidated in 2017 by amending the Civil Code of the Russian Federation. In January 2017, the Tax Code also underwent changes - it was supplemented with a special taxation procedure for the category of self-employed individuals. In order to stimulate the above category and speed up the registration process, the state introduced mitigating measures - those who applied for registration with the tax authorities were allowed so-called tax holidays for a period of 2 years.

As a result of the measures taken, at the end of 2017, the number of self-employed amounted to 3,542 thousand people (4.89% of the economically active population). The following year, this number increased by 1.6% and amounted to 3598 thousand people (4.96% of the economically active population of the country). As we can see, the growth is relatively small, and this can be explained by two reasons:

- insufficient awareness of the population;
- too low motivation - persons who fit into the category of self-employed did not see enough positive incentives to go through the procedure of official registration of their activities.

Of course, these data are insufficient for a full analysis of the effectiveness of state policy in relation to the self-employed. However, the unemployment rate in 2019 began to decline and amounted to about 4.4%, which suggests a correlation with the new approach to the self-employed. We need large arrays of data for analysis and full-fledged research, but, unfortunately, the coronavirus infection that has swept the whole world and our country, in particular, has deprived us of this opportunity. A deep economic crisis, production downtime, widespread closure of small businesses - all this made significant adjustments and made it impossible to summarize. Unemployment jumped sharply to 6.5% (Apresova, 2020). Abakarova (2020) highlights the potential economic effect of the introduction of a new tax system - a decrease in the unemployment rate. Citizens are increasingly working "for themselves", both online and offline, and before the adoption of the law they had 2 ways: to be registered as unemployed or to open an individual entrepreneur. The latter is rather laborious, therefore it is not very popular.

Blanchflower (2020) identifies a negative relationship between self-employment and unemployment rates. Also, the likelihood of self-employment among men is higher than among women and increases with age. Another study (Harms et al., 2020), based on a sample of 29,000 people, identified a small but significant positive association between narcissism and self-employment. In addition, their results showed that male narcissists are more likely to be self-employed than female narcissists. If we exclude "narcissism" from the study, then, in principle, the results of Harms et al. are similar to Blanchflower's results. These results remind us of the traditional model of gender perception, which may already be outdated. In the future, we will check the modernity of views and it is possible that women and men will strive on equal terms to be self-employed, that is, there may not be statistically significant differences.

Self-employed people have higher job satisfaction rates than employees (Abreu et al., 2019; Blanchflower, 2020). Perhaps this is due to the greater responsibility in relation to the conscious choice of a profession by the self-employed. A similar point of view is reflected in the work of Stephan et al. (2020). Another view is that self-employment is a way out of poverty for those receiving government benefits (Axe

et al., 2020; Danson et al., 2020). And a decrease in the number of self-employed can be due to a reduction in payroll taxes (Narita, 2020). These sources suggest that lowering payroll taxes can increase official recruitment and get out of the crisis. But there is no consensus in support of a positive answer to this question.

There is also a perception that self-employment in the informal economy negatively affects the Indonesian economy (Pritadrajati et al., 2021). This aspect differs from the "positive" approaches to self-employment, this is due to the different methodology for defining the content of the term "self-employed". Thus, the well-being of self-employed and paid employees differs from country to country (Fritsch et al., 2019). In developed European countries, employment at an older age is characterized by a higher proportion of self-employment (Cowling et al., 2019; Nolan & Barrett, 2019).

