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Governance and agricultural growth: Evidence from selected developing countries

Aida Ariabod, Reza Moghaddasi*, Yaa'ghoub Zeraatkish, Amir Mohammadi Nejad

Department of Agricultural Economics, Science and Research Branch, Islamic Azad University, Tehran, Iran.
*Corresponding author: r.moghaddasi@srbiau.ac.ir

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Abstract

Agriculture is a key sector for almost all developing countries. One of the factors influencing agricultural production improvement is government intervention and its important role in improving good governance indicators. This study examines the impact of governance on total agricultural output in developing nations. To address these issues, this paper estimates the panel data regression model. The data of Governance Indicators (GI) is provided by the World Bank. **Findings/Originality**: The main results suggest a reverse association between overall GI and agricultural growth. In addition, among the six individual GI, control of corruption has the highest impact. It implies that the governance has not addressed the problems in the agricultural sector. On the other hands, the development of agriculture sector is still mainly supported by the economic inputs. It is explained by the evidence that the inputs have positive and significant effect on the value of agricultural production.

Introduction

One of the most important economic sectors which have a vital role in the development process is the agricultural sector, and agricultural productivity is one of the most important problems encountered in the world. Contributions of the agricultural sector to the economic development process, food supply, supply of raw materials for the industrial sector, creation of additional sources of foreign currency for the import of capital goods and creation of jobs, clarify its major role in the flourishing of economy, especially in developing countries (Brownson, Vincent, Emmanuel, & Etim, 2012).

With 75% of the world's poor in rural areas, most of them being dependent on farming, agriculture must be involved in world economic growth, poverty reduction, and environmental sustainability (UNDP, 2012). Agriculture is critical to achieving global poverty reduction targets and it is still the single most important productive sector in most low-income countries, often in terms of its share in gross domestic product and almost always in terms of the number of people it employs (IDA (International Development Association), 2009). More agricultural production could result in lower price a consumer faces which in turn provides more access to food and higher living standards (USAID, 2002).

Growth in agricultural output can fuel growth in the non-agricultural economy through a variety of mechanisms, with some being direct and some indirect. Sometimes, the poor performance of the agricultural sector is attributed to the shortage of physical, human capital and new technology, which could potentially promote innovation in agriculture. In most international aid programs, there is a great emphasis on activities such as optimal irrigation, improved application of chemical fertilizers, construction of training centers and transfer of new agricultural technologies. However, without proper government planning and policies, the achievements resulting from these activities cannot significantly influence the economy (Lio & Liu, 2008). It is therefore reasonable to the

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hypothesis that good governance and the provision of the necessary institutions for effective development will significantly influence a country's agricultural production efficiency. For instance, (Hayami & Ruttan, 1985) suggest that in agriculture, poor institutions and policies impede both the adoption of appropriate technology and the outcome of organizational innovation.

Various studies have been conducted to investigate the impact of government policies on total agricultural output. The direct effect of good governance on agricultural production and productivity is supported by several studies (Bayyurt & Arıkan, 2015; Lio & Liu, 2008). On the other hand, some researchers showed a reverse relationship between some mentioned variables. In addition, Sebudubudu (2010) found good governance to positively impact poverty and stability. Herrendorf and Schoellman (2015) investigated the causes of low productivity in the agricