Analysis and assessment of structure of the RA economy in the context of ensuring long-term stable economic growth

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ՀՀ տնտեսության ճյուղային կառուցվածքի վերլուծությունը և գնահատումը երկարաժամկետ կայուն տնտեսական աճ ապահովելու համատեքստում

Դավթյան Կամո Ա.

ՀՊՏՀ տնտեսամաթեմատիկական մեթոդների ամբիոնի ասպիրանտ (Երևան, ՀՀ)

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Ամփոփագիր. Սույն հոդվածը նվիրված է ՀՀ տնտեսության ճյուղային կառուցվածքի համապարփակ վերլուծությանը կայուն տնտեսական աճ ապահովելու համատեքստում: Հետազոտության արդյունքներից պարզ է դարձել, որ ՀՀ տնտեսության կառուցվածքում չնայած վերջին ժամանակների դրական տեղաշարժերին առկա են մի շարք խնդիրներ, որոնք խոչընդոտ են հանդիսանում կայուն տնտեսական աճ ապահովելու գործում: Մասնավորապես, ծառայությունների ոլորտը շարունակում է պահպանել աճի բարձր տեմպեր Հայաստանի տնտեսության կառուցվածքում, չնայած այն բանին, որ ոլորտում նույնպես կան ներոլորտային խնդիրներ: Ի հակադրություն ծառայությունների, գյուղատնտեսությունը՝ ըստ վիճակագրական վերլուծության արդյունքների, որպես ՀՀ տնտեսության արտահանելի ճյուղերից մեկը, դեռևս ցուցանիշների առումով շարունակում է մտահոգիչ դեր ունենալ հետագա զարգացման համար: Արդյունաբերության՝ հատկապես մշակող արդյունաբերության, դերը ՀՆԱ-ի մեջ տարեցտարի ավելանում է, ինչն կայուն հիմք է տնտեսության հետագա զարգացման համար, սակայն այստեղ նույնպես առակ են խնդիրներ, որոնք հանգեցնում են կառավարության թիրախային ցուցանիշներից շեղման:

Հոդվածում կիրառվել են մի շարք էկոնոմետրիկ գործիքներ որոնցից են կառուցվածքի դիսկրետ հարաբերակցության գործակիցը, վեկտորային սխալի ուղղման էկոնոմետրիկ մոդելը(VECM) և այլ գործիքակազմ: VECM մոդելի գնահատականների արդյունքներից պարզ է դառձել, որ գոյություն ունի ինչպես երկարաժամկետ, այնպես էլ կարճաժամկետ կապ գյուղատնտեսության, արդյունաբերության և ծառայությունների ոլորտների և տնտեսական աճի միջև: Մասնավորապես, ստացված արդյունքների համաձայն մոդելի ճշգրտման գործակիցը հավասար է 15%-ի, ինչը նշանակում է , որ t-րդ ժամանակաշրջանում շոկ ի հայտ գալու պարագայում 15%-ով մոդելը t+1-րդ ժամանակահատվածում կվերադառնա երկարաժամկետ հավասարակշիռ իրավիճակին:

Հանգուցաբառեր` Տնտեսության ճյուղային կառուցվածք, կայուն տնտեսական աճ, վեկտորային սխալի ուղղման մոդել(VECM), կառուցվածքի դիսկրետ հարաբերակցության գործակից

Анализ и оценка отраслевой структуры экономики РА в контексте обеспечения долгосрочного устойчивого экономического роста

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Аннотация. Данная статья посвящена всестороннему анализу отраслевой структуры экономики РА в контексте обеспечения устойчивого экономического роста. По результатом исследований стало ясно, что В структуре экономики РА, несмотря на положительные изменения последнего времени, имеется ряд проблем, которые являются препятствием в обеспечении стабильного экономического роста. В частности, сфера сервисов продолжает сохранять высокие темпы роста в структуре экономики Армении, несмотря на то, что в секторе также существуют внутриотраслевые проблемы. В отличие от сферы сервисов, сельское хозяйство, по результатам статистического анализа, как одна из экспортоспособных отраслей экономики РА, тем не менее, с точки зрения показателей, он по-прежнему имеет тревожную роль для дальнейшего развития. Роль промышленности, особенно обрабатывающей промышленности, в ВВП с каждым годом возрастет что является устойчивой основой для дальнейшего развития экономики, но и здесь существуют проблемы, приводящие к отклонению от целевых показателей правительства.

В статье используется ряд эконометрических инструментов, в том числе дискретный коэффициент корреляции структуры, эконометрическая модель векторной коррекции ошибок (VECM) и другие инструменты. Из результатов оценки модели VECM становится ясно, что существует как долгосрочная, так и краткосрочная связь

между сельским хозяйством, промышленностью, и сектором услуг и экономическим ростом. В частности, согласно полученным результатам, корректирующий коэффициент модели равен 15 %, а это означает, что в случае шока в t-1 периоде модель вернется к ситуации долгосрочного равновесия на 15 % в t+1-м периоде.
Ключевые слова: Отраслевая структура экономики, устойчивый экономический рост, векторная модель ошибок (VECM), коэффициент корреляции дискретной структуры

Introduction: Economic growth is an important prerequisite for improving the standard of living, well-being and overall life opportunities of every member of society, and it is also one of the main indicators that helps to understand and evaluate the performance of each economy.

The development of the entire economy for any country is largely determined by the performance of such sectors of the economy as industry, agriculture, service sector and other fundamental factors.

