

# Comparison of the centralization of the RA economy with the economic result

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## ՀՀ տնտեսության կենտրոնացվածության համադրումը տնտեսական արդյունքի հետ

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**Ամփոփագիր.** Երկրի կառուցվածքային տնտեսական առանձնահատկությունները երկարաժամկետ և բազմաբնույթ ազդեցություն ունեն երկրի տնտեսական արդյունքի և աճի որակի վրա: Ստացվում է երկրի տնտեսական վարքագիծը և տնտեսական ռեսուրսների և արդյունքի կենտրոնացվածությունը փոխկապակցված են, և ուրեմն դրանց բաշխման արդյունավետությունը կարևոր ցուցիչ է երկրի համախառն ներքին արդյունքի բարելավման համատեքստում: Մույն ուսումնասիրությամբ գնահատել ենք Հայաստանի տնտեսական ռեսուրսների և արդյունքի կենտրոնացվածության մակարդակները 2006-2021 թվականներին: Հաշվարկել ենք Հերֆինդալ-Հիրշմանի նորմավորված ինդեքսները 36 ցուցանիշների համար, որոնք խմբավորել ենք 3 խմբերում՝ ըստ բաժանման միավորների բնույթի՝ կառուցվածքային, տարածքային (երկու սցենարով՝ Երևանը ներառյալ և առանց Երևան) և սեռատարիքային: Առաջին խմբում կենտրոնացվածության բարձր մակարդակ է արձանագրվել արդյունաբերությունում (ըստ ոլորտների) և գիտատեխնիկական աշխատանքների ծավալների գծով (ըստ ուղղության): Ըստ տարածքային բաժանման բարձր ինդեքսները համեմատաբար ավելի շատ են, իսկ սեռատարիքային խմբում կենտրոնացվածության աստիճանը փոքր է բոլոր ցուցանիշների համար: Այնուհետև հաշվարկված ցուցանիշները համադրել ենք համախառն ներքին արդյունքի հետ: Հաշվարկելով դրանց միջև առկա կորելացիան՝ ստացել ենք յուրաքանչյուր ցուցանիշի կենտրոնացվածության և ՀՆԱ միջև առկա կապի բնույթը և նշանակալիությունը: Ունենալով նշված ցուցանիշները, կարող ենք որոշել, թե որոնց ապակենտրոնացվածությանն ուղղված միջոցառումներն են կարող բարելավել ՀՀ տնտեսական արդյունքը: Օրինակ՝ շինարարության կենտրոնացվածության մակարդակն ըստ տարածքների բարձր է (0.48), իսկ դրա և ՀՆԱ միջև կապը՝ նշանակալի և բացասական (-0.62):

**Հանգուցաբառեր՝** շուկայի կենտրոնացվածություն, տնտեսական ռեսուրսների կենտրոնացվածություն, տնտեսական արդյունք, Հերֆինդալ-Հիրշմանի ինդեքս, ռեսուրսների բաշխման արդյունավետություն

## Сравнение централизации экономики РА с экономическим результатом

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**Аннотация.** Структурные экономические особенности страны оказывают долгосрочное и разностороннее влияние на объемы производства и качество экономического роста страны. Получается, что экономическое поведение страны и концентрация экономических ресурсов и выпуска взаимосвязаны, и поэтому эффективность их распределения является важным показателем в контексте улучшения валового внутреннего продукта страны. Данным исследованием мы оценили уровень концентрации экономических ресурсов и результатов Армении в 2006-2021 годах. Мы рассчитали нормализованные индексы Херфиндаля-Хиршмана для 36 показателей, сгруппированных в 3 группы по характеру единиц деления: структурные, территориальные (по двум сценариям – включая Ереван и без) и половозрастные. В первой группе отмечен высокий уровень концентрации в промышленности (по отраслям) и по объемам научно-технических работ (по направлениям). Высокие индексы по территориальному разделению сравнительно больше, а степень концентрации в половозрастной группе мала для всех показателей. Затем мы сопоставили рассчитанные показатели с валовым внутренним продуктом. Рассчитав корреляцию между ними, мы получили характер и значимость связи между централизацией каждого показателя и ВВП. Имея указанные показатели, можем определить, какие мероприятия, направленные на децентрализацию которых, могут улучшить экономический результат Армении. Например, уровень концентрации строительства по административно-территориальным единицам высокий (0.48), а связь между ним и ВВП значимая и отрицательная (-0.62).

**Ключевые слова:** концентрация рынка, концентрация экономических ресурсов, объем производства, индекс Херфиндаля-Хиршмана, эффективность распределения ресурсов

The solutions to the underlying problems of improving the efficiency and quality of economic growth are often hidden in the structural features of the country's economy. As a result of the influence of diverse factors and various managerial decisions, a certain structure of the economy has formed in the RA with its own characteristics, some of which actually have a negative impact on the development of the country and the well-being of the population, in particular, the disparity between the available resources and the results obtained as a result of their use, the formation of income and in the form of injustice appearing in distribution processes, disruption of economic mechanisms and other similar manifestations.

