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The Impacts of Sectoral Value Added to Economic Growth in Turkey

Türkiye'de Sektörel Katma Değerin Ekonomik Büyümeye Etkileri

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Mustafa Batuhan TUFANER

Dr. Öğr. Üyesi, Beykent Üniversitesi, İktisadi ve İdari Bilimler Fakültesi

Asst. Prof., Beykent University, Faculty of Economics and Administrative Sciences

batuhantufaner@beykent.edu.tr

Orcid ID: 0000-0003-0415-4368

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Öz

İktisat biliminin kökenleri, sınırsız ihtiyaçlar ile kıt kaynaklar arasındaki dengeye dayanmaktadır. Bu sınırlama, iktisatçıları üretim kapasitelerini nasıl arttıracaklarını ve hangi malı ne kadar üreteceklerini düşünmeye sevk etmiştir. Ekonomilerin bu tarihsel süreç içerisinde üretim kapasitelerini arttırması ve yapısal dönüşümler gerçekleştirmesi kaçınılmaz hale gelmiştir. Bu noktada, üretimde verimlilik ve katma değerin ekonomik büyümeye hangi sektörde daha fazla katkı sağladığı sorusu ortaya çıkmaktadır. Tarım, gelişmekte olan ülkelerde ekonomik büyümenin önemli bir bileşeni olup, istihdamın büyük bir kısmını oluşturmaktadır. İmalatın ise, sanayi devriminden bu yana hızlı ekonomik büyümede kilit bir rol üstlendiği görülmüştür. Diğer taraftan, 1980 sonrası serbestleşme dönemiyle birlikte imalatın üretimdeki payının azaldığı ve gelişmekte olan ülkelerde hizmetler sektörüne doğru bir eğilim olduğu anlaşılmıştır. Bu bağlamda, tarım, imalat ve hizmetler sektöründeki katma değerlerin araştırılması ve sektörel verimliliklerin ortaya konulması önem arz etmektedir. Makalenin amacı, Türkiye'de tarım, imalat ve hizmetler katma değerlerinin ekonomik büyüme üzerindeki etkilerini ekonometrik analiz yöntemlerini kullanarak araştırmaktır. Bu amaçla, değişkenler arasındaki ilişki 1969-2019 dönemi için regresyon ve Granger nedensellik yöntemleri kullanılarak analiz edilmiştir. Regresyon analizi sonuçlarına göre, ekonomik büyümeye en fazla katkıda bulunan katma değerin 0.47 ile hizmetler sektörü olduğu görülmüştür. Ardından 0.32 ile imalat ve son olarak 0.19 ile tarım sektörü gelmiştir. Granger nedensellik testi sonuçları, ekonomik büyüme ile imalat katma değeri arasında karşılıklı bir nedensellik ilişkisi olduğunu göstermiştir. Bununla birlikte, ekonomik büyümeden tarımsal katma değere doğru tek taraflı bir nedensellik olduğu görülmüştür. Analiz sonuçları, tarım ve imalat sektörü katma değerinin ekonomik büyümeyi yeterince desteklemediğini ortaya koymaktadır. Bu bağlamda, politika yapıcıların tarım ve imalat sektöründeki katma değeri arttırmaya yönelik politikaları teşvik etmesi gerekmektedir.

Anahtar Kelimeler: Katma Değer, Tarım, İmalat, Hizmetler, Ekonomik Büyüme, Türkiye.