The purpose of this article is to analyze and evaluate the sectoral structure of the RA economy, to reveal the relationship between the latter and stable economic growth, to highlight the problems in the structure and to propose solutions for their stabilization. For this purpose, it is essential to analyze and quantitatively evaluate the shares of individual sectors in the economy, to understand their dynamics, contribution to economic growth , further development opportunities, as well as the impact on the sustainable development of the country's economy in the future, which is done within the framework of the following research.

Literature review. There are a number of views and opinions, under the influence of which factors and in which conditions the economy ensures stable and developing economic growth.

Agriculture is one of the main and vital sectors of any economy. In particular, it is the main guarantee of food security for the country's population, and also ensures the employment of the country, especially the rural population, and is generally important for the economy as a whole. Therefore, any change in the strategy of the agricultural sector affects the economy and a large part of the population of the country [**3**]. Some studies also indicate that agriculture relates not only to the economic growth, but what is more it has an impact on industry, which can be seen in the development of agricultural processing for industry [**10**; **11**]. Therefore, based on the experience of some developed countries as well, the authors stated that in such conditions of economic transformations, developing agriculture is only a stimulus for the development of the industry and service sector in the future [**4**].

The development of the industrial sector also plays a significant role in ensuring sustainable economic growth, and for many countries, it is the driving force of the economy and is one of the leading sectors in terms of promoting economic growth. According to the views expressed by various economists, the sector of industry, including manufacturing, construction, and mining, clearly increases the level of employment in the economy. According to Kaldor, the field of industry is an engine of economic growth because manufactured goods have a higher income elasticity of demand [**7**]. Another study is dedicated to identifying the relationship between economic growth and the industrial sector in Ghana using the ARDL econometric model [**9**] According to the results, the main macroeconomic factors affecting industrial activity in Ghana are credit interest rate, inflation, employment and government spending. Therefore, according to the authors, the Ghanaian government needs to stabilize the macroeconomic environment to promote the industrial sector.

As it is known, in all developed countries the service sector accounts for the majority of economic growth and GDP in general. Kongsamut, Rebelo, and Xi analyzed about 123 countries and found that the growth of GDP per capita in economies is related to the growth of services, and when the economy begins to develop, the share given by the agricultural sector moves more to the service sector and less to industry [**8**]. Another study for developing countries included a sample of about 40 developing countries and assessed the impact of manufacturing industries and services in those countries during periods of accelerated growth. The results of the econometric evaluation showed that the impact of industry is particularly obvious during periods of accelerated growth. As a conclusion, the authors note that manufacturing is essential in a period of accelerated growth. But at the same time, they note that Services are also significant in accelerating growth, but less important than manufacturing [**5**].

In summary, we can state that the structure of the real sector of the economy has always been important in ensuring stable economic growth and economic policy makers and implementers should always conduct such policies that will lead to the optimization of the economy structure, the result of which will be the stability and development of the economy.

Research methodology. The data of the Statistical Committee of the Republic of Armenia, the Central Bank of the Republic of Armenia, and the World Bank, as well as other research and

analytical works, served as an information source for the research.

In the framework of the research, several /indices were used and calculated, which served as the basis for presenting the further analysis even more thoroughly. One such indicator is the discrete ratio of the structure, which is used to investigate the degree of symmetry between the output value structure of economic sectors and the employment structure [6]:

The formula can be written as:

$$\frac{S_i}{S} = \frac{\frac{Y_i}{Y}}{\frac{L_i}{L}} - 1$$

Where:

S_i stands for the discrete ratio ofstructure of the industry i in different years,

Y represents the gross domestic product (GDP),

Y_i represents the output production value of theindustry I,

L means the total employment

L_i means the employment figure of the industry i.

The economic interpretation of the index is that when $\frac{S_i}{S}$ is zero, the industrial output value equals the total number of employment, indicating that the industrial structure is in equilibrium. And, if $\frac{S_i}{S}$ is not zero or has a relatively large absolute value, it is likely that there is some bias or that the industrial structure is quite unreasonable.

Using econometric tools in research evaluated and analyzed the relationship between GDP and individual sectors of the economy. In particular, the relationship between GDP and industry, agriculture, and service sectors was estimated using the vector error correction model (VECM). The VECM is a restricted VAR model with cointegration across variables that is intended to be used in non-stationary time series.

The mathematical representation of the vector error correction model is as follows: [13]

$$\Delta y_t = \alpha\beta'y_{t-1} + \sum_{t=1}^{p-1}\Gamma_t \Delta y_{t-1} + \varepsilon_t$$

Where:

$\Delta y_t = y_t - y_{t-1}$

y_{t-1} vector variable endogenous with lag 1,

$\Gamma_t -$ (k × k)matrix coefficient the ith variable endogenous,

α- (k × r) matrix, vector adjustment,

β- (k × r) matrix cointegration (long-run parameter)

ε_t (k × 1) vector residuals,

The VECM econometric model consists of a VAR model based on differences in variables of order p - 1 and an error correction part.

Analysis: According to the structure of the economy, countries with relatively close economic opportunities and resources are possible to record distinctly different economic results. As well as the capacity of monetary and fiscal policy due to the structure of the economy is also variable. Therefore, it is of great importance to understand in which direction and with what structure the economy is moving forward.