In order to mitigate such negative consequences, it is necessary to study the structure of resources and output of the economy, to compare them with the manifestations of economic growth and to identify the directions and strength of the connections between them, to optimize the structure of the economy in order to ensure high-quality economic growth.

Among economists, very often, the issues of disproportionate development of the economy and inclusiveness of economic growth are the main subjects of debate. On the one hand, a high level of concentration can have a positive effect on technological development, digitisation, automation, stronger international division of labour, and market integration [2, p. 1]. On the other hand, in the long run, there is a contention that big is bad, and that the growth of structural components with high market shares is increasing concentration and weakening competition, driving up profits, damaging innovation and productivity, and increasing inequality [8, p. 4]. Diversification of the economy is considered one of the prerequisites for sustainable development, which is especially important for small, landlocked states that are dependent on resources and external shocks or are exhausted by geopolitical conflicts. According to the World Bank, economic diversification occurs when domestic production moves toward new activities within and between sectors. In turn, this leads to better resource allocation and improves overall productivity. Diversification will tend to increase the demand for labor and deliver jobs, of particular importance in resource dominated economies with large youth populations and high unemployment rates [7, p. 30].

Armenia is one of the countries that can be described by all the listed features. In 2008-2021, on average, the 45-49, 50-54 and 55-59 age groups have the largest shares among the employed in the

country: 11.27%, 12.05% and 10.99%, respectively. There are more employed people in the 60-64 age group (7.75%) than in the 20-24 group (7.37%). The unemployment rate is also not inspiring, averaging about 22% over the twenty-year period (2001-2021) [10].

In order to consider the structure of the RA economy in the context of the growth quality, we studied the asymmetries among the country's resource markets and the generated result, in particular, their concentration levels and the latter's impact on the economic result. For this purpose, we used the Herfindahl-Hirschman index (HHI) mentioned above, which is the sum of the squares of each component share in the market. It follows that the shares of all segments are taken into account, and the index calculated as a result of squaring them gives a more prominent expression to the role of companies with larger market shares. An industry or market is considered to be decentralized if the HHI value is less than 1500 (0.15), while the market is moderately concentrated if the index value is between 1500 and 2500 (0.25), and in the case of a value above 2500, there is a high degree of market concentration. Thus, HHI ranges from zero to 10000 – the higher the resulting value, the higher the market concentration [11, p. 19].

We studied the inequalities manifested in the resource markets of RA, in the economic sectors, moreover, according to the content of the division: structural, territorial and gender-age (table 1). We grouped a total of 36 indicators among them. The data covers 2006-2021. We compared the HHIs of the indicators with the RA GDP in order to reveal the nature and strength of the relationship between them.

In the case of combining or comparing any heterogeneous indicators, there is a need for normalization. The amounts of structural components of the HHIs of the collected indicators are different, and therefore the calculated concentration indicators are affected by the number of components, that is, the unnormalized HHI does not control the number of available items [1, p. 15]. For example, the HHIs of export and import were calculated according to product groups included in them, which are 95 in both cases, on the other hand, the asymmetry index in industry was estimated for only 4 fields.

In the case of normalized HHI, the index ranges from  $1/n$  to 1, where  $n$  is the number of structural components. Thus, the formula for calculating the normalized HHI is:

$$HHI_{\text{normalized}} = \frac{HHI - \frac{1}{n}}{1 - \frac{1}{n}} \quad (1)$$

**Table 1.** The average values of the normalized HHIs of the indicators of the RA economy and the correlation coefficients between the corresponding normalized HHIs and the GDP (covering 2006-2021)

Author's calculations, based on the source data [10]

Indicator	HHI (average)	Correlation coefficient between HHI and GDP
structural indicators		
GDP added value by economic activity type	0.05	-0.92
Industry output by sector	0.34	-0.20
agriculture output by sector	0.04	-0.85
services output by sector	0.06	-0.63
energy balance by sector	0.14	0.91
foreign trade structure	0.20	-0.90
export by product group	0.15	-0.30
import by product group	0.08	-0.37
employed by education level	0.16	0.71
employed by economic activity type	0.10	-0.94
average monthly nominal salary by the size of the organization	0.07	0.73
average monthly nominal salary by economic activity type	0.01	0.87
scientific and technical services by study direction	0.59	0.09
regional		
industry output (excluding Yerevan)	0.07	0.67
industry output	0.12	-0.12
mining industry output (excluding Yerevan)	0.65	-0.49
mining industry output	0.64	-0.51
manufacturing output (excluding Yerevan)	0.07	0.86
manufacturing output	0.18	0.64
agriculture output (excluding Yerevan)	0.03	0.25
Agriculture output	0.04	0.22
services output (excluding Yerevan)	0.05	0.39
services output	0.69	-0.25
retail trade (excluding Yerevan)	0.03	-0.51
retail trade	0.60	-0.92
construction (excluding Yerevan)	0.10	-0.01
construction	0.48	-0.62
employed population (excluding Yerevan)	0.02	0.65
employed population	0.05	0.18
employed (urban-rural)	0.45	0.49
average monthly nominal salary (excluding Yerevan)	0.01	0.87
average monthly nominal salary	0.01	0.78