The Impacts of Sectoral Value Added to Economic Growth in Turkey

Abstract

The origins of economics are based on the balance between unlimited needs and scarce resources. This constraint has prompted economists to consider how to increase their production capacity and how much they will produce which good. In this historical process, it has become inevitable for economies to increase their production capacities and to realize structural transformations. At this point, the question arises in which sector the productivity and added value in production contribute more to economic growth. Agriculture is an important component of economic growth in developing countries and constitutes a large part of employment. Manufacturing has played a key role in rapid economic growth since the industrial revolution. On the other hand, with the liberalization period after 1980, it was understood that the share of manufacturing in production decreased and there was a tendency towards the services sector in developing countries. In this context, it is important to research the added values in agriculture, manufacturing, and services sectors and to reveal sectoral productivity. The aim of this paper is to research the impacts of agriculture, manufacture, and services value-added on economic growth in Turkey using econometric analysis methods. For this purpose, the relationship between variables was analyzed using regression and Granger causality methods for the period 1969-2019. According to the results of the regression analysis, it was seen that the value added that contributed the most to economic growth was the services sector with 0.47. Next, came manufacturing with 0.32 and finally the agricultural sector with a coefficient of 0.19. Granger causality test results showed that there is a mutual causality relationship between economic growth and manufacturing value added. In addition, it appeared that there is a one-sided causality from economic growth to agricultural value added. Analysis results reveal that the value added in the agriculture and manufacturing industry does not support sufficiently economic growth. In this context, it should be encouraged by policymakers to increase the added value in agriculture and manufacturing industry.

Keywords: Value Added, Agriculture, Manufacturing, Services, Economic Growth, Turkey.

Introduction

Societies have always aimed to live in better conditions since their existence. In order to achieve this goal, scientists have been searching for centuries how to meet their unlimited needs more effectively with scarce resources and by what means can they increase their production capacity. It has become necessary to increase the production capacities of countries to higher levels in terms of economy and to realize some social and cultural transformations in this process. At this point, the question arises that the value added produced and in which sector the value added contributes more to economic growth.

Agriculture is an important component of economic growth and constitutes a large part of employment in developing countries. Agricultural value added, which supports other sectors through resource transfer, can affect economic growth by creating a market for non-agricultural goods and services (Keskingöz and Dilek, 2016, p.182). However, it is seen that the importance given to agriculture decreases as countries become industrialized.

The manufacturing industry has been the key to rapid economic growth since the industrial revolution. It is possible for relatively behind countries to catch up with developed countries with the development of a strong manufacturing industry sector. However, with the liberalization period after 1980, the share of the industrial sector in total income and total employment decreased in both developed and developing countries. Income and employment shares of service sectors have increased, especially in developing countries, without a certain industrial infrastructure.

The decrease in the share of industry in production and employment causes developing countries to become dependent on service sectors without using the opportunities provided by industrialization. However, developing countries need to use their current scarce resources in the most efficient way to achieve their targeted economic growth rate. Directing investments to key sectors with the highest backward and forward linkage effects will initiate the structural change process in the country's economy and contribute to the growth and development process.

The aim of the study is to investigate the impacts of the value added of three main sectors of the Turkish economy which are agriculture, industry, and services on economic growth. For this purpose, unit root, regression, and Granger causality analyzes were performed for the period 1969-2019.

In the first part of the study, a literature review on the subject is included. In the second part of the study, the data and method used in the study are discussed. The research findings are given in the following section. In this context, the results of the unit root test, regression analysis, and Granger causality analysis are presented.

Literature Review

There are limited studies in the literature that examine the effect of value added in agriculture, manufacturing, and services sectors on economic growth. Many of the studies on value added in the industrial sector have been examined within the framework of the Kaldor Law (1966). On the other hand, Solow (1957) and Kendrick (1961) took employment as the reference production factor. Previous empirical studies on the subject are given below.

Basarir et al. (2006) are analyzed agricultural productivity performance in Turkey for the 1961-2001 period. According to the analysis results, although the change is low, it has been found that there is a potential to achieve higher growth rates in agricultural production in the future if resources are used efficiently.

Arisoy (2008) has been analyzed the relationship between economic growth and the industrial sector in Turkey in the framework of the Kaldor hypothesis. The period of 1963-2005 was discussed and it was concluded that economic growth increased the industrial sector production contrary to Kaldor Law. However, it has been stated that the economic growth or the growth of the agriculture and service sectors are the determinants of the growth in the industrial sector.

Imrohoroglu et al. (2011) investigated the relationship between economic growth and agricultural productivity in Turkey. According to them, total GDP per capita would have increased more in Turkey, if Turkey had caught up with productivity growth in agriculture in Spain.