As a result of the 2008 financial and economic crisis, the real GDP decline was 14.1%. The decline, as before the growth was mainly due to the decline in the construction sector. Since 2010, growth rates in Armenia started to stabilize to some extent, and the economy seemed to be coming out of the crisis, but already developing and moving forward with a different structure. In 2010, the real GDP growth rate was 2.2%, and starting from 2013, the economic growth rate in Armenia slowed down. The previous year's 7.2% economic growth rate was followed by a modest growth of 3.3% and the above tendency was observed until 2016 recording only 0.2% real GDP growth. From 2017 to 2019, it was quite a successful year for the economy of Armenia and the average rate of economic growth was 6.8%. In 2020, like the whole world, the economy of RA also faced a difficult economic situation as a result of the COVID-19 pandemic. The war in Artsakh instigated by Azerbaijan also added to the epidemic which created a humanitarian and political crisis as well as had an impact on the country's economic stability. As a result, the economic decline was a 7.2% in 2020. After the negative situations of 2020 and their impact, the economy of Armenia seems to be coming out of the crisis and according to the data of 2022, the real GDP growth rate in Armenia was around 12.6%. It is a record for the considered period and exceeds the world average by almost 4.5 times. The main factor determining the growth was the growth of the service sector. In particular, the contribution of trade to economic growth has increased sharply, equaling 1.89%, which is largely due to the influence of capital inflow to Armenia as a result of the Russian-Ukrainian war. In the services sector, the contribution of information and communication was also higher, 1.75%, where growth is particularly significant in the information technology sector.
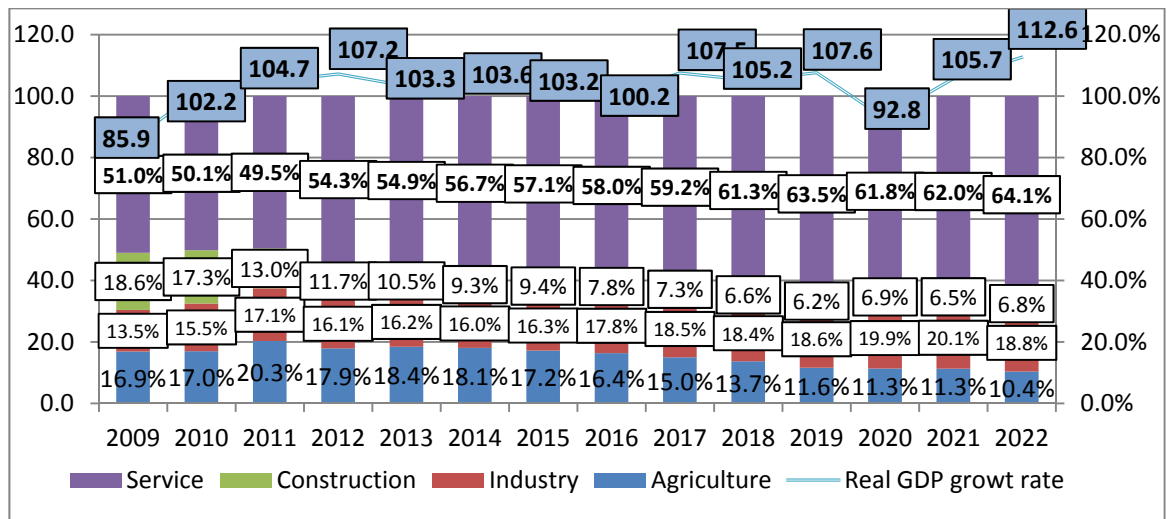
Figure 1. *The trend of real GDP growth of the Republic of Armenia and shares of the sectoral structure of the economy from 2009 to 2022* [**1**].

From Figure 1, we understand that several changes took place in the GDP structure during the considered period. In particular, if the share of construction in the total GDP in 2008 was about 25.3%, after the crisis, due to changes in the structure of the economy and new economic realities, the share of construction in the GDP has decreased year by year, and in 2022 it was only 6.8%. The share of agriculture in GDP also decreased from 16.9% in 2009 to 10.4% of GDP in 2022.

The share of services in the total GDP grew the fastest during the observed period. In 2009, the share of services was 51% of GDP, then in 2022, it reached the maximum value of the considered period - 64.1%. Within this sector, there has been growth in almost every direction, however, the growth rates are higher in the share of services related to real estate activities and financial and insurance activities. In the field of industry, there was also an increase in the share from 13.5% to 18.8%. It is important to note here, that the growth rate was higher in the manufacturing sector, which stands out as a high-value-added sector and also promotes the increase in the level of employment in the economy. In particular, the share of the manufacturing industry increased from 8.6% to 11.7% in 2022, and the mining industry increased from 1.7% to 3.8% in 2022.

To understand the features of the structure of the economy, an important indicator is the contribution of each sector to economic growth. It allows understanding what kind of changes occur in the branch structure of the economy over time and whether what is happening contributes to stable economic growth or not.

In Table 1, we have calculated the contributions of the four major sectors to GDP. The contribution of construction to economic growth has shown a decreasing trend throughout the considered period, the indicator was also negative in some years (2011, 2013 to 2016, and 2020). However, according to the data for 2022, the contribution to economic growth was about 1.22 percentage points compared to 0.21 percentage points in the previous year, which is evidenced by the growing volumes of construction in RA, especially in 2022 (18.8 percentage point increase compared to the previous year).

The contribution of agriculture to real GDP growth has also decreased year by year, and if in 2011 this indicator was around 2.4 percentage points and it could be argued that agriculture is one of the important driving forces of economic growth, then in 2022, it was -0.08%. Compared with the Government's five-year program, according to which the formation of productive agriculture is one of the priority directions of reforms, we can conclude that the government's tasks here are complex and extremely essential, which should cover all sub-sectors of agriculture indiscriminately [**12**]. In particular, to achieve the target indicators of the 2020-2030 Programme of the main directions ensuring the economic development of the RA agricultural sector and the growth rate of gross agricultural output from 2020 to 2022. should have been 10.66%. However, the average value of the real growth rate of agriculture in the previous 3 years was negative -1.7%. Therefore, it is a priority to promote the growth of the share of agriculture, which will make it possible to achieve the specified target results.

