Evaluating the Link Between Agricultural GDP Growth and Employment in Albania

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Abstract

Purpose: *The aim of this article is to analyze the impact of economic growth on employment in the agricultural sector. However, it raises a critical question: Is it legitimate to assume that economic growth in agriculture will lead to a corresponding increase in employment in this sector? Historically, the agricultural sector in Albania—despite being regarded as one of the country's key competitive advantages relative to other countries in the region—continues to face persistent challenges. Consequently, development strategies for this sector have focused primarily on enhancing productivity, with the expectation that such improvements will generate positive effects on employment within agriculture.*

Methodology: *To explore this relationship, the study utilizes annual time series data on GDP and employment in agriculture covering the period from 2000 to 2024. These data are analyzed using regression techniques implemented in the e-views software, through which a "translation" coefficient is estimated. This coefficient serves as a key indicator of the relationship between sectoral economic growth and employment dynamics in agriculture.*

Findings: *Building on the estimated model, a forecast is conducted for the period 2025–2030. Referring to Okun's Law, the results suggest that economic growth in the agricultural sector may, counterintuitively, be accompanied by a decline in employment within the same sector.*

Value: *These findings offer important insights for policymakers, helping them to better anticipate and address structural issues that may emerge as productivity increases in the agricultural sector.*

Keywords: *Agricultural sector, Gross Domestic Product, Employment, Okun's Law.*

Introduction

In many developing economies, agriculture plays a pivotal role in sustaining livelihoods and ensuring food security. Yet, the extent to which growth in this sector translates into employment remains a pressing and underexplored question, particularly in transition economies such as Albania.

This paper finds its initial inspiration in the Solow economic model, highlighting those components most relevant to our analysis. The study then deepens the investigation through the use of Okun's model, employed as a reference framework for linking time series data on GDP and employment levels in the agricultural sector, while also taking into account the particular characteristics of this sector as anticipated by Petty's Law.

From a neoclassical perspective, the main factors driving economic growth are savings, population growth, and technological progress (Solow, 2000). The Solow model demonstrates that the savings rate is one of the most critical determinants of the capital stock's steady state in an economy. The steady state of the capital stock describes a point at which the value of investment equals the value of depreciation. At this point, both the capital stock and output are assumed to remain constant over time.

This point is important because it can be interpreted as a long-term equilibrium for the economy: regardless of the capital level an economy may have at a given moment, over time the capital stock will tend to converge toward its equilibrium value. This observation helps explain the high economic growth rates observed in countries like Japan and Germany after World War II. Even though a significant portion of their capital stock was destroyed, if the savings rate (i.e., the portion of output allocated to saving and investment) remains unchanged, the economy will experience a period of rapid growth until it reaches its steady-state level.

Output increases when more capital is added than is lost through depreciation. Therefore, even if GDP initially declines as a result of a reduction in the capital

stock, the economy is expected to experience higher growth rates in subsequent periods.

The savings rate is crucial in determining the steady-state level of a country's capital stock. A high savings rate leads to a significant accumulation of capital and, consequently, to higher productivity. Conversely, when the savings rate is low, capital accumulation becomes a slow process, and productivity remains limited. The outcome of the Solow growth model suggests that persistent budget deficits are detrimental to long-term economic growth, as they reduce national savings and lead to lower productivity. In conclusion, a high savings rate results in higher levels of productivity in the long run. However, there is only one level of the steady-state capital stock that maximizes consumption, a point referred to as the "Golden Rule."

This point is often viewed as desirable by policymakers, but reaching it entails a trade-off between the consumption of the current generation and that of future generations. An economy that is already at a steady-state capital stock level, which is below that required by the Golden Rule, must increase its savings rate and accept a temporary decline in consumption in order to build up its capital stock and eventually maximize consumption over the long term.

Another important factor affecting GDP per capita is population growth. It has been observed that there is a negative correlation between population growth rates and income levels, although this correlation does not necessarily imply a causal relationship. Population growth has implications for the expansion of total capital and output at the steady state, even though capital per worker and output per worker remain constant. If the rate of population growth increases, then output per worker will decline, and the steady-state level of capital per worker will also decrease.

Thus, in order to sustain or improve high living standards, policymakers closely monitor population growth rates and may intervene if the growth rate is considered unsustainable. It is often noted that low population growth is associated with high income levels. However, there may be other factors linking low population growth with higher income levels, such as higher female labor force participation, greater access to education, and the availability of modern birth control methods.

From a neoclassical perspective, the final fundamental factor influencing real GDP growth is technological progress. In fact, this factor is considered essential in explaining the sustained improvements in living standards over time. Technological progress is incorporated into the model as a factor that causes labor efficiency to increase at a given rate.

