

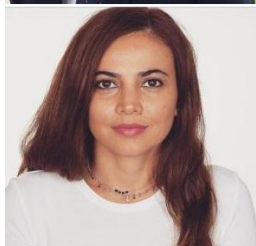


Traian Ionut Luca, D.Sc. (Math.)

Babes-Bolyai University

Address: Strada Kogalniceanu Mihail 1, Cluj-Napoca 400084, Romania

E-mail: ionut.luca@tbs.ubbcluj.ro



Gulshan Valiyeva-Luca

Azerbaijan State University of Economics

Address: Istiglaliyyat str.6, AZ 1001, Baku, Azerbaijan,

E-mail: gulshan.waliyeva@gmail.com

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DIVERSIFICATION STRATEGY FOR ECONOMIC DEVELOPMENT OF AZERBAIJAN

Abstract

This article is analyzing the potential of Azerbaijan to increase its` economic performance, measured by GDP. Saphiro-Wilk tests are used to test normality of data and ANOVA test is employed to generate homogenous intervals for GDP. Diversification strategy is designed based on economic strategy of countries situated in same homogenous group for GDP.

According to classical theory of economy, economic performance of a country (GDP) is influenced by 3 production factors: capital, labor and resources. Out of these 3 production factors, labor is intensively analyzed and compared with labor in European countries, proving that labor structure of Azerbaijan is sustaining a diversification strategy for economy.

Keywords: GDP, population structure, unemployment, Saphiro-Wilk, ANOVA, economic strategy.

Introduction

According to classical theory, the economy market has three components: capital, labor and resources.

Capital is defined as – all man-made goods used in further production of wealth [4]. It includes, among others, machinery, tools and equipment, buildings, raw material, transportation and communication means.

According to International Labor Organization, labor force is – the sum of persons in employment plus persons in unemployment [5]. Labor force is acting on a regulated market, called labor market. It is the market in which the amount of services, corresponding to tasks

well established in the job description, are offered for a price or remuneration [1].

Resources refer to all natural resources given by nature, as: oil, gas, water, air, forests and land.

Total output of an economy, measured by GDP, represents all goods produced and sold by a country. Total output is modeled by production factors, based on a mathematical relation of the following type:

$$Y=F(K,L,N)$$

where: Y= quantity of output, K=capital, L=labor, N=resources.

Circulation of capital and resources is not a critical issue anymore, considering globalization, but circulation of labor is still a critical issue due to negative social and economic consequences arising from workers mobility [3].

Delicate character of labor, among the 3 production factors, has determined us to choose it for our analysis.

In our study, we will analyze and compare GDP (as indicator of economic performance) and labor (as factor of influence for economic performance) for EU member countries and Azerbaijan.

1. Theoretical and methodological bases

Our study relies on statistical analysis performed on data provided by Eurostat and World Bank. We are using data recorded from 2007 until 2018 for GDP, structure of population by age and unemployment rate.

The main goal is to identify groups of countries having similar group countries and neighboring groups, in order to improve performances of their own countries.

An ANOVA test is performed in order to determine the above mentioned groups. Important to mention is that ANOVA test is conclusive only if input data follow a normal distribution.

Thus, before performing the ANOVA test, a Saphiro-Wilk test is performed in order to test whether hypothesis –data are following a normal distribution– can be rejected or not. The Saphiro-Wilk test was chosen due to its ‘performances for small samples of data.

All tests (ANOVA and Saphiro-Wilk) are performed with a 95% confidence level. Statistical analysis are performed using Statgraphics Centurion software.

2. Results and discussions

This section is presenting the statistical analysis performed, being split in 3 paragraphs, each one dedicated to an economic indicator (GDP, unemployment and structure of population by age).

2.1. Analysis of GDP

GDP values are obtained from Eurostat [6] for countries member of EU and from World Bank for Azerbaijan [7]. Considering that World Bank is reporting GDP in USD, an annual average exchange rate provided by statista.com [exchange rate] is used to convert GDP to EURO.

Thus, the following data are available for GDP recorded by EU countries and Azerbaijan during 2007 – 2018. GDP in billion euros is calculated at current prices.

Table 1.