Industry's contribution to economic growth showed fluctuating behavior during the observed period. For example, if in 2016 the latter contributed to economic growth by 1.24 percentage points, and in 2017 the contribution was almost 2 percentage points, then in 2018 it recorded a sharp decline of 1.08 percentage points, and in 2020 the indicator

was -0.29%. According to the data for 2022, the contribution of industry to economic growth was 1.28 percentage points, in which the contribution of the manufacturing industry is the highest at 1.36 and mining is negative at -0.20 percentage points. Here it is important to mention the fact that a separate part of the Government's 2021-2026 strategy is dedicated to the manufacturing industry in the economy, where the government's goal is to ensure the continuous growth of the international competitiveness of Armenia's manufacturing industry, and the target is to increase the share of the manufacturing industry in the GDP at least up to 15%. Comparing the target index with the current situation, we notice that there was certainly an increase in 2022, however, to reach the set target, a faster growth rate is needed. Therefore, the Government should make additional efforts to maintain and accelerate the rate of growth of the

industry, as well as to promote and develop new growth directions.

The service sector can be considered the most developing sector of Armenia's economy, which is also confirmed by statistical data. If in 2010 the contribution of services to real GDP growth was 4.6 percentage points, then in 2022 this indicator was 10.55, which means that we have an increase of about 2.3 times. At the same time, we should note that although services contributed about 6 percentage points to economic growth from 2017 to 2019, the growth was mainly due to the growth of gaming services, which do not provide such a large positive effect on the economy as well as the welfare of the population. According to 2022, the contribution of services to the GDP was 10.44%, which is the result of a large amount of capital inflow into the Armenian economy as a result of the Russian-Ukrainian war.

Table 1. *Real GDP growth rate of RA and contributions of economic sectors by production from 2009 to 2022.* (*Calculations performed by the author*) [**1**].

	Agriculture	Industry	Construction	Service	Real GDP growth rate
2009	0.96%	-0.68%	-10.53%	-2.44%	85.9
2010	-2.70%	1.21%	0.61%	4.86%	102.2
2011	2.38%	2.11%	-2.11%	4.45%	104.7
2012	1.93%	1.09%	0.62%	6.40%	107.2
2013	1.36%	1.01%	-0.87%	1.65%	103.3
2014	1.12%	-0.14%	-0.47%	3.11%	103.6
2015	2.39%	1.00%	-0.29%	0.11%	103.2
2016	-0.86%	1.24%	-1.33%	1.11%	100.2
2017	-0.84%	2.09%	0.22%	5.68%	107.5
2018	-1.27%	1.08%	0.06%	5.17%	105.2
2019	-0.55%	1.87%	0.28%	5.59%	107.6
2020	-0.43%	-0.29%	-0.37%	-6.61%	92.8
2021	-0.07%	0.70%	0.21%	2.65%	105.7
2022	-0.08%	1.28%	1.22%	10.44%	112.6

As for GDP contributions from the expenditure point of view, several significant changes took place during the considered period. In particular, as shown in the graph, the contribution of exports to economic growth increased from -2 percentage points in 2009 to almost 19.2 percentage points in 2022 which is essential for the further development of the economy of any country. In the government's five-year programme, a goal of economic policy of the Government are to ensure conditions promoting export and create an environment for this as a result of which the country receives foreign currency income, and this leads to the improvement of the external stability of the country's economy. Export growth rates have been particularly significant in recent years. Moreover, the growth rate of exports in 2022 compared to the previous year was about 153.8%, and the contribution to growth was 19.2 percentage points, which for the first time in the entire considered period surpasses the contribution of imports. And what about the dynamics of

consumption in Armenia, the economy continues to move forward based on increased consumption, which does not contribute to the strengthening and recovery of the economy and also makes it more difficult to achieve long-term stable economic growth. In particular, in 2022, compared to the previous year, the rate of consumption increased by 7.7%, having a positive contribution to GDP growth by 6.8 percentage points.

According to the 2021-2026 program of the RA Government, one of the three goals of the Government's economic policy is to provide conditions and create an environment that promotes exports. The dynamics of recent years show that along with the growth of exports, the growth rate of imports has also increased sharply, as a result of which the balance of exports and imports of goods and services continues to remain negative. The growth rates of final consumption expenditures and gross accumulation and their contribution to economic growth also prove that ensuring the progressive

growth rate of the exportable sector of the economy, included in the government program and the transition from a consumer economy is still relevant. Therefore, high positioning of the exportable sector

will have a positive chain effect on other sectors of the economy, therefore it will also create sufficient foundations to ensure long-term stable economic growth.
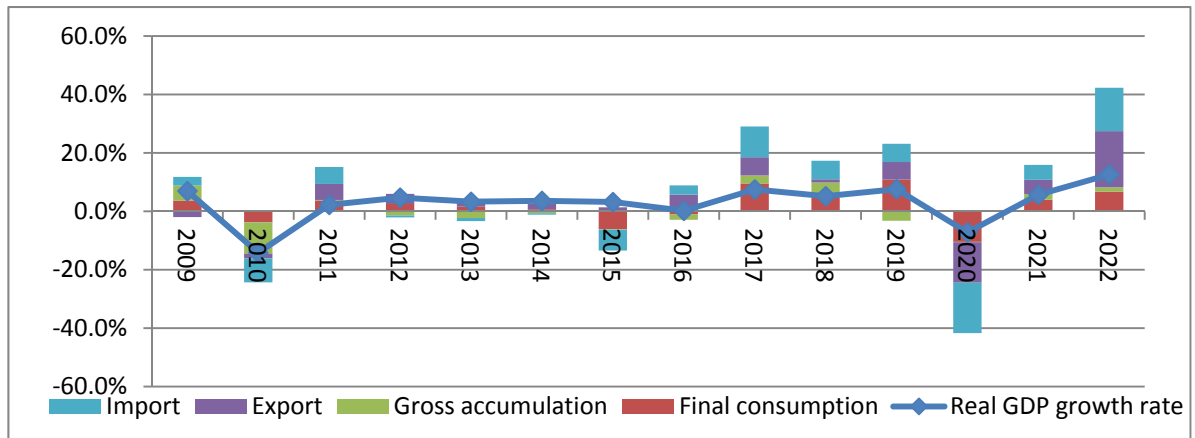