In the steady state, the change in the capital stock is equal to the difference between investment and the break-even level of investment (which must compensate for depreciation, population growth, and the rate of technological progress). Therefore, an increase in the savings rate leads to a rising trend in

economic growth until the economy reaches its steady state. Once this point is reached, the growth rate of the economy depends solely on the rate of technological progress.

The unemployment rate is another key macroeconomic variable, as it reflects how efficiently an economy utilizes its resources. Unemployment cannot be reduced to zero, even when the economy operates at full capacity, due to the existence of frictional and structural unemployment. Frictional unemployment is defined as the time spent matching workers to available jobs. This period can vary significantly due to incomplete information about job vacancies, geographical immobility of workers, and wage rigidities.

Sectoral shifts occur frequently in an economy because demand for goods and services changes over time. As a result, workers may need time to adapt to new conditions, leading to transitional unemployment. The natural rate of unemployment is defined as the unemployment rate at which the economy is operating at full capacity. It reflects a low level of unemployment but accounts for frictional factors.

This natural rate of unemployment is sometimes associated with the concept of NAIRU—the Non-Accelerating Inflation Rate of Unemployment. If the actual unemployment rate falls below the NAIRU, inflation is expected to accelerate, as employers offer higher wages to attract workers. Conversely, if the actual unemployment rate is higher than the NAIRU, inflation is likely to remain subdued due to lower wage pressures.

When an economy is operating at full capacity, it is said to be at its natural or potential level of GDP. If actual GDP exceeds the potential level, the output gap becomes positive, and the economy experiences inflationary pressure.

The only way GDP can grow without triggering high inflation is either through a higher capital stock or through improvements in technological processes, both of which shift the production function outward.

The relationship between unemployment and real GDP growth is expected to be negative. Intuitively, this is because employed workers produce goods and services, whereas the unemployed do not contribute to output. Arthur Okun (1962) was the first economist to empirically study the relationship between unemployment and economic growth. Using data from the United States, he analyzed changes in the unemployment rate in relation to percentage changes in real GDP. The resulting graph showed a negative correlation, indicating that increases in unemployment tend to be associated with real GDP growth rates below the long-term norm.

The main objective of this paper is to analyze the impact of economic growth on employment in the agricultural sector in the case of Albania.

The objectives of the study are as follows:

1. To analyze the progress of economic growth in the agricultural sector in Albania during the period 2000–2024, by identifying the trends of agricultural GDP and the factors that have influenced it.
2. To examine the dynamics of employment in the agricultural sector during the same period, also analyzing the number of employed individuals in this sector.
3. To assess the statistical relationship between economic growth in agriculture and the level of employment in this sector, using regression models to measure the strength and direction of this relationship.
4. To identify whether economic growth in the agricultural sector is "jobless growth," or whether it has actually led to an increase in employment.
5. To analyze other factors that may affect this relationship, such as agricultural mechanization, rural migration, agricultural policies, subsidies, etc.
6. To provide policy recommendations for promoting more inclusive economic growth in agriculture that contributes to the creation of more jobs.

To achieve these objectives, the study employs an econometric approach using annual time series data from 2000 to 2024, sourced from INSTAT and the World Bank. A linear regression model is applied through EViews software to analyze the relationship between agricultural GDP and employment, enabling the estimation of key statistical indicators and trends.

To analyze whether there is a relationship between economic growth and employment in the agricultural sector, as well as to assess the level of its impact, linear regression has been used through the EViews software, which enables the estimation of econometric models and the interpretation of relevant statistical indicators. The coefficient resulting from the tests will serve as a key indicator of the relationship between sectoral economic growth and employment dynamics in the agricultural sector.

The research questions of the study are as follows:

1. Is there a statistically significant relationship between economic growth in the agricultural sector and the level of employment in this sector in Albania during the period 2000–2024?
2. What is the strength and direction of the impact of Gross Domestic Product growth in agriculture on the number of employed persons in this sector?
3. Can economic growth in the agricultural sector be considered "jobless growth," or has it led to a real increase in employment?
4. What are the main employment trends in the agricultural sector in Albania during the period 2000–2024?

Agriculture remains a cornerstone of Albania's economy, employing a large share of the labor force and contributing significantly to national GDP. Despite the global trend towards industrialization and service sector growth, agriculture continues to be a key livelihood source for rural populations, making the understanding of its dynamics crucial for inclusive economic development and poverty alleviation. This study contributes to policy debates by clarifying whether agricultural growth translates into meaningful employment opportunities.

The agricultural sector in Albania faces multiple challenges, including rapid mechanization, rural-urban migration, and the effects of climate change, which may decouple GDP growth from employment generation. Understanding these factors is essential for assessing whether growth in agriculture is truly inclusive or characterized by "jobless growth," where productivity gains do not translate into increased labor demand.