gender-age

average monthly nominal salary by gender	0.08	-0.93
employed by sex	0.01	0.43
employed by age group	0.02	0.23

Let's look at the nature of the received connections and the corresponding HHIs according to the groups of separated criteria.

**Structural indicators:** First of all, note that the GDP value added has an opposite and rather strong linear relationship (-0.92) with GDP, that is, market decentralization leads to GDP growth, while the generation of added value is not centralized (0.05). The degree of centralization of the internal structures of the economy varies by sector. In services (0.06) and agriculture (0.04), a low level of concentration was recorded, while in industry (0.34) a high degree of concentration was recorded, which is mainly due to the high share of manufacturing industry, on average about 67%. The connection between the GDP and energy resources concentration is very strong and positive (0.91), which proves that the asymmetry according to the sectors has a positive impact on the created result. At the same time, it should be noted that this level of concentration in the long run undermines the vision of stable and balanced development of the country and negatively affects the dynamics of other categories of economic derivatives. Maybe it provides economic growth, but it does not provide a positive effect for the quality of the latter. Despite the fact that in general, the distribution of energy resources by sector is moderate (0.14), its share in the agricultural sector is comparatively low (about 3% on average).

Referring to the asymmetry of foreign trade, the was originally used to analyze a country's trade measuring the concentration in its export or import pattern in a given period of a time. Its well-known definition follows [3, p. 383]. The RA trade balance is characterized with a moderate degree of concentration (0.2). And according to product groups, the nature of the degree of concentration is similar, in both export and import cases decentralization has a positive relationship with GDP growth, despite the fact that the average HHI of exports over the observed 14 years is at the limit of moderate concentration (0.15). Currently, there is a need to decentralize the market, because according to the share in exports, the leading 5 product groups together make 2/3 of exports, and the remaining 90 groups - only 1/3.

The level of structural concentration of the employed, particularly by type of economic activity, is not concentrated (0.1) and decentralization has a

positive relationship with GDP (-0.94). The picture is slightly different according to the educational level of the employed population. In this case, the market is moderately concentrated (0.16), and the latter has a positive correlation with GDP (0.71). Taking into account the fact that the degree of concentration refers to those with secondary, professional and higher education, the asymmetry and the positive impact on the GDP contributes to the qualitative improvement of economic growth. The problem here lies in the very large proportion of those engaged in secondary education (in 2008-2021-about 41%) and the superiority over the share of communities that have received higher (on average about 27%) and specialized secondary (on average about 0.21%) education. The economy itself, despite the constantly accelerating pace of technological development, does not require a higher level of education and qualifications, which leads to an increase in the unemployment rate of skilled labor. Diversification of the economic portfolio can change the structure of labor demand according to various criteria, including age group and level of education. And in this case, educational training programs can stimulate structural changes in the economy, in parallel having a positive impact on the educational level of the RA labor market.

The relationships between the concentration degrees of salary concentration according to the types of economic activity and to the size of the organization and GDP is positive, despite their low level. This circumstance will definitely contribute to the growth of the concentration degree of the employed according to the sectors. The average monthly nominal salary levels in the mining industry and operation of open-pits, information and communication, financial and insurance activities exceed the average monthly nominal salary level by more than 2 times. Meanwhile, in the two most important areas from the point of view of well-being and quality of growth, which are health care and social services of the population, education and science, they are much lower than the national average, by 13% and 29%, respectively. The concentration of scientific and technical services according to study directions is highly concentrated (0.59), despite the lack of correlation with GDP (0.09). The degree of centralization is also high in the field of scientific researches – more than 80% on average in 2010-2021. The shares of scientific and

technical services and preparation of test sample groups are insignificant, about 4.9% and 2%, respectively. The volume of research is sufficient, but there are very few experiments and a low level of their commercialization.

**Regional indicators:** Many countries are characterized by regional disparities in economic performance. Regional disparities may have harmful implications for economic efficiency, as limited opportunities for those stuck in the wrong place lead to the underutilization of potential and constrain overall growth. Regional disparities in GDP per capita are greater in developing economies. Such differences in economic activity directly exacerbate

differences in living standards. In developing countries, real household consumption levels are approximately 75 percent higher in leading regions than in lagging regions. For advanced economies, the corresponding consumption gap is less than 25 percent [4, p. 9]. One of the main reasons for such reality is fundamental structural changes, in particular, the characteristics of the transition from agriculture and industry to services [9].