Figure 2. *RA's real GDP growth rate and contributions according to the main expenditure component, from 2009 to 2022 (Calculations performed by the author)* [**1**].

To perform a comparative analysis, consider the structure of GDP in several upper-middle-income countries to understand the relationship between structure and real growth and how well the country can withstand shocks with that structure.

In Table 2, two major crisis periods have been considered, from which we can draw the following conclusions. There were no significant changes in the sectoral structure of the Georgian economy and compared to upper-middle-income countries. The difference is mainly the higher share of services at the expense of industry. In Armenia and Azerbaijan,

the decrease in the share of industry has been combined with a continuous increase in the share of services. Moreover, among the considered countries, only the share of industry in Azerbaijan exceeds the indicator of the group of upper-middle-income countries. Here, Armenia is the only country where the share of agriculture remains high. Compared to Armenia, the decline in economic growth caused by the first crisis in Georgia was quite low -3.7%. It is also clear from the table, that in the rest of the countries, the economy recovers more quickly than in Armenia after the recessions.

Table 2. *Sectoral structure of the economy in Armenia, Georgia, Azerbaijan and the group of upper-middle-income countries* [**13**].

	Real GDP growth rate	Agriculture % of GDP	Industry % of GDP	Services % of GDP
Georgia				
2008	2.4	8.1	18.9	60.7
2009	-3.7	8.1	18.9	60.7
2010	6.2	8.5	16.9	63.1
2020	-6.8	7.3	21.2	59.1
2021	10.5	6.5	21.4	59.5
Azerbaijan				
2008	10.8	5.6	65.7	23.4
2009	9.3	6.1	56.4	31.2
2010	5	5.5	59.8	27.9
2020	-4.3	6.7	42.0	42.4
2021	5.6	5.9	48.4	37.6
Armenia				
2008	6.9	16.3	35.4	37
2009	-14.1	16.9	28.9	43.6
2010	2.2	17	29.6	42.2
2020	-7.2	11.3	23.1	54.6
2021	5.7	11.3	23.5	54.2
Upper middle income countries				
2008	6.4	7.0	37.1	49.4
2009	2.7	7.1	36.2	51.1

2010	8.4	6.9	36.7	50.5
2020	-0.6	7.0	34.1	55.9
2021	7.4	6.7	36.0	54.2

In order to analyze the variability of the real GDP of RA over time, as well as how much is determined by the structure of the economy is calculated standard deviations of growth rates of economic sectors relative to their averages in RA and middle-income countries.

In the observed period, the standard deviation of the real GDP of RA compared to the average was 6.82% the difference with the uppe-middle-income countries is about 4.6% points. However, at the same time, it is important to note that before the global financial and economic crisis, and after that, the real growth rate of RA was mostly high compared to the upper-middle-income countries. As is clear from the calculation and the diagram there were two main breaks in the stability of the real

GDP growth in Armenia: the first refers to the global financial and economic crisis, when the real GDP growth rate was -14.1%, the volatility was almost 10.5% (about 3.7% higher than the indicator of the entire considered period), and the second due to the COVID-19 pandemic when the economic downturn was -7.2% and volatility was 7.4%. Other upper-middle-income countries are not immune to these gaps, however, there is some stability in their case. In particular, 3% economic growth was recorded in the countries of this group in 2009 and the volatility was around 2% in 2009 and 3% in 2010. In 2020, in the background of the pandemic economic decline in this group of countries was only -0.6%, and real GDP volatility was 2.4%.
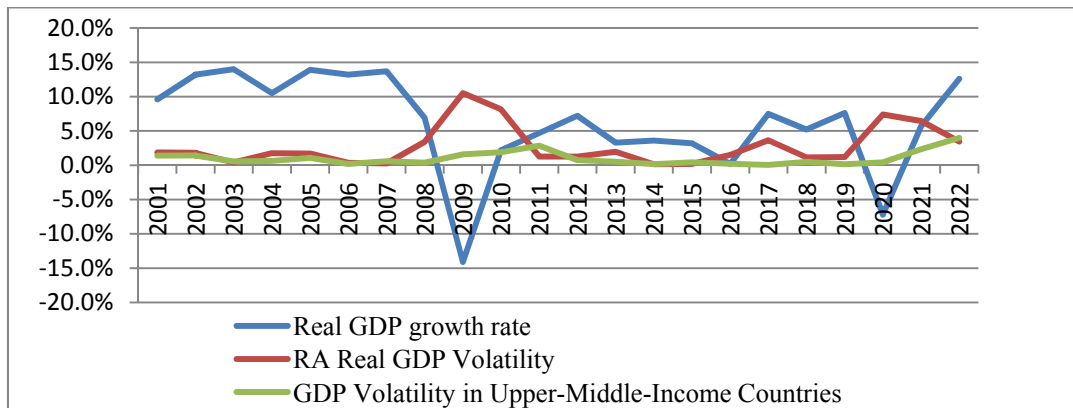

Figure 3. *GDP volatility in Armenia and group of upper-middle-income countries (Calculations performed by the author)* [**1**; **13**].