Employment growth in agriculture is closely linked to rural development and social stability. In Albania, where a substantial portion of the population lives in rural areas, job creation in this sector has significant implications for reducing poverty, curbing migration to urban centers or abroad, and fostering sustainable development.

While numerous international studies have explored the relationship between agricultural growth and employment, evidence from Albania remains scarce and fragmented. This study aims to fill this gap by providing an empirical analysis specific to the Albanian context, utilizing recent data and advanced econometric techniques.

The findings of this study are expected to provide valuable insights for policymakers and stakeholders, enabling the design of targeted interventions to promote sustainable agricultural growth and employment. By identifying whether growth in this sector leads to meaningful job creation, the study informs strategies for inclusive economic development in Albania.

The paper is structured into three main parts. The first chapter presents a review of the relevant literature, outlining the theoretical and empirical background. The second chapter discusses the theoretical framework and econometric methods employed. The third chapter is dedicated to empirical analysis and interpretation of the results, culminating in policy recommendations.

Literature Review

The role of agriculture in economic development has long been central to debates on structural transformation, particularly in low- and middle-income countries. Classical models, such as that of Lewis (1954), emphasized the reallocation of surplus labor from a low-productivity agricultural sector to a modern industrial

sector, viewing agriculture largely as a transitional phase toward industrialization. However, more recent literature offers a broader and more nuanced understanding of agriculture's contribution to development. Byerlee, de Janvry, and Sadoulet (2009) propose a new paradigm that places agriculture at the heart of development strategies, particularly in countries where large segments of the population remain engaged in farming. According to this perspective, agriculture plays multiple roles: driving economic growth, generating employment, reducing poverty, promoting gender equity, ensuring food security, and contributing to environmental sustainability. These functions are especially relevant in countries like Albania, where the agricultural sector still accounts for a significant share of both GDP and employment. The authors argue that the contribution of agriculture to development depends on how effectively its growth translates into labor absorption and income generation for rural populations—a point that is particularly pertinent when evaluating the link between agricultural GDP growth and employment, as this paper aims to do in the Albanian context.

Economic growth and its impact on employment represent one of the most widely debated topics in economic literature, particularly when examined within the context of specific sectors such as agriculture. The relationship between GDP growth and employment levels has drawn the attention of numerous scholars seeking to determine whether economic growth is consistently accompanied by job creation. In the case of the agricultural sector, the literature is divided between those who argue that agriculture can serve as an initial driver of development and employment, and those who contend that modernization and mechanization diminish its role in job creation, resulting in so-called "jobless growth."

Okun's Law (1962) has traditionally been applied to analyze the relationship between overall economic growth and unemployment, with the key insight being a negative correlation between GDP growth and unemployment rates. While originally focused on the U.S. economy, later research (e.g., Knotek, 2007; Lee, 2000) has shown that the Okun coefficient can vary significantly across countries and time periods. Sector-specific adaptations of Okun's Law have demonstrated that different economic sectors, such as agriculture, services, or industry, may exhibit varying dynamics depending on labor intensity, informality, and productivity trends. The agricultural sector, in particular, is often less sensitive to short-term economic fluctuations due to its dependence on seasonal cycles and climatic conditions. This complexity makes the application of Okun's insights to agriculture both challenging and necessary for deeper understanding.

Petty's Law, which describes the declining share of agriculture in national employment as economies develop, is another important theoretical lens. It underscores the tendency of labor to shift away from agriculture toward more productive sectors, even when agricultural output increases. This structural transformation is a defining feature of economic development and has profound

implications for employment analysis, especially in transition economies like Albania.

Abdelgawwad and Kamal (2023) examined the impact of agricultural investment and employment on the growth of Egypt's agricultural sector over the period 1991–2021, employing the ARDL model to explore both short- and long-term relationships. Their findings reveal that both variables exert a significant and stable influence on agricultural GDP. In the long run, agricultural employment and investment are key determinants, with a 1% increase in employment leading to a 3.73% rise in agricultural GDP. The authors advocate for increased public and private investment, enhanced human capital development, and expanded support services for farmers as essential drivers of agricultural and rural development.

Similarly, Timmer (2002) analyzed the role of agriculture in Congo Brazzaville's economic growth using ARDL models. The study concluded that agriculture significantly contributes to short-term economic growth, although its long-term influence diminishes unless supported by macroeconomic policies and diversification strategies. These findings reflect the dual role of agriculture as both a growth driver and a sector in transition.

Studies in transition and developing economies further highlight the complexity of the agriculture-employment-growth nexus. Miluka et al. (2010), focusing on Albania, emphasized the role of agriculture as a labor buffer, absorbing rural labor when non-farm job opportunities are limited. However, this often translates into low-productivity employment and hidden unemployment. Fuglie (2010) showed that mechanization, while boosting output, tends to reduce labor demand, especially among low-skilled workers.