The shares, on the basis of which the indices of territorial disproportionate development of RA were calculated according to the spheres of economic activity, are presented in table 2 (covering 2021).

**Table 2. Shares (%) of the regions by economic activity type in 2021 [10]**

	<b>Industry</b>	<b>Agriculture</b>	<b>Services</b>	<b>Construction</b>
Aragatsotn	2.13	9.33	0.71	1.35
Ararat	10.69	15.10	1.47	9.03
Armavir	5.01	22.59	1.46	3.43
Gegharkunik	2.46	12.18	0.89	5.27
Lori	6.32	8.41	1.24	1.68
Kotayk	11.57	8.41	2.93	16.18
Chirac	3.09	9.35	1.53	2.56
Syunik	22.21	6.37	1.44	5.31
Vayots Dzor	1.16	2.38	0.61	0.23
Tavush	1.37	4.88	0.89	2.13
Yerevan	34.00	1.00	86.82	52.83

Based on the RA materials, we have also calculated HHIs by regions, both by including Yerevan and without it, taking into account the obvious high level of concentration in the capital city on the scale of the whole republic. That circumstance is also documented by the differences in the obtained indices and in their relations with GDP dynamics. Except for the mining industry, in the case of all other observed indicators, the HHI including the capital exceeds the corresponding HHI calculated without it. In the case of the employed and the manufacturing industry, the difference is more than double, in the case of construction, about 5 times. For some indicators, this gap reaches dozens of times, in the case of services - more than 12 times, in the case of retail trade - almost 23 times. The concentration of industry by regions is quite low in both scenario (including Yerevan and without it), but there is a significant relationship with GDP only in the case of HHI excluding Yerevan. The picture is more interesting in the internal structure of the industry. RA regional

concentrations, according to the volume of mining and processing industry, have different effects on GDP: in the case of the first, negative (-0.51), in the case of the second, positive (-0.64), and regardless of the fact that Yerevan is included as a component in the calculations. In general, the concentration levels of agriculture and service production volumes, regardless of their nature and taking into account Yerevan's share, do not have a significant linear relationship with GDP. However, for example, the territorial concentration of retail trade has a strong negative relationship with GDP (-0.92). On the other hand, the regional HHI of retail trade is quite high (0.6). Such is the picture in the case of construction volumes as well - in the presence of a high HHI (0.48), a negative correlation of concentration with GDP (-0.62) was recorded.

The territorial concentration of the employed population is low (0.05), despite the fact that the share among the employed in Yerevan (28.5%) is almost three times higher than the indicators of Ararat (10.5%) and Armavir (11.4%), which

recorded the next largest shares. Therefore, the discussed HHI excluding Yerevan is lower (0.02). Concentration among the employed is very acute according to the rural-urban division (0.45), and it has a positive relationship with GDP. The HHI of the average monthly salary by regions in both scenarios is low (0.01), but as concentration increases, GDP also increases, with correlation coefficients of 0.87 and 0.78, respectively, which indicates social polarization and creates preconditions for even more concentration of the economy according to employed population and sectors.

**Gender-age indicators:** The influence of the age structure of the population and the employed on economic growth was touched upon by various authors. Mason et al., using the example of Asia, glanced at the prospects of the lifecycle, in particular, the provision that consumption and labor income of individuals differ among age groups. The analysis confirms that the existing demographic transition will pose two strategic challenges for the region: maintaining economic growth in the face of less favorable demographics and securing adequate resources to meet the consumption needs of the elderly [6, p. 161]. In another paper, using predicted variation in the rate of population aging across U.S. states over the period 1980-2010, Maestas et al. estimate the economic impact of aging on state output per capita. The authors come to the following empirical conclusion: a 10% increase in the fraction of the population ages 60+ decreases the growth rate of GDP per capita by 5.5%. Two-thirds of the reduction is due to slower growth in the labor productivity of workers across the age distribution, while one-third arises from slower labor force growth [5, p. 1].

Therefore, the age composition of the population, in various studies, is emphasized as a factor affecting economic growth. The concentration of employed people in the RA is low according to age groups, on the other hand, it has no significant correlation with GDP.

Thus, in the considered sectors of the RA, there are no indicators that are both highly concentrated, and that concentration is positively correlated with GDP. However, the level of concentration in some markets of the RA resources and GDP production is quite high, and in some cases, the connection with GDP is positive, which in the long run can lead to

disproportionate development of the economy and even more concentration of resources.

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Րեցնզիրուանա/Գրւիւրիտւիւրէ է՝ 15.05.2023

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