Comparing the real GDP with the volatility of individual sectors of the economy, we can conclude that the service sector showed a mostly stable trend until 2020 and was close to average values, which we can't confirm for other industries. From the

graph, it becomes clear that services are the most sensitive to economic growth, as the standard deviation of this curve increased sharply relative to the mean due to the difficult economic situation in 2020.
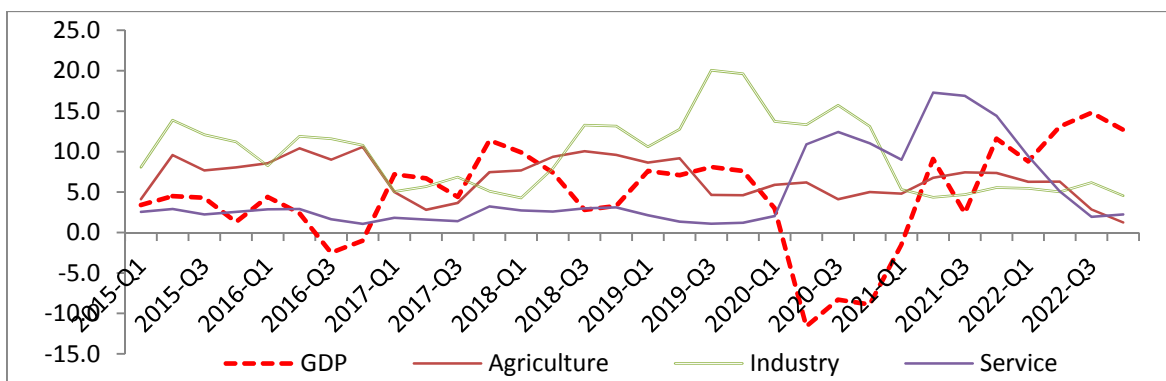

Figure 4. *Volatility in the sectoral structure of the RA economy (Calculations performed by the author)* [**1**].

From this, we can conclude that to have long-term sustainable economic growth, especially deve-

loping and upper-middle-income countries should focus their efforts to develop the industry sector and

increase its share in the structure of the economy, because the continuous development of the industry creates great opportunities for the further development of the country's economy in all directions.

As we know, the output of each sector of the economy is also a result of indicators characterizing the level of employment in that sector. And in this context, from the point of view of economic growth and economic stability, the analysis of the labor market indicators of that sector is also of great importance. In particular, the latter is an indicator of the directions in which work should be carried out

so that the level of employment moves from unproductive sectors to more productive ones.

Let's look at the employment rate according to individual activity types.

As the graph shows, the share of agricultural workers compared to the total employed decreased year by year and reached 22% in 2021. This is conditioned not only a result of the decline in the absolute number of employed but also to a certain extent the change in the share of agriculture in GDP. In the services sector, along with the growth of the share in the GDP, the share of the employed also increased from 44% to 56%. And in other sectors, there were basically no changes.
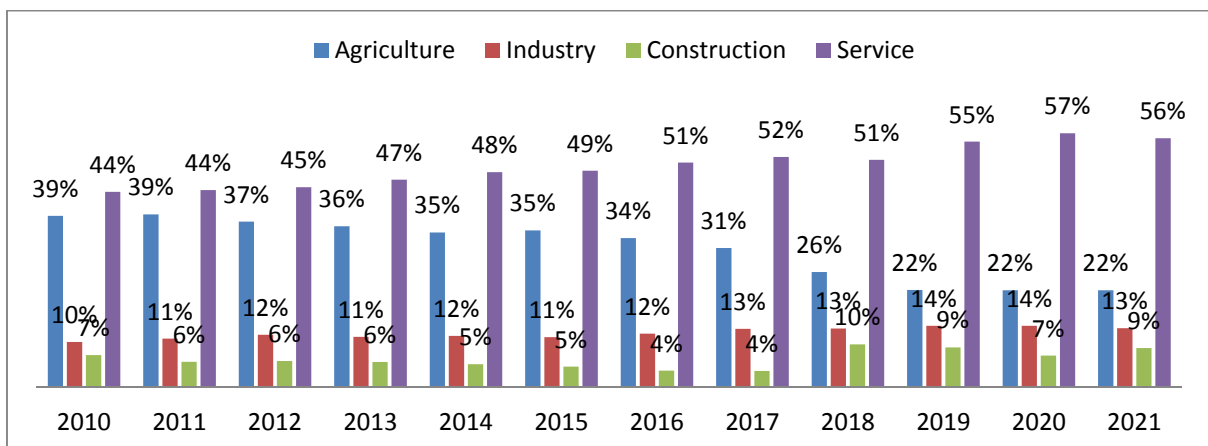

Figure 5. *Share of the employed according to individual sectors from 2010 to 2021* [**1**; **2**]