Adenomon and Oyejola (2013) examined the impact of agriculture and industry on GDP in Nigeria for the period of 1960-2011. VAR and SVAR methods were used in the study. The results of VAR model indicated that agriculture contributed about 58% to GDP, while industry contributed about 32%. In addition, the SVAR results revealed that agriculture contributed more to the structural innovations of GDP in Nigeria.

Rahman et al. (2011) examined the relationship between agriculture, industry, and services sector and GDP in Bangladesh for the period 1972-2008. They found a long-term cointegration relationship between variables. Also, they found that there is unilateral causality from GDP to agriculture and industry to GDP.

Ceylan and Ozkan (2013) analyzed the relationship between agricultural value added and economic growth for the periods 1995-2007 and 2002-2007 with two samples and for 25 and 30 countries. According to the results of the analysis, it has been found that the increase in agricultural value added increases economic growth.

Gaspar et al. (2015) investigated the long run relationship and causality among agriculture, industry and service sectors of Portugal for the period of 1970-2006. According to the results of the VAR analysis, it was stated that

the agricultural value added was both weakly and strongly exogenous and did not affect the other two sectors and was not affected by them.

Kubar (2016) examined the relationship between the development indicators of underdeveloped and developing countries and economic growth for the period 1995-2010. It is concluded that the value added of the agricultural sector affects the economic growth negatively and the value added of the industrial sector positively in middle-income countries which Turkey located in.

Ugurlu and Tuncer (2017) have been discussed the contributions of industrial and service sectors to economic growth in Turkey for the 1995-2011 period. It has been found that the developments in the industrial sectors with strong feeding and stimulation effects in the economy will contribute positively to economic growth, while the contribution of service sectors with lower feeding and stimulation effects will be limited.

Yetiz and Ozden (2017) examined the relationship between agriculture, industry, services sector, and the GDP in Turkey for the 1868-2015 period. A relationship has been found between these variables in the long run. However, a unilateral causal relationship has been found from agriculture to GDP.

Data and Methodology

The effects of agriculture, manufacturing, and services sector value added on economic growth have been investigated in Turkey for the 1969-2019 period. The data sets from which the variables used are obtained and the definitions of the variables are given in Table 1 below.

Table 1. Data Sets and Definitions

Variables	Definitions	Sources
GRO	GDP growth (annual %)	WB National Accounts Data
AGR	Agriculture, forestry, and fishing, value added (annual % growth)	WB National Accounts Data
MAN	Manufacturing, value added (annual % growth)	WB National Accounts Data
SER	Services, value added (annual % growth)	WB National Accounts Data

The effect of value added in agriculture, manufacturing, and services sectors on economic growth will be examined in three stages. In the first stage of the analysis, whether the variables used in the study are stationary or not will be tested with the unit root test. Including non-stationary time series in the model may cause a spurious regression problem. Therefore, making the series stationary ensures that the mean, variance, and common variance in

various delays are the same (Gujarati, 1999, p. 78). For this purpose, Augmented Dickey-Fuller unit root test will be used. Unit root equation is as follows;

$$X_t = c_0 + j.X_{t-1} + e_t \quad (1)$$

It can be said that Xt series is stationary if $|j|<1$, and it is not stationary if $|j|=1$ in the above equation (1). In most of the economic time series, the autoregressive coefficient j is expected to be one or less. The basic hypothesis is established as "there is a unit root in the series", while the alternative hypothesis is "there is no unit root in the series" in equation (1).

Regression analysis constitutes the second stage of the analysis. The relationship between variables is tried to be determined numerically in regression. The regression equation is located in equation (2) below.

$$Y_i = \alpha + \beta_1 X_i + \beta_2 X_{2i} + \beta_3 X_{3i} + \varepsilon_i \quad (2)$$

In the above equation (2), Yi represents the dependent variable, Xi, X2i, X3i are the independent variables, and ◎i represents the error term. In order to apply the multiple linear regression method, the following assumptions must be met (Sarstedt and Mooi, 2014);

- The sample used should be random or represent the population to a large extent.
- The dependent variable is assumed to have random error and the mean error is zero.
- According to the constant variance assumption, the errors are not dependent on each other over time.
- According to the autocorrelation assumption, the error variance is constant and it is assumed that it does not change at all between the data.
- Errors show normal distribution.
- With the assumption of no multicollinearity, there should be no relationship between the independent variables.