1.1. Self-employment as a transitional form

Earle and Sakova (2000) argue that self-employment status is a transition from unemployment to employment or entrepreneurship in transition economies (Figure 1). Dvouletý (2020) concludes that state support for the unemployed to stimulate self-employment is quite effective, but not effective in terms of business growth.
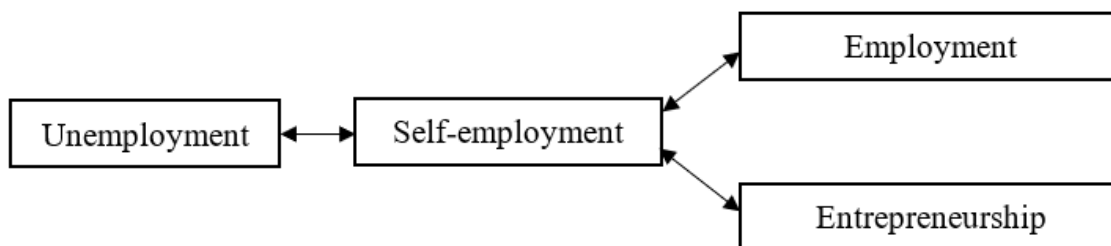

Figure 1. The place of self-employment among its forms in the labor market

Krasniqi (2014) concludes that self-employment can be a transitional form from hiring to unemployment. Namely, as a deterrent to the transition to unemployment. Thus, analyzing the economic literature, one can come to the conclusion that self-employment is a transitional form between unemployment and hiring or entrepreneurship, regardless of the vector of movement in one direction or another.

2. Problem Statement

Alba-Ramirez (1994) identifies the relationship between unemployment and self-employment. Namely, the duration of unemployment significantly increases the probability of becoming self-employed. In Spain, self-employed people were found to earn less than workers with similar functional characteristics for hire. Thurik et al. (2008) based on an analysis of data from 23 OECD countries from 1974 to 2002. the relationship between self-employment and the level of unemployment is determined. They also identified two derivative effects of self-employment: the "refugee effect" occurs when unemployment is high, which stimulates self-employed entrepreneurship; The "entrepreneurial effect" appears with a high level of self-employment, and also stimulates entrepreneurial activity with a subsequent decrease in the unemployment

rate. In our work, we will collect similar data from 2000 to 2020. for OECD countries and analyse the relationship between self-employment and unemployment. And perhaps we will come to other conclusions, different from the results of Alba-Ramirez (1994), Thurik et al. (2008) and the assumptions of Abakarova (2020).

3. Research Questions

- Is there a link between unemployment and self-employment?
- If there is a relationship between unemployment and self-employment (according to new data), then this relationship is direct or inverse, and can we single out similar countries in order to further study those countries that are most similar to Russia?

4. Purpose of the Study

In order to test the hypothesis about the relationship between self-employment and unemployment, it is necessary to calculate the correlations between the indicators "LUR" (data on unemployment in% of all labour resources in the country according to the International Monetary Fund) and "SELFEMP" (data on self-employment in% of all workers in the country according to the Organization for Economic Co-operation and Development (2020)). The data was taken from the Knoema aggregator.

Data note: Unemployment rate can be defined by either the national definition, the ILO harmonized definition, or the OECD harmonized definition. The OECD harmonized unemployment rate gives the number of unemployed persons as a percentage of the labour force (the total number of people employed plus unemployed) (OECD Main Economic Indicators, OECD, monthly).

As defined by the International Labor Organization, unemployed workers are those who are currently not working but are willing and able to work for pay, currently available to work, and have actively searched for work. (International Monetary Fund, 2020).

5. Research Methods

To calculate the correlation coefficient between these indicators, the LUR and SELFEMP values were analysed for the period from 2000 to 2020 for 38 countries.

Since the studied indicators are quantitative (the scales are metric), but the distribution of indicators is not normal (The Asymptotic Significance of the Kolmogorov-Smirnov Statistics Z for both indicators is 0.000, which is less than 0.05 - this means that the distribution of indicators is not normal) (Table 1) , to identify and assess the tightness of the relationship between the series of compared quantitative indicators of data on unemployment and self-employment, the Spearman's parametric correlation coefficient was calculated.

In order to group countries according to the SELFEMP and LUR indicators, the method of hierarchical cluster analysis will be used, followed by visualization of the dendrogram.