The discrete ratio of the structure, is one of the widely used methods in econometrics, which allows to understand the degree of symmetry between the

output and the level of employment in a given sector of the economy. The obtained results are shown in the graph.
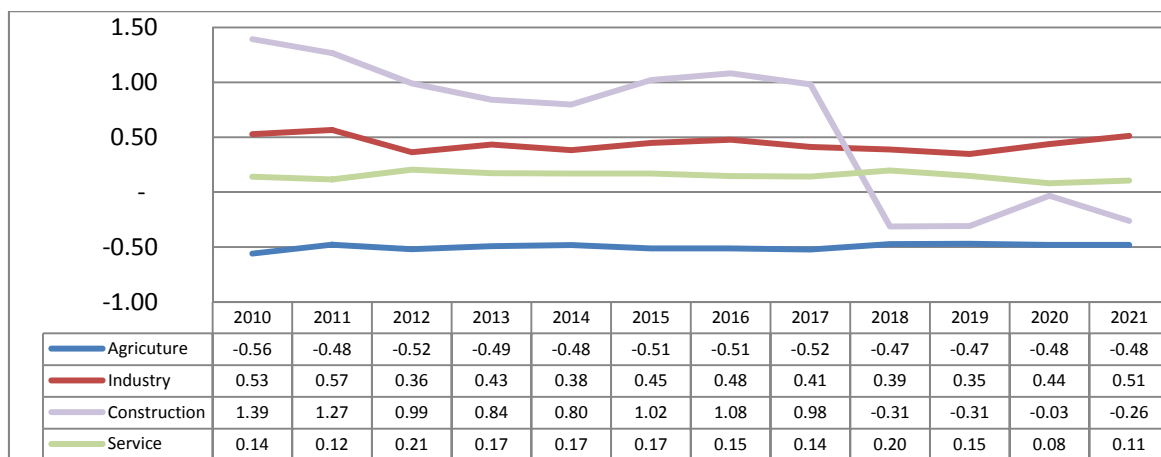

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Agricture	-0.56	-0.48	-0.52	-0.49	-0.48	-0.51	-0.51	-0.52	-0.47	-0.47	-0.48	-0.48
Industry	0.53	0.57	0.36	0.43	0.38	0.45	0.48	0.41	0.39	0.35	0.44	0.51
Construction	1.39	1.27	0.99	0.84	0.80	1.02	1.08	0.98	-0.31	-0.31	-0.03	-0.26
Service	0.14	0.12	0.21	0.17	0.17	0.17	0.15	0.14	0.20	0.15	0.08	0.11

Figure 6. *Coefficients of discrete ratio of the RA structure from 2010 to 2021*
(Calculations performed by the author) [**1**].

As can be seen from the figure 6, the discrete ratio coefficient of agriculture is less than 0, varying between -0.56 and -0.47. We can conclude from this result, that the share of employed in agriculture is much higher than the volume of output in that sector. Hence, there is a large surplus of agricultural labor. The main reason for this could be that

agriculture has a relatively low level of employment and the output of the sector did not increase during the considered period resulting in a mismatch of the labor force involved in the sector. The discrete ratio coefficient of the industry has varied between 0.35 and 0.57 which means there is insufficient use of its total employment and underutilization of the labor

force. Referring to the construction, we can say that the dynamics here can be divided into 2 periods until 2018, and after that. The ratio was consistently above 0 until 2018, and this is explained by the fact that there was underutilization of the labor force. In contrast to this, since 2018 there was a large surplus of construction labor. As for the services sector, the variations are the smallest here: from 0.11 to 0.21 and the latter are quite close to equilibrium. So, we can state that the industry and service sectors have a relatively more positive trend than the others and there is enormous potential in these sectors to absorb surplus labor from the other two sectors.

The VECM econometric model was estimated to understand the relationship between value-added created in industry, agriculture, and services sectors and GDP. The parameters of the model are economic growth, value added of services, agriculture, and industry adjusted by average annual prices of the previous year. One of the necessary conditions before moving on to the estimation of the model is the condition of first-order cointegration of the variables. For this purpose, the stationarity of the series was checked using the Dickey-Fuller test. According to the test results, the variables were non-stationary series, and in the case of the first-order difference, the series were stationary. Therefore, the variables satisfy the first of the predefined conditions for the model and it is appropriate to proceed with the estimation using the VECM model. The seasonality of the series was also checked, as a result of which all series were adjusted for seasonality.

In the next step, it is determined the optimal lag limit for the model. The table shows the results of the test to determine the optimal lag. According to Akaike's criterion, the 6th lag of variables was chosen as the optimal lag for the model.

Table 3. *Results of the optimal lag determination test*
(The results were obtained from the author's optimal lag selection test).

VAR Lag Order Selection Criteria
Endogenous variables: LNGDP_SA LNAGR_SA LNIND_SA LNSERVICE_SA
Exogenous variables: C
Date: 05/17/23   Time: 23:09
Sample: 2009Q1 2022Q4
Included observations: 48

Lag	LogL	LR	FPE	AIC	SC	HQ
0	191.7783	NA	4.70e-09	-7.824097	-7.668164	-7.765169
1	310.8157	213.2752	6.44e-11	-12.11732	-11.33765*	-11.82268
2	331.6841	33.91121	5.34e-11	-12.32017	-10.91677	-11.78982
3	343.5534	17.30947	6.58e-11	-12.14806	-10.12093	-11.38200
4	389.8436	59.79146*	2.00e-11*	-13.41015	-10.75928	-12.40838*
5	405.1466	17.21591	2.34e-11	-13.38111	-10.10651	-12.14363
6	428.7410	22.61127	2.08e-11	-13.69754*	-9.799207	-12.22436
7	436.1982	5.903627	4.05e-11	-13.34159	-8.819523	-11.63270
8	457.5175	13.32454	5.26e-11	-13.56323	-8.417426	-11.61862

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The relationship between the non-stationary variables included in the model, in the long run, was revealed by the Johannes cointegration test. Compared to the Engle-Granger test, the Johansen test allows for more than one cointegration relationship. Based on both the trace test and the maximum eigenvalue tests, there is 1 cointegrating equation at the 5% significance level.