GDP in billion euros, calculated at current prices

country /period	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
M										
CY	18.7	19.3	19.7	19.5	18.1	17.6	17.7	18.5	19.6	20.7
EST	14.1	14.7	16.7	17.9	18.9	20.1	20.7	21.7	23.6	25.7
LV	18.7	17.8	20.2	22.1	22.8	23.6	24.3	25.0	27.0	29.5
AZ	31.9	39.8	47.4	54.4	55.8	56.6	47.8	34.1	36.2	39.8
LT	26.9	28.0	31.3	33.3	35.0	36.6	37.4	38.8	42.2	45.1
SLO	36.3	36.4	37.1	36.3	36.5	37.6	38.9	40.4	43.0	45.8
HR	45.1	45.2	44.8	44.0	43.8	43.4	44.6	46.6	49.0	51.5
BG	37.3	38.2	41.3	41.9	41.9	42.8	45.3	48.1	51.7	55.2
L	37.0	40.2	43.2	44.1	46.5	49.8	51.6	53.3	55.3	58.9
SK	64.0	67.6	70.6	72.7	74.2	76.1	79.1	81.2	84.9	90.2
H	94.3	98.8	101.3	99.5	101.9	105.5	110.9	113.9	124.1	131.9
GR	237.5	226.0	207.0	191.2	180.7	178.7	177.3	176.5	180.2	184.7
P	175.4	179.9	176.2	168.4	170.3	173.1	179.8	186.5	194.6	201.6
RO	125.2	125.4	131.9	133.1	143.8	150.5	160.3	170.4	187.5	202.9
CZ	148.7	156.7	164.0	161.4	157.7	156.7	168.5	176.4	191.7	207.8
FIN	181.0	187.1	196.9	199.8	203.3	205.5	210.0	216.1	223.9	232.1
DK	231.3	243.2	247.9	254.6	258.7	265.8	273.0	282.1	292.8	298.3
IRL	170.1	167.7	170.8	175.1	179.7	194.8	262.8	271.7	297.1	324.0
A	288.0	295.9	310.1	318.7	323.9	333.1	344.3	356.2	369.9	386.1
BE	348.8	365.1	379.1	387.5	392.3	400.1	411.1	424.6	439.2	450.5
S	310.0	369.5	405.4	423.8	436.2	433.1	449.2	463.1	475.2	466.9
PL	317.1	361.8	380.2	389.4	394.7	411.2	430.3	426.5	467.3	496.5
NL	624.8	639.2	650.4	653.0	660.5	671.6	690.0	708.3	738.1	774.0
SP	1079.1	1080.9	1070.4	1039.8	1025.7	1037.8	1081.2	1118.7	1166.3	1208.2
IT	1572.9	1604.5	1637.5	1613.3	1604.6	1621.8	1652.1	1689.8	1727.4	1757.0
FR	1936.4	1995.3	2058.4	2088.8	2117.2	2149.8	2198.4	2234.1	2295.1	2353.1
UK	1725.4	1850.5	1894.9	2089.6	2074.0	2287.9	2611.9	2403.4	2338.0	2393.7
D	2445.7	2564.4	2693.6	2745.3	2811.4	2927.4	3030.1	3134.1	3245.0	3344.4

Performing a Saphiro-Wilk test, the hypothesis “GDP values for the period 2007-2019 are coming from a normal distribution” can’t be rejected with a 95% confidence level for the following countries:

Table 2.

Normally distributed GDP according to Saphiro-Wilk test with 95% confidence level

country	M	CY	EST	LV	AZ	LT	BG	L	SK
p-value	0.4060	0.7676	0.9569	0.9745	0.3017	0.9615	0.4263	0.9786	0.9962

country	H	P	RO	CZ	FIN	DK	A	BE	S
p-value	0.2234	0.2718	0.2794	0.0938	0.9900	0.9377	0.9492	0.9866	0.1098

country	PL	NL	SP	IT	FR	UK	D
p-value	0.9890	0.3859	0.1695	0.3389	0.9965	0.7730	0.9522

Performing the same test, the hypothesis “GDP values for the period 2007-2019 are coming from a normal distribution” can be rejected with a 95% confidence level for the following countries:

Table 3.

GDP not following normal distribution according to Saphiro-Wilk test with 95% confidence level

country	SLO	HR	GR	IRL
p-value	0.017231	0.025755	0.010784	0.02477

As a result of Saphiro-Wilk tests performed, Slovenia, Croatia, Greece and Ireland will be excluded from the ANOVA test performed to determine the groups of countries.