In the Western Balkans, agriculture continues to serve as a major source of employment, especially in rural areas. However, rapid mechanization, aging rural populations, and rural-to-urban migration have altered the labor dynamics of the sector. As a result, agricultural growth in the region may not necessarily lead to proportional increases in employment. The World Bank (2021) stresses that inclusive agricultural growth requires targeted rural policies, land reform, improved infrastructure, and access to credit and extension services. These interventions can help ensure that productivity gains do not come at the cost of labor displacement.

Technological advancement has played a critical role in shaping the employment elasticity of agricultural growth. According to Fuglie (2010), technological change in agriculture has historically improved yields and efficiency, but not always employment. In fact, technology-driven productivity gains often reduce the need for labor, particularly in labor-intensive sub-sectors like crop harvesting.

While numerous international studies have explored the relationship between agricultural growth and employment, evidence from Albania remains scarce and fragmented. The few studies available tend to focus either on household income

or poverty reduction, with limited empirical research examining the employment elasticity of agricultural GDP growth. This study aims to fill this gap by providing a comprehensive analysis specific to Albania, utilizing updated time series data and rigorous econometric models. In doing so, it contributes to a better understanding of whether agricultural growth in Albania is inclusive and employment-generating, or if it exhibits characteristics of jobless growth.

This literature review has established a foundation for analyzing the employment effects of agricultural growth by integrating theoretical perspectives with cross-country evidence and regional challenges. It highlights the need for more granular, country-specific research—a gap this paper seeks to address through empirical analysis of the Albanian case.

Theoretical Framework of Okun's Law

Okun's Law represents a fundamental macroeconomic relationship linking changes in unemployment to fluctuations in real output (GDP). Initially formulated by Arthur Okun in the early 1960s, the law quantifies the inverse relationship between the unemployment rate and real GDP growth. The empirical relationship is commonly expressed as:

$$w(U^* - U) = (Y - Y^*) / Y^* \quad (1)$$

where:

- Y is the actual real GDP,
- U the actual unemployment rate,
- w is the Okun coefficient measuring the sensitivity of output to unemployment deviations.

The asterisk (*) denotes the potential or natural level of the respective variable,

- Y^* is the potential (natural) level of real GDP,
- U^* is the natural rate of unemployment,

This equation states that for every percentage point that unemployment falls below its natural rate, real GDP exceeds its potential level by 2%. In Okun's original empirical study for the United States,, Okun empirically estimated that approximately 2. This means that a one percentage point increase in unemployment leads to roughly a 2% decline in real GDP relative to its potential. Thus, Okun's Law provides a useful rule of thumb to quantify the output cost of unemployment fluctuations in an economy.

Since U^* and are Y^* are difficult to observe directly, researchers often use a reduced-form version of Okun's Law to estimate the relationship empirically, focusing on growth rates rather than levels.

To derive the growth rate formulation, we can expand equation (1) as follows:

$$wU^* - wU = Y / Y^* - Y^* / Y^* \quad (2)$$

We now derive equation (2) with respect to all variables. For the purpose of simplifying our analysis, we will consider Y^* (potential GDP) as a constant, assuming that potential output does not change in the short term. As a result, we obtain the following:

$$wdU^* - wdU - dY / Y^* - dY^* / Y^* \quad (3)$$

Gjithashtu do të supozojmë se ndryshimi i normës natyrore të papunësisë është $dU^*=0$. Me këtë supozim dhe riorganizim do të kemi se:

$$dY / Y^* = -wdU + dY^* / Y^* \quad (4)$$

Meqënëse norma potenciale e rritjes së PBB-së reale është përgjithësisht pranë normës reale të rritjes, si pasojë mund të bëjmë përafrimin e dY^*/Y me dY / Y. Ky modifikim mund të shfuqizohet në periudhën afatshkurtër, por në periudhën afatgjatë ajo është e qëndrueshme. Kështu që do të kemi:

$$dY / Y = -wdU + dY^* / Y^* \quad (5)$$

This equation highlights that the actual growth rate of real GDP is equal to the potential growth rate of GDP minus the product of the Okun coefficient and the change in the unemployment rate.

Using the Least Squares Method, Okun obtained an empirical value of w=2 dhe dY*/ Y*=3. and an estimated potential GDP growth rate by 3%. This implies that the potential growth rate of GDP is approximately 3 percentage points, and a 1 percentage point increase in the unemployment rate would result in a 2 percentage point decline in real GDP growth.