The main statistical data on the relationship between the indicators "SELFEMP" and "LUR" are presented in Table 1.

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Table 1. Relationship between self-employment and unemployment rates in OECD countries

		SELFEMP (data on unemployment in% of all labour resources in the country)	LUR (data on self-employment in% of all workers in the country)
N		674	798
Normal parameters	Mean	17.7627	7.7854
	STDev	9.93961	4.06408
Differences of extremums	Module	.196	.110
	Positive	.196	.110
	Negative	-.122	-.094
Kolmogorov-Smirnov's Z statistics		5.093	3.104
Asymptotic Significance (2 Sided)		.000	.000
a. Comparison with normal distribution.			
b. Estimated by data.			

When using the coefficient of rank correlation, the closeness of the relationship between the signs "LUR" and "SELFEMP" is conditionally estimated by years. The conditions for the tightness of the connection between the analysed features:

- $r_{xy} \leq 0.3$ - indicator of weak communication tightness;
- $0.4 \leq r_{xy} \leq 0.7$ - indicator of moderate tightness of communication;
- $0.7 \leq r_{xy}$ is an indicator of high communication tightness.

In the correlation tables, the following designations for the significance of correlations are used:

- ** - Correlation is significant at the 0.01 level (two-sided).
- * - Correlation is significant at the 0.05 level (two-sided).

The results of calculating the correlations are presented in Table 2.

Table 2. Results of the correlation analysis "SELFEMP" and "LUR"

		SELFEMP	LUR
SELFEMP	Pearson correlation	1	.292**
	Asymptotic Significance (2 Sided)		.000
	N	674	674
LUR	Pearson correlation	.292**	1
	Asymptotic Significance (2 Sided)	.000	
	N	674	798
**. The correlation is significant at the 0.01 level (2 Sided).			

Thus, Spearman's correlation coefficient between the indicators "SELFEMP" and "LUR" was = 0.3 (the correlation is significant at the level of 0.01). This indicates that there is a weak direct relationship between "SELFEMP" and "LUR" indicators.

Comparative information on the correlations between "SELFEMP" and "LUR" by country is presented in Table 3.

Table 3. Spearman's correlation coefficient between indicators "SELFEMP" and "LUR"

№	Country	Spearman's correlation coefficient
1	Australia	0.21
2	Austria	-0.33
3	Belgium	0.39
4	Canada	0.49*
5	Chile	0.75*
6	Colombia	0.19
7	Czech Republic	-0.29
8	Denmark	0.12
9	Finland	0.29
10	France	0.38
11	Germany	0.80*
12	Greece	-0.13
13	Hungary	0.14
14	Ireland	-0.30
15	Israel	0.91*
16	Italy	-0.54*
17	Japan	0.79
18	Korea	0.01
19	Latvia	0.12
20	Lithuania	-0.51
21	Luxembourg	0.80
22	Mexico	0.29
23	Netherlands	0.45*
24	New Zealand	-0.26
25	Norway	-0.37
26	Poland	0.90*
27	Portugal	-0.56*
28	Slovak Republic	-0.50
29	Slovenia	0.57*
30	Spain	-0.42
31	Sweden	0.21
32	Switzerland	0.47
33	Turkey	-0.56*
34	United Kingdom	-0.09
35	United States	0.14
36	Brazil	0.79*
37	Costa Rica	0.10
38	Russia	0.76*

5.1. Clustering countries by indicators of self-employment and unemployment

In order to group (cluster) countries according to the indicators "SELFEMP" and "LUR" based on data for 2000-2020. the method of hierarchical cluster analysis was used (Table 4).