In the third stage of the analysis, Granger causality tests will be conducted. Granger (1988) reports that the Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another. It can be relevant only when the variables are either stationary or non-stationary but cointegrated, can be written as:

$$GRO_t = \alpha_1 + \beta_1 AGR_{t-1} + \beta_2 AGR_{t-2} + \cdots + \delta_1 MAN_{t-1} + \delta_2 MAN_{t-2} + \cdots + \gamma_1 SER_{t-1} + \gamma_2 SER_{t-2} + \cdots + \varepsilon_{1t} \quad (3)$$

where ε_{1t} and ε_{2t} are white noise error terms, and β, δ, γ and λ are the parameters which tell how much the past values of the variables can explain the current value of either series. The null hypothesis in general is variable X does not Granger cause variable Y.

Empirical Results

The multiple linear regression equation for the model established is as follows;

$$GRO = \beta_0^- + \beta_1 AGR + \beta_2 MAN^- + \beta_3 SER + \varepsilon_i \quad (4)$$

Regression assumptions should be met before proceeding with regression analysis. Tests performed on regression assumptions are listed as multiple linearity, constant variance, autocorrelation, and normality.

Table 2. VIF Test Results

Variables	VIF	1/VIF
AGR	1.12	0.893847
MAN	3.41	0.292898
SER	3.63	0.275465
Mean VIF	2.72	

The Variance Inflation Factors (VIF) test was applied to measure that the independent variables are not interrelated. VIF test results are shown in Table 2 above. According to the test result, the VIF values and the average VIF value of the variables are less than 5. Therefore, the multiple linear connection problem was not encountered in the model.

Table 3. Breusch-Pagan / Cook-Weisberg Heteroskedasticity Test Results

Variable	Chi2 (1)	Prob > chi2
Fitted values of GRO	0.01	0.9412

Breusch-Pagan / Cook-Weisberg (1979) test was applied to reveal whether the model provides the assumption of constant variance. Breusch-Pagan / Cook-Weisberg test results are shown in Table 3 above. When the probability values of the model are examined, it is seen that it is less than 0.05. Since the H_0 hypothesis is accepted, it can be stated that there is no variance problem in the model.

Table 4. Breusch-Godfrey LM Autocorrelation Test Results

Lags(p)	Chi2	df	Prob > Chi2
1	1.670	1	0.1962

Autocorrelation test is another regression assumption. It is examined whether there is an autocorrelation between the error terms in this test. Breusch-Godfrey LM (1978) test was used to test autocorrelation in the

study. The results of the autocorrelation test are given in Table 4 above. When the autocorrelation test results are examined, it is seen that the probability value is greater than 0.05. The rejection of the null hypothesis implies that there is no autocorrelation in the model.

Table 5. Shapiro-Wilk W Test Results

Variable	Obs	W	V	z	Prob > z
Residual	51	0.97809	1.046	0.097	0.46138

Shapiro-Wilk W test (1968) was used to investigate whether the error terms were normally distributed. Normality test results are shown in Table 5 above. According to normality test results, the probability value is greater than 0.05. Due to the acceptance of the H_0 hypothesis, it is understood that the error terms in the model show normal distribution.

Table 6. Unit Root Test Results

	Test Statistic	%1 Crit. Val.	%5 Crit. Val.	%10 Crit. Val.
Z(t)	-4.855	-3.587	-2.933	-2.601
MacKinnon prob.	0.0000			

Augmented Dickey-Fuller (1981) unit root test was applied to test stationarity in series. Unit root test results are given in Table 6 above. When looking at the test results, it is understood that all series are stationary at level.

The regression assumptions and unit root test required for the application of the model were tested and it was concluded that the model was suitable. The results of the regression analysis are shown in Table 7 below.