Originally, Okun's Law connected GDP growth to reductions in unemployment. However, in our study, rather than focusing on unemployment, we aim to examine the relationship between economic growth and employment growth. This methodological adjustment stems from significant inconsistencies in unemployment data reported by INSTAT (the Albanian Institute of Statistics). For example, at the end of 2014, administrative records from INSTAT indicated an unemployment rate of no more than 14%. Meanwhile, the Labour Force Survey,

conducted quarterly, reported an unemployment rate of 18%. Furthermore, if we were to calculate unemployment based on the active population seeking employment and the number of employed individuals from INSTAT's administrative sources, the unemployment rate could reach up to 26%.

Due to this instability and uncertainty in unemployment statistics, we are compelled to use the number of employed persons instead, as these data are comparatively clearer and relatively more reliable.

A common feature of economic development—observed both in capitalist and socialist countries—has been the relative decline in agricultural employment and the corresponding increase in industrial and tertiary sector employment. This trend is known as Petty's Law. According to this law, economic development unfolds in three distinct phases:

1. In the initial phase, agricultural employment dominates and continues to grow, albeit at a slower pace than employment in non-agricultural sectors.
2. In an intermediate phase of stagnation, employment in agriculture begins to decline significantly relative to employment in industry and services.
3. In the final phase, agricultural employment decreases sharply while industrial and service sector employment expands rapidly.

In France, the first phase lasted until the mid-20th century, the second phase continued until the end of World War II, and the third phase began thereafter. A similar evolution occurred in the United Kingdom. In the United States, agricultural employment increased slowly until the end of the 19th century, remained stable until the onset of the Great Depression, and then began a clear downward trend starting around 1935.

Where does Albania stand in this trajectory?

It would be reasonable to assume that GDP growth in Albania's agricultural sector—rather than leading to an increase in agricultural employment—may in fact cause a decline in employment due to the adoption of new technologies and mechanization. This shift reflects the broader transformation experienced by other economies as they progressed through the stages described by Petty's Law.

Okun's Law is a well-studied concept in macroeconomics and has been widely used to understand the relationship between unemployment and economic growth. Okun (1962) was the first to formulate this relationship, while more recent studies have examined variations in the Okun coefficient over time and across different countries (Ball & Mankiw, 2002). For example, Ball and Mankiw (2002) argue that the Okun coefficient can vary depending on the economic context,

influenced by factors such as monetary policy and labor market structure. In cases where unemployment statistics are inaccurate or unreliable (as often happens in developing countries), the use of employment indicators can be a more stable alternative for analysis (Klas & Gordon, 2004). This is because employment figures are often easier to measure. In developing countries, where informality is high, official unemployment rates are often underestimated, making employment the main indicator of labor market conditions (Fields, 2011). The agricultural sector in Albania continues to play an important role in the national economy, accounting for a significant share of GDP and employment (INSTAT, 2023). According to the latest data, the agricultural sector's share of GDP is about 20%, while approximately 40% of the active labor force works in this sector. Modernization and mechanization are bringing changes to the employment structure, with a tendency towards a decline in agricultural employment, reflecting the structural transformation of the Albanian economy. Petty's Law describes the inter-sectoral transformation of employment during economic development, where the share of agricultural employment decreases while that in industry and services increases (Timmer, 1988). This regularity has been observed in many countries and is important for understanding the challenges and opportunities presented by the agricultural sector in Albania's transformation process. According to Timmer (1988), transition countries like Albania experience different phases of this process, where growth in agricultural GDP is not always accompanied by growth in agricultural employment due to technology and mechanization. Studying the relationship between agricultural GDP growth and employment is very important for formulating development policies in Albania. Understanding this relationship helps identify ways to stimulate economic growth by creating jobs in the rural sector and promoting sustainable development (World Bank, 2021). Moreover, effective policies should address challenges such as mechanization, rural migration, and adaptation to climate change, which directly affect employment dynamics in agriculture. This study aims to contribute to the existing literature by providing an empirical analysis of the relationship between agricultural GDP growth and employment in Albania, using reliable employment data. The econometric methods used, including ARDL models, will help test Okun's Law in this specific context, offering valuable insights for policymakers and development researchers.

Model Analysis

In the case of Albania, the analysis is based on annual data. This choice is primarily due to the lack of high-frequency, sector-disaggregated data for the Albanian economy. Sectoral data with quarterly frequency are only available from 2005 onward. Therefore, we have opted to use annual data on GDP and the number of

employed individuals in the agricultural sector, covering the period from 2000 to the present.

This approach is also consistent with the methodology adopted by Knoester (1986), Paldam (1987), and Musa (1997), who employed annual data in their estimations of Okun's Law. Given the data constraints and the objective of this study, the use of annual time series is considered both appropriate and methodologically sound.

TABLE 1: Trends of the number of employed persons and GDP (in million ALL) in the agriculture sector.