Table 4. Average values of SELFEMP and LUR indicators by country

	Mean SELFEMP	N	σ SELFEMP	Mean LUR	N	σ LUR
Australia	11.43	20	1.35807	5.5579	21	0.7012
Austria	13.0218	20	0.51321	5.0202	21	0.62448
Belgium	14.7848	20	0.47089	7.5005	21	0.93148
Canada	9.1564	20	0.61652	7.0661	21	0.93112
Chile	25.3899	10	0.65805	8.2277	21	1.64258
Colombia	52.1678	13	2.18372	11.7455	21	2.32803
Czech Republic	16.8616	20	0.91341	5.9488	21	2.09958
Denmark	8.9581	20	0.36404	5.666	21	1.32503
Finland	13.2779	20	0.48056	8.3596	21	0.91029
France	11.3598	17	0.40003	9.0708	21	0.77266
Germany	11.2145	20	0.74717	6.7063	21	2.44523
Greece	36.1567	20	2.27588	15.856	21	6.78506
Hungary	12.2939	20	1.40838	7.1519	21	2.36458
Ireland	16.8099	20	1.04655	8.0664	21	4.12699
Israel	12.9313	20	0.50749	8.1911	21	3.13578
Italy	25.5128	20	1.68137	9.4222	21	1.93774
Japan	12.7847	20	2.06769	4.072	21	0.91457
Korea	30.2011	20	4.17776	3.6074	21	0.32217
Latvia	12.2192	20	1.2919	11.265	21	3.72115
Lithuania	12.5804	15	2.03206	10.5931	21	4.15174
Luxembourg	8.3766	4	0.34398	4.9241	21	1.51172
Mexico	33.1036	15	1.28015	3.994	21	0.91038
Netherlands	14.5459	20	2.00807	5.0019	21	1.25988
New Zealand	17.6378	20	1.57971	5.0453	21	0.91069
Norway	7.3088	19	0.51513	3.8023	21	0.61197
Poland	23.5457	20	2.74203	10.832	21	5.56616
Portugal	22.6514	20	3.75092	9.0001	21	3.52988
Slovak Republic	12.9311	3	4.30628	13.0892	21	4.1952
Slovenia	15.8085	20	1.28375	6.931	21	1.6368
Spain	17.5058	20	1.10076	15.9473	21	5.66377
Sweden	10.4193	20	0.34572	7.1601	21	0.88646
Switzerland	15.0932	10	0.39057	2.9953	21	0.59751
Turkey	39.6496	20	6.68754	10.1401	21	1.93648
United Kingdom	13.9245	20	1.12336	5.7214	21	1.32175
United States	6.929	20	0.48037	6.0234	21	1.89802
Brazil	33.5598	18	2.6472	10.7831	21	2.34036
Costa Rica	24.2278	10	1.32242	8.72	21	3.78116
Russia	7.4249	20	0.72788	6.642	21	1.55581
Total	17.7627	674	9.93961	7.7854	798	4.06408

The belonging of countries to clusters according to SELFEMP and LUR characteristics is presented in Table 5.

Table 5. Agglomeration order (clusters). SELFEMP and LUR

Stage	Cluster Merged with		Coefficients	Stage of the first appearance of the cluster		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	9	15	.149	0	0	12
2	19	20	.582	0	0	20
3	35	38	.629	0	0	17
4	11	31	.838	0	0	13
5	8	21	.889	0	0	16
6	23	34	.904	0	0	14
7	2	17	.955	0	0	14
8	3	29	1.372	0	0	15
9	7	24	1.419	0	0	25
10	5	16	1.442	0	0	11
11	5	37	1.869	10	0	21
12	9	13	1.957	1	0	18
13	1	11	2.477	0	4	22
14	2	23	2.904	7	6	23
15	3	14	3.357	8	0	25
16	4	8	3.598	0	5	17
17	4	35	3.989	16	3	24
18	9	10	3.994	12	0	22
19	26	27	4.156	0	0	21
20	19	28	5.094	2	0	30
21	5	26	6.665	11	19	33
22	1	9	6.686	13	18	28
23	2	32	7.001	14	0	27
24	4	25	7.163	17	0	32
25	3	7	7.361	15	9	27
26	18	22	8.574	0	0	33
27	2	3	14.652	23	25	28
28	1	2	20.796	22	27	30
29	12	36	32.478	0	0	31
30	1	19	37.361	28	20	32
31	12	33	41.185	29	0	35
32	1	4	44.980	30	24	34
33	5	18	88.272	21	26	35
34	1	30	124.025	32	0	36
35	5	12	154.467	33	31	36
36	1	5	349.380	34	35	37
37	1	6	1329.670	36	0	0