Table 7. Regression Analysis Results

Source	SS	df	MS	Numbers of obs	51
Model	754.119143	3	251.373048	F (3, 47)	244.29
Residual	48.3624161	47	1.02898758	Prob > F	0.0000
Total	802.48156.	50	16.0496312	R^2	0.9397
				Adj. R^2	0.9359

GRO	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
AGR	0.1916553	0.034877	5.50	0.000	0.1214918	0.2618187
MAN	0.3238403	0.0432351	7.49	0.000	0.2368625	0.4108182
SER	0.4731603	0.0724358	6.53	0.000	0.3274382	0.6188823
Cons	-0.0732372	0.2449151	-0.30	0.766	-0.5659429	0.4194685

F probability value in Table 7 above shows that the model is meaningful as a whole. R^2 and adjusted R^2 values also show that the systematic error level of the established model is quite low. It is seen that there is a significant relationship between all explanatory variables and economic growth. The probability values of all explanatory variables are less than 0.05. Accordingly, it can be stated that there is a positive relationship between AGR, MAN, and SER variables and economic growth. When the coefficients are examined, it is understood that the biggest effect is in the SER variable of 0.4731603. Next comes MAN with 0.3238403 and finally the AGR variable with 0.1916553.

Table 8. Granger Causality Test Results

Equation	Chi2	d	Prob > chi2
GRO => AGR	11.502	2	0.003
AGR => GRO	0.99367	2	0.608
GRO => MAN	7.9038	2	0.019
MAN => GRO	4.7406	2	0.093
GRO => SER	4.5104	2	0.105
SER => GRO	3.9935	2	0.136

Granger causality analysis was conducted to better explain the relationship between economic growth and AGR, MAN, and SER. Granger causality test results are given in Table 8 above. Granger causality test results show that there is a reciprocal causality relationship between economic growth and manufacturing value added. In addition, it appears that there is a one-sided causality from economic growth to agricultural value added.

In addition to the relevant findings on the effects of value added of agriculture, manufacturing and services sector on economic growth, the validation of the model shows the absence of any statistical anomalies for the series of variables chosen. So, the model is statically consistent and the choice of the variables is relevant in terms of results and interpretations.

Conclusions

Societies have been in a dilemma between scarce resources and unlimited needs. Unlimited needs have encouraged individuals to be more productive in the ongoing process. In order to meet the needs of its people, every society must answer three basic economic questions: "what goods will be produced? how will it be produced? for whom will it be produced?" The industrial revolution that emerged after agricultural production and the liberalization process that occurred after the industrial revolution deeply affected the dynamics of social production. Following these developments, it has begun to be discussed which sector produces more efficient production and their contributions to economic growth have come to the fore.

Agriculture is still an important component of economic growth and constitutes a large part of employment in developing countries. On the other hand, the manufacturing industry has been the key to rapid economic

growth since the industrial revolution. Developing countries with a strong manufacturing industry have a chance to catch up with developed countries. However, with the liberalization period after 1980, the decrease in the share of industry in production causes developing countries to become dependent on service sectors. Therefore, it is important to investigate the relationship between the value added of the sectors and economic growth. For this purpose, the effects of agriculture, manufacturing, and services sector value added on economic growth have been investigated in Turkey for the 1969-2019 period.

The effect of value added in agriculture, manufacturing, and services sectors on economic growth will be examined in three stages. In the first stage of the analysis, whether the variables used in the study are stationary or not will be tested with the unit root test. Regression analysis constitutes the second stage of the analysis. It has been observed that there is a significant relationship between all explanatory variables and economic growth. It has been understood that the greatest influence on economic growth belongs to SER, MAN, and AGR, respectively. In the third stage of the analysis, Granger causality tests will be conducted. Granger causality test results showed that there is a mutual causality relationship between economic growth and manufacturing value added. In addition, it appeared that there is a one-sided causality from economic growth to agricultural value added.

The results of the study are as expected. The aim of the study is to draw attention that the services sector is at the forefront, and the manufacturing and agriculture sectors are not productive enough in Turkey. According to the results of the study, although it is seen that the increase in the value added in the services sector affects the economic growth more, the added value in the manufacturing and agriculture sector should also be increased. For this purpose, it is recommended to give incentives for these sectors in order to increase the added value in the agriculture and manufacturing sector. Also, it is important that policymakers secure policies that will increase productivity in these sectors, both in practice and by enacting laws.

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