Year	Agriculture Employment	GDP Agriculture
2000	761000	114718
2001	526337	119492
2002	526290	126105
2003	533639	138662
2004	542152	141642
2005	542179	141842
2006	542000	144623
2007	541860	156522
2008	496100	170957
2009	501427	178721
2010	496036	206669
2011	503854	220418
2012	525384	235173
2013	500529	257223
2014	479538	270290
2015	468755	272274
2016	454454	285654
2017	432435	286765
2018	434478	299051
2019	413140	310628
2020	411551	311176
2021	408600	330312
2022	401223	362246
2023	396002	383434
2024	392143	310628

Source: INSTAT

From 2000 to 2024, Albania's agricultural sector underwent a gradual but clear structural transformation. At the beginning of this period, agriculture employed a substantial portion of the workforce, with over 760,000 people working in the sector in 2000. However, employment declined sharply in the early 2000s (dropping by nearly 30% between 2000 and 2001) and continued to fall steadily in the following years. By 2024, the number of people employed in agriculture had nearly halved, falling to around 392,000.

Despite the declining number of workers, the sector's economic output steadily increased. Agricultural GDP more than tripled, rising from approximately 114 billion ALL in 2000 to a peak of over 383 billion ALL in 2023. This growth in output, alongside shrinking employment, reflects rising productivity and modernization within the sector. Advances in technology, improved farming techniques, and structural reforms likely contributed to this shift, allowing fewer workers to generate more economic value.

However, in 2024, agricultural GDP experienced a notable decline, falling back to the 2019 level. This drop may suggest temporary disruptions or underlying vulnerabilities, such as climate-related challenges, price fluctuations, or global market pressures.

Overall, the data highlights a transition from labor-intensive to more capital- and technology-intensive agricultural production in Albania, in line with broader economic development patterns. While this transformation has improved productivity, it also underscores the importance of managing rural employment and ensuring that those exiting agriculture find opportunities in other sectors of the economy. The contraction of the agricultural sector has also been driven by increased emigration from rural areas to Northern and Western Europe, particularly following the end of the COVID-19 pandemic.

TABLE NR.2: Agriculture sector: GDP and employment growth in percentage terms

Year	Agriculture Employment	GDP Agriculture	Employment change	GDP change
2001	526337	119492	-30.84%	4.16%
2002	526290	126105	-0.01%	5.53%
2003	533639	138662	1.40%	9.96%
2004	542152	141642	1.60%	2.15%
2005	542179	141842	0.00%	0.14%
2006	542000	144623	-0.03%	1.96%
2007	541860	156522	-0.03%	8.23%
2008	496100	170957	-8.44%	9.22%
2009	501427	178721	1.07%	4.54%
2010	496036	206669	-1.08%	15.64%
2011	503854	220418	1.58%	6.65%

2012	525384	235173	4.27%	6.69%
2013	500529	257223	-4.73%	9.38%
2014	479537	270290	-4.19%	5.08%
2015	468755	272274	-2.25%	0.73%
2016	454454	285654	-3.05%	4.91%
2017	432435	286765	-4.85%	0.39%
2018	434478	299051	0.47%	4.28%
2019	413140	310628	-4.91%	3.87%
2020	411551	311176	-0.38%	0.18%
2021	408600	330312	-0.72%	6.15%
2022	401222	362246	-1.81%	9.67%
2023	396001	383434	-1.30%	5.85%
2024	392142	397998	-0.97%	3.80%

Source: INSTAT, Author

Between 2001 and 2024, Albania's agriculture sector experienced contrasting trends in employment and economic output, pointing toward a long-term process of structural transformation and productivity gains.

In terms of employment, the sector saw a consistent decline over the two decades. The most dramatic drop occurred in 2001, when agricultural employment fell by nearly 31% compared to the previous year. This likely reflects methodological adjustments or significant labor shifts during the early post-transition period. While the pace of decline slowed in subsequent years, the downward trend remained evident. Minor positive fluctuations in employment—such as in 2003 (1.4%), 2004 (1.6%), and 2012 (4.27%)—were exceptions rather than the norm. Overall, from 2001 to 2024, agricultural employment shrank substantially, indicating a gradual withdrawal of labor from the sector, possibly due to mechanization, migration, and better opportunities in urban and non-agricultural areas.

In contrast, agricultural GDP generally followed an upward trajectory. Although annual growth rates varied, the sector recorded positive GDP growth in nearly every year, with particularly strong performances in 2010 (15.64%), 2008 (9.22%), and 2022 (9.67%). This steady rise in output, despite falling labor input, suggests increased productivity per worker and greater efficiency in agricultural practices.

Occasional dips in employment did not always align with output declines. For instance, in 2010, despite a 1.08% drop in employment, agricultural GDP grew by over 15%, reflecting strong performance potentially linked to favorable climatic conditions or improved market conditions. Similarly, even in years like 2023 and 2024, when employment declined slightly, GDP continued to grow by 5.85% and 3.8% respectively.