To identify the optimal number of clusters, the values of the indicators were analysed, which are contained in the column "Coefficients". This coefficient means the distance between two clusters, determined on the basis of the selected distance measure (in our case, it is the square of the Euclidean distance), taking into account the envisaged transformation of values (in our case, this is z-standardization) (Kochetov, 2012). At that step of merging (column "stage"), where the measure of distance between two

clusters increases in leaps and bounds, the process of merging into new clusters must be stopped, since otherwise the clusters located on relatively large distance from each other.

In our case, such a sharp jump is observed after step 26 - from 154 to 349 (Figure 2). This indicates that after the formation of X clusters, it is not advisable to carry out further mergers, and the result with X clusters is optimal.
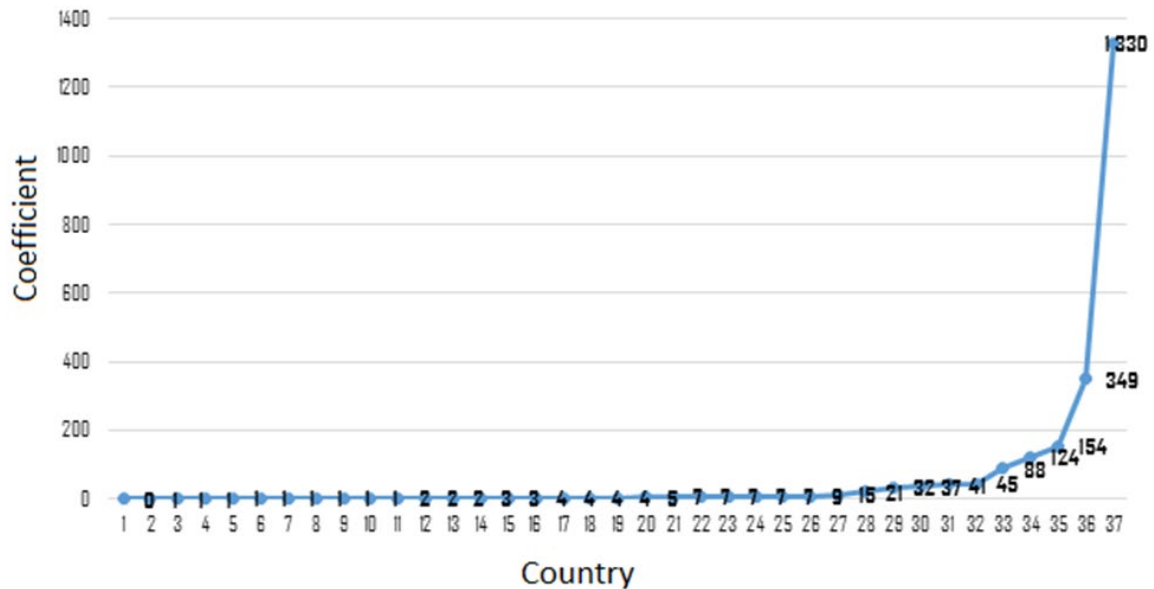

Figure 2. Graphical visualization of clustering coefficients

The number of clusters X is defined as equal to the difference between the number of countries (38) and the number of stages before the abrupt change, which is observed visually in Figure 2 (in our case, about 35). Therefore, X = 38 - 35 = 3.