With a 95% confidence level, ANOVA test is indicating existence of 14 homogenous groups regarding economic performances. Those groups are:

Group 1: Malta, Cyprus, Estonia, Latvia, Lithuania, Azerbaijan, Bulgaria, Luxemburg, Slovakia;

Group 2: Lithuania, Azerbaijan, Bulgaria, Luxemburg, Slovakia, Hungary;

Group 3: Slovakia, Hungary, Romania;

Group 4: Hungary, Romania, Czech Republic, Portugal;

Group 5: Romania, Czech Republic, Portugal, Finland;

Group 6: Finland, Denmark;

Group 7: Denmark, Austria;

Group 8: Austria, Belgium, Poland;

Group 9: Belgium, Poland, Sweden;

Group 10: The Netherlands;

Group 11: Spain;

Group 12: Italy;

Group 13: France, United Kingdom;

Group 14: Germany.

Azerbaijan is present in two different groups, Group 1 and Group 2, together with countries like: Malta, Cyprus, Estonia, Latvia, Lithuania, Bulgaria, Luxemburg, Slovakia and Hungary.

Azerbaijan is generating it's GDP mainly from oil industry, while fellow countries from Groups 1 and 2 are generating their GDP from tourism (Cyprus, Bulgaria), IT industry (Estonia, Latvia, Lithuania) or production (Slovakia, Hungary).

What Azerbaijan can learn from this is that a diversification of it's economy may contribute to an increase of GDP. Thus also dependency on oil and gas prices and production is mitigated and situation like that from 2015 will be better handled and overcome. Idea is sustained also by Markowitz model applicable on stock market (diversification of portfolio is mitigating risk) [2].

Does Azerbaijan have necessary production factors for this diversification?

Regarding capital and resources we might definitely answer YES. Azerbaijan has the capacity to generate financial capital based on oil and gas industry, while infrastructure is already under development process. Resources are variate (oil, gas, metalliferous resources, non-metallic resources, agriculture potential – cotton, pomegranate, winery, tourism potential) and widely available in the country or in the Caspian Sea area.

For analyzing availability of labor, necessary for sustaining a diversification strategy, we will study the structure of population by age and unemployment.

2.2. Analysis of populations structure by age

According to Eurostat [9], Azerbaijan has the following structure of population:

Table 4.

Distribution of Azerbaijan population by age during 2007-2018

period	groups of age				
	0-14	15-24	25-49	50-64	>65
2007	23.80	20.80	38.50	9.80	7.10
2008	23.20	20.80	38.50	10.50	7.00
2009	22.60	20.70	38.40	11.50	6.70
2010	22.60	20.50	38.60	12.40	5.90
2011	22.30	20.00	38.50	13.40	5.80
2012	22.20	19.40	38.50	14.10	5.70
2013	22.30	18.60	38.60	14.80	5.80
2014	22.40	17.80	38.60	15.40	5.80
2015	22.40	17.00	38.70	15.90	6.00
2016	22.50	16.10	38.80	16.40	6.10
2017	22.60	15.30	38.90	16.80	6.30
2018	22.60	14.70	39.00	17.20	6.60