The contrast between shrinking employment and growing GDP points to an important dynamic: the modernization and capital-intensification of Albanian agriculture. As fewer people work the land, technological adoption and efficiency gains have enabled the sector to maintain, and even expand, its economic contribution.

While fewer Albanians are working in agriculture, the sector has become significantly more productive, contributing steadily to economic growth, even amid demographic and structural shifts.

Methodology

To identify the translation coefficient of Gross Domestic Product (GDP) in the agricultural sector, the statistical software EViews was used, applying the Least Squares Method. The two variables analyzed in the regression model are Gross Domestic Product (denoted by the acronym GDP) and employment in the agricultural sector (denoted by the acronym E).

In this analysis, the dependent variable is the number of employed individuals, while the independent variable is the GDP of the agricultural sector over the time period from 2000 to 2024. The next step involves interpreting the statistical results, focusing on the estimation of the model parameters as provided by the software output.

The model proposed in this paper is represented by the following equation:

$$Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t$$

In the model, Yt (the dependent variable) represents the number of employed individuals in the agricultural sector in period ttt, while Xt (the independent variable) denotes the value of Gross Domestic Product at constant prices for the same period.

The first regression links these two variables using their original, untransformed values. The results of the analysis suggest that the relationship between them appears to be largely random, and from a statistical standpoint, the significance level is relatively weak, as the p-value exceeds 5%, although it does not reach the 10% threshold.

1st regression

Dependent Variable: E
Method: Least Squares
Sample: 2000 2024
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	661346.6	64914.51	10.18796	0.0000
PBB	-0.684506	0.350360	-1.953720	0.0744

R-squared	0.241324	Mean dependent var	538502.6
Adjusted R-squared	0.178101	S.D. dependent var	66598.01
S.E. of regression	60376.87	Akaike info criterion	24.98616
Sum squared resid	4.37E+10	Schëarz criterion	25.07746
Log likelihood	-172.9031	Hannan-Quinn criter.	24.97771
F-statistic	3.817022	Durbin-Watson stat	1.304380
Prob(F-statistic)	0.074443		

The first regression yields a slope coefficient of –0.6845, with a p-value of 0.0744. This leads us to fail to reject the null hypothesis at a 5% level of significance ($\alpha = 0.05$), indicating that the variable is not statistically significant.

The second regression, however, produces more satisfactory results in the context of Okun's Law, as it is based on the logarithmic transformation of both variables. Taking the natural logarithm of the variables serves to linearize the relationship between the evolution of real GDP and labor market variables. The log-log specification also enables more accurate modeling when dealing with positively skewed distributions and when the dependent variable is expressed in rates or percentages.

According to the results of the second regression, a 1% increase in Gross Domestic Product leads to a 0.236% decrease in employment in the agricultural sector.

2nd regression

Dependent Variable: LE
Method: Least Squares
Sample: 2000 2024
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.03574	1.203878	13.32007	0.0000
LPBB	-0.235782	0.099750	-2.363739	0.0358

R-squared	0.317688	Mean dependent var	13.19068
Adjusted R-squared	0.260829	S.D. dependent var	0.107180
S.E. of regression	0.092148	Akaike info criterion	-1.799277
Sum squared resid	0.101895	Schëarz criterion	-1.707983
Log likelihood	14.59494	Hannan-Quinn criter.	-1.807727
F-statistic	5.587262	Durbin-Ëatson stat	1.393826
Prob(F-statistic)	0.035807		

The second regression involves the logarithmic transformation of both variables. The analysis shows that the probability (p-value) associated with the independent variable (GDP) is 0.0358, which is less than 5%. This indicates that the variable is statistically significant and plays an important role in explaining the dependent variable—in this case, employment in the agricultural sector. The regression results also reveal an inverse relationship between the two variables.

Furthermore, the F-statistic is reported as 5.587262, with a corresponding prob(F-statistic) = 0.0358, again below the 5% threshold. This confirms that the model as a whole is statistically significant, implying that the dependent variable, employment (LE), is meaningfully influenced by the independent variable, log GDP (LPBB).

The result is an average growth rate of 5.38%, which is used as a baseline for forecasting in subsequent years.

It is important to note that the exact value of future agricultural GDP growth is not crucial for the following analysis. What matters is the inverse relationship observed between economic growth and employment in the agricultural sector. Specifically, if the growth rate of the agricultural sector falls below 5.38%, the decline in employment will be more gradual. Conversely, if agricultural growth exceeds 5.38%, the decline in employment is expected to occur at a faster pace.

TABLE 3: Forecasting changes in agricolture GDP and employment, in Albania.