From the Johannes model, we can bring out the Normalized Cointegration Equation, which has the following form

Normalized cointegrating eq. = LNGDP-0.906342LNAGR -3.333255LNIND +2.478252LNSERVICE

Where

LNGDP- economic growth, is the estimated variable in the model,

LNAGR- gross agricultural output

LNIND- gross output of the industry

LNSERVICE- gross output of the service sector,

According to the results, LNAGR has a significant and positive effect on economic growth in the long run, ceteris paribus. LNIND also has a positive and significant effect on the dependent variable in the long run, ceteris paribus. The service sector gross output has a negative effect in the long run, but the estimation shows that the variable has a non-significant effect.

Summarizing the results of the Johannes cointegration test, we can state that we reject the 0 hypotheses that there is no cointegration and accept the opposite hypothesis to the 0 hypotheses.

The vector error correction model (VECM) estimation results are presented in the table.

Table 4. *VECM estimates in the long run (estimated moel results).*

LNGDP(-1)	LNAGR(-1)	LNIND(-1)	LNSERVICE(-1)	C
1.000000	-0.322011	-2.037915	1.212289	-1.288777
	[-3.01804]***	[-5.63187]***	[1.38488]	

*** significant at 1% significance level

Estimates show, that In the long run, there is a significant relationship between value added in agriculture and industry and real GDP growth. And although the coefficient in the service sector is negative, we should note that the relationship is not significant here. Specifically, a 1% change in agricultural output leads to a 0.322% increase in GDP on average, and a 1% increase in industry output leads to a 2.03% increase in GDP in the long run.

for the choice of model parameters, as well as the reliability of estimates.

Table 5. *Speeds of adjustment*

Variables		Speeds of adjustment
Real GDP growth	1	-0.14824
Added value of the agricultural sector	-0.32	-0.11
Added value of the industrial sector	-2.03792	0.5422
Added value of the service sector	1.212289	0.31428

The speed of adjustment for the variables is calculated by multiplying the coefficient of the variable in the cointegration equation by the error correction coefficient, where the first-order difference of the variable is the dependent variable. Concerning if the speed of adjustment products are positive(above 0) this means that our VECM continues to move away from long-run equilibrium after experiencing a shock, instead of converging back to it. The observed coefficient for economic growth as the dependent variable is -0.15, which means that if there are shock conditions in period t, the model will return to the long-run equilibrium situation by 15% in period t+1.

The model estimation results show that the estimates for the agriculture, services, and industry sectors are about -0.04, -0.20, and -0.31, respectively, which means that when experiencing a shock in the t-th quarter, the agriculture, services, and industry sectors will return to the long-term equilibrium situation by 4%, 20% and 31% respectively in the t+1st quarter. However, we should also note that the assessment for services is not statistically significant. The coefficient of determination of the model (R^2), in turn, shows that 77.6% of the movement of the dependent variable of the model is explained by the independent variables of the model, which is again an important indicator

The results of the model estimation in the short term show that a 1% increase in GDP in period t, leads to an average increase of 0.81% in GDP in period t+1 ceteris paribus. After that 1% increase in agricultural output in period t, leads to an average increase in GDP of 0.24% in period t, and also a 1% increase in services in period t, leads to a 1.08% increase in GDP in period t+1 ceteris paribus.

Conclusion. The analysis and assessment of the sectoral structure of the economy is one of the most important conditions for stable economic growth and with its analysis,11!! it is possible to understand the changes taking place in the economy as well as to evaluate their impact in ensuring economic growth.

During the observed period, the share of services in Armenia's GDP has increased, reaching 64%. According to the data of 2022 financial and insurance activities contributed the most to economic growth with a 2.79% point, which, moreover, was negative last year. There has also been a sharp increase in the contribution of information and communication, construction, trade and manufacturing industries to economic growth. As for the contributions to the GDP expenditure direction, we must state that the contribution of exports to economic growth is increasing which in turn creates new opportunities for Armenia's economy to face challenges more effectively.

According to the sectoral structure of the economy, comparisons were made between Armenia, neighboring countries, as well as the group of upper-middle-income countries. It is clear from the results that In Armenia, the share of agriculture, and In upper-middle-income countries,

the share of industry remains high, which is also combined with a high willingness to withstand economic shocks in the group of these countries, which is definitely not typical of the Armenian economy.

As a result of comparisons with the target indicators of the government's five-year programme, as well as with the long-term development plans of individual sectors we can conclude that in all the four considered sectors, the problems, things to be done are a priority on the way to ensure stable economic growth. In particular, it will be possible to increase the resistivity of the country's economy to shocks, with a more sustainable development of the agricultural and industrial sectors, as well as by increasing the share of the latter in the GDP. And as for the service sector, there is a need for changes within the sector that is, promoting the fastest development of sectors that create the greatest added value which is also no less important from the point of view of long-term stability of the economy.

The results of the discrete ratio of the structure allow us to conclude that according to the sectoral structure, the labor force is also distributed disproportionately. In particular, there is an inefficient concentration of labor in the agriculture and construction sector which causes a break in the output-labour ratio.

The VECM econometric model was estimated to understand the relationship between value added created in industry, agriculture and services sectors and GDP. The results showed that the impact of industry and agriculture on economic growth is significant both statistically and in terms of impact, both in the long run and in the short run. Based on the speeds of adjustment coefficient of the model we can conclude that the estimated model is quite stable to shocks and when experiencing a shock he model will restore the long-term equilibrium by 15% in the next period (quarter).

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