6. Findings

The results of the correlation analysis "SELFEMP" and "LUR" should be interpreted as follows: the more data on unemployment (in% of all labour resources in the country), the more data on self-employment (in% of all workers in the country), and vice versa (coefficient correlation 0.3). However, only on the basis of the presence of this dependence, we cannot assert that self-employment depends on unemployment: we can only assert that the dynamics of self-employment and unemployment indicators is consistent in time: with an increase in unemployment, self-employment is likely to grow, and the highest indicators self-employment with a significant degree of probability corresponds to the maximum unemployment rates.

This relationship is valid for indicators for all countries as a whole, but the situations of different countries are not the same: in some of them the correlation indicator is large and statistically significant, in others it is small and statistically insignificant. At the same time, for a number of countries, the coefficient is negative, which indicates an inverse relationship between the indicators "SELFEMP" and "LUR" for the respective countries for the period under study. Countries with a statistically significant direct relationship between SELFEMP and LUR are the countries shown in Table 6.

Table 6. Countries with a direct relationship between SELFEMP and LUR

Country	Correlation
Israel	0.91*
Poland	0.90*
Germany	0.80*
Brazil	0.79*
Russia	0.76*
Chile	0.75*
Slovenia	0.57*
Canada	0.49*
Netherlands	0.45*

For this group of countries, the statement discussed above is true: the more data on unemployment (in% of all labor resources in the country), the more data on self-employment (in% of all workers in the country), and vice versa (correlation coefficient from 0.45 to 0.91 at a significance level of 0.05).

Countries with a statistically significant inverse relationship between SELFEMP and LUR are the countries shown in Table 7.

Table 7. Countries with an inverse relationship between "SELFEMP" and "LUR"

Country	Correlation
Portugal	-0.56*
Turkey	-0.56*
Italy	-0.54*

For this group of countries, the opposite statement to that discussed above is true: the larger the data on unemployment (in% of all labor resources in the country), the less data on self-employment (in% of all workers in the country), and vice versa (correlation coefficient from -0.54 to -0.56 at a significance level of 0.05).

With regard to the conclusions of the cluster analysis, Table 7 shows the clustering sequence, which is ultimately illustrated on the dendrogram (Figure 3) (Organisation for Economic Co-operation and Development, 2021). In the first step, observations 9 and 15 (i.e. Finland and Israel) are clustered. These two countries are most similar to each other in terms of SELFEMP and LUR. The next step is to combine observations 19 and 20 (Latvia and Lithuania), then 35 and 38 (United States and Russia), 11 and 31 (Germany and Sweden), 8 and 21 (Denmark and Luxembourg), etc.
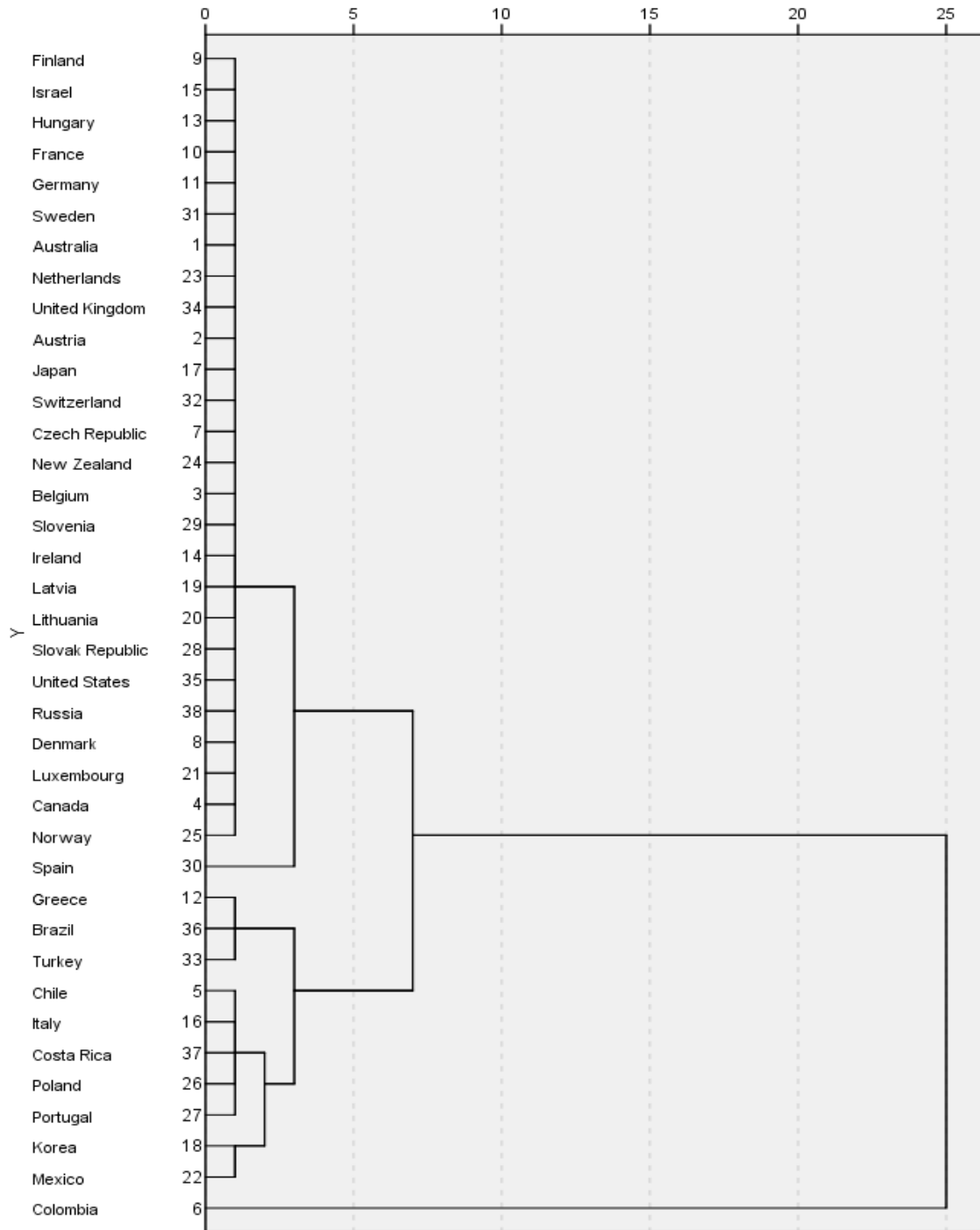
Figure 3. Dendrogram using the method of intergroup connections (combining clusters by scaled distance)

7.   Conclusion

According to the results of the cluster analysis, countries form three clusters according to the characteristics "SELFEMP" and "LUR" (Figure 2). At the same time, 27 out of 38 countries make up one, the most numerous cluster, 10 countries are united in the second cluster, and, finally, Colombia forms an independent cluster. If we consider the similarity of countries in terms of correlation, then the three countries Portugal, Turkey, Italy have an inverse relationship between the signs of self-employment and

unemployment. Russia is similar to Brazil, Chile and also Germany. Israel has a correlation coefficient similar to Poland.

Spearman's correlation coefficient between the indicators "SELFEMP" and "LUR" was = 0.3 (the correlation is significant at the 0.01 level). This indicates that there is a weak direct relationship between the signs of self-employment and unemployment. This relationship is valid for indicators for all countries as a whole, but the situations of different countries are not the same: in some of them the correlation indicator is large and statistically significant, in others it is small and statistically insignificant. There is also a feedback (Portugal, Turkey, Italy). Thus, our results are similar to those of the study by Thurik et al. (2008) conducted in 2008 from 23 OECD countries from 1974 to 2002.

Acknowledgments

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