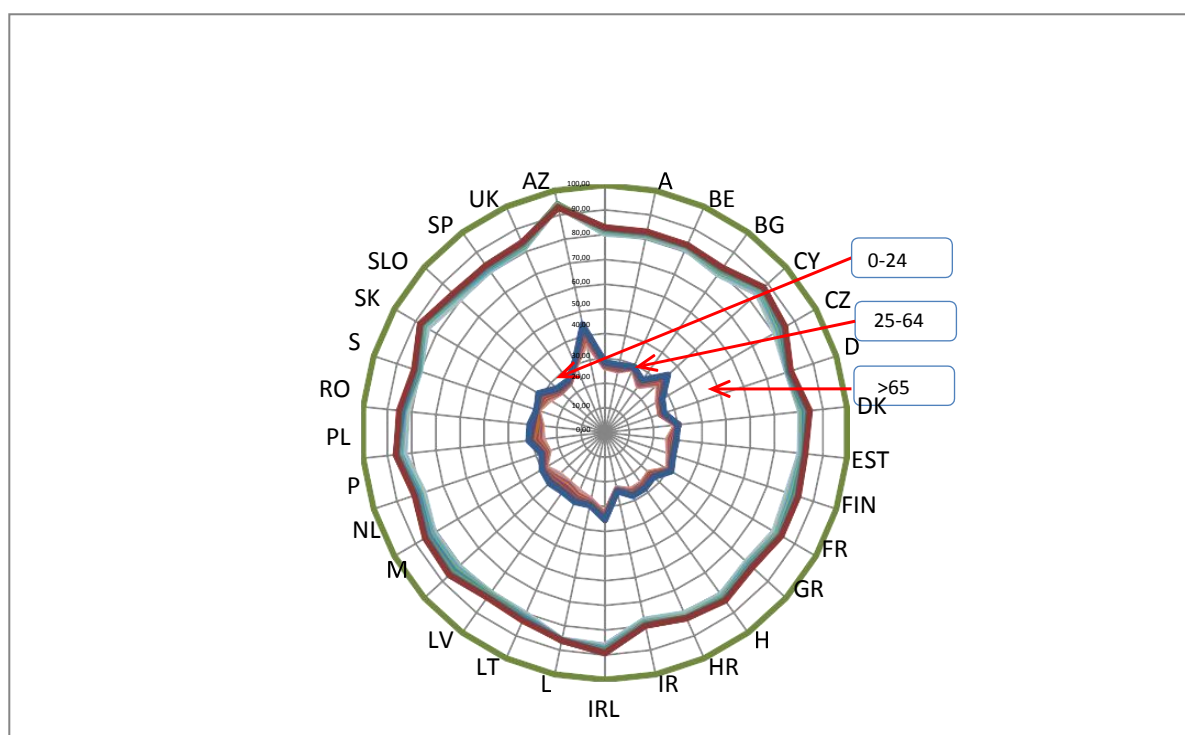
This distribution of population is very promising for sustaining the Azerbaijani economy, considering that approximately 40% of the population is under 24 years, approximately 50% of the population is between 25 and 64 years and only 10% is above 65 years old.

Young population (<24 years old) represents a potential labor force for sustaining development of IT and services, while mid-age population (between 25 and 64 years old) represents a potential labor force for sustaining diversification of industry.

Comparing population of Azerbaijan with population of European countries the following chart is obtained:

Chart 1.

Distribution of population by age in EU and Azerbaijan during 2007-2018



It is clearly visible that Azerbaijan has the best structure of population among all European countries. This remark is sustained not only by the above chart. The ANOVA test performed to identify homogenous groups reveals, with a 95% confidence level, that:

- 17 homogenous groups are identified for young population (0 to 24 years old), Azerbaijan being included alone in Group 17– an average of 41.1% of population is under 24 years old, compared with the lowest rated group with an average of 24% of the population.
- 13 homogenous groups are identified for mid-age population (25 to 64 years old), Azerbaijan being included in Group 1, together with Denmark and Finland - an average of 52% of the population is in this group, compared with the lowest rated group with an average

of 57% of the population.

– 14 homogenous groups are identified for old population (above 65 years old), Azerbaijan being included alone in Group 1 –an average of 6% of the population is in this group, compared with the lowest rated group with an average of 21% of the population.

As a conclusion for the ANOVA test we might say with a 95% confidence level that Azerbaijan has a young population, sustaining the conclusion generated by Chart 1.

Thus design of a diversification strategy for Azerbaijani economy is sustained by population structure and implementation of this strategy has high chances of success (considering structure of population).

2.3. Analysis of unemployment

Although Azerbaijan has a very good structure of population (the best in Europe – better than that of the direct followers: Cyprus and Ireland) is the unemployment rate sustaining a diversification strategy for economy?

Unemployment data are provided by Eurostat – for EU countries [10] and World Bank for Azerbaijan.

By performing Saphiro-Wilk test for all European countries and Azerbaijan, we conclude, that only in case of Romania the hypothesis – *“unemployment values for the analyzed period are coming from a normal distribution”* can be rejected with a 95% confidence level. Thus Romania is excluded from the ANOVA test.

The ANOVA test emphasizes with a 95% confidence level the existence of 11 homogenous groups. Azerbaijan is situated in Group 1, together with: Germany, Austria, Czech Republic, Luxemburg, Malta, The Netherlands, United Kingdom and Denmark. The average unemployment rate for this group is 5.6%, compared with the lowest rated group (Greece and Spain) with an average unemployment rate of 20.8%

According to these data, Azerbaijan has a low unemployment rate and thus an active population, well trained and with a good moral.

Conclusion

For increasing economic performances Azerbaijan might diversify its' economy, by adding IT, services, tourism and industry diversification to its' current economic structure based mainly on gas and oil industry.

This diversification is sustained by all 3 production factors: capital, resources and labor. Regarding labor, Azerbaijan has the best population structure compared to all European countries and an active and well trained population with a good moral, sustained by low unemployment rate.

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