Year	Agriculture Employment	GDP Agriculture	Employment change	GDP change
2001	526337	119492	-30.84%	4.16%
2002	526290	126105	-0.01%	5.53%
2003	533639	138662	1.40%	9.96%
2004	542152	141642	1.60%	2.15%
2005	542179	141842	0.00%	0.14%
2006	542000	144623	-0.03%	1.96%
2007	541860	156522	-0.03%	8.23%
2008	496100	170957	-8.44%	9.22%
2009	501427	178721	1.07%	4.54%
2010	496036	206669	-1.08%	15.64%
2011	503854	220418	1.58%	6.65%
2012	525384	235173	4.27%	6.69%
2013	500529	257223	-4.73%	9.38%
2014	479538	270290	-4.19%	5.08%
2015	468755	272274	-2.25%	0.73%
2016	454454	285654	-3.05%	4.91%
2017	432435	286765	-4.85%	0.39%
2018	434478	299051	0.47%	4.28%
2019	413140	310628	-4.91%	3.87%
2020	411551	311176	-0.38%	0.18%
2021	408600	330312	-0.72%	6.15%
2022	401223	362246	-1.81%	9.67%
2023	396002	383434	-1.30%	5.85%
2024	392143	397998	-0.97%	3.80%
2025	387166	419410	-1.27%	5.38%
2026	382255	441975	-1.27%	5.38%
2027	377406	465753	-1.27%	5.38%
2028	372618	490810	-1.27%	5.38%
2029	367891	517216	-1.27%	5.38%
2030	363224	545042	-1.27%	5.38%

Source: Instat, Author

According to the above projection, if the agriculture sector grows by 5.38%, it is expected that the number of employed persons will decrease by approximately 40,000 units during the period 2025–2030.

The theoretical trend suggests that when a country experiences economic growth, this is typically accompanied by a decline in employment levels in the agricultural sector. As demonstrated in the case of Albania, this dynamic clearly holds true. Viewed from a long-term perspective, between 2000 and 2024, the sector's GDP increased by 3.3 times in current prices, while the number of employed persons decreased by about 370,000, or -45%. This downward trend clearly confirms the relevance of Petty's Law, which suggests that as economies develop, the share of labor in agriculture declines.

However, this projection assumes that there will be no change in the other variables affecting employment (ceteris paribus). These variables include potential technological shocks, long-term and intensified efforts to combat informality, as well as significant climatic or geological changes within the territory of Albania.

Limitations

While regression analysis can provide useful insights into the relationship between agricultural GDP and employment, several limitations must be considered:

- Regression can identify correlations but cannot definitively establish causality. Changes in agricultural GDP and employment may both be influenced by external factors not captured in the model, leading to spurious relationships.
- The regression may omit important variables that influence either agricultural GDP or employment, such as technological advancements, policy changes, migration flows, climate variability, or capital investments. Excluding these variables can bias the estimated relationship between GDP and employment.
- Agricultural employment data often suffer from underreporting or inconsistencies, especially regarding informal or seasonal workers. Similarly, GDP figures may be affected by estimation errors or revisions. Such measurement errors can weaken the reliability of the regression results.
- Time series data on GDP and employment may exhibit trends, cycles, or structural breaks due to economic reforms, shocks, or crises (e.g., financial crises or pandemics). Ignoring these features can lead to misleading regression outcomes and poor model fit.
- Employment and GDP might be simultaneously determined; for instance, higher GDP could affect employment, and employment levels can influence GDP. This simultaneity can cause endogeneity, violating regression assumptions and leading to biased estimates unless properly addressed.

- Regression results typically represent average effects and do not account for heterogeneity across regions, types of agriculture, or worker characteristics (e.g., gender, age, skill levels), which may affect the interpretation and policy relevance.

Conclusions and Recommendations

Since the late 1990s, the number of individuals employed in the agricultural sector in Albania has declined gradually and consistently, while Gross Domestic Product (GDP) in the same sector has followed a steadily increasing trend. There is little reason to believe that these trends will not continue into the future.

The preceding analysis has demonstrated the inverse relationship between economic growth and employment in the agricultural sector, a dynamic that is clearly observable in the case of Albania. The regression results indicate that for every 1% increase in agricultural GDP, employment in the sector declines by approximately 0.236%. Based on this trend, it is projected that by 2030, at least 40,000 workers will have exited employment in agriculture.

The positive news of economic growth in the agricultural sector should prompt policymakers to simultaneously focus on identifying alternative employment opportunities for individuals who will no longer be engaged in agricultural labor. Albania is likely to face serious employment challenges in the coming years—not only due to the influx of young people entering the labor market and the currently unemployed, but also as a result of the displacement of a portion of the agricultural workforce.

Some Albanian economists and policymakers naively assume that increasing productivity in the agricultural sector will automatically lead to higher employment within the same sector. This belief is also reflected in official policy documents and media statements. Such assumptions underscore the superficial nature of previous development strategies regarding both the agricultural sector and the associated employment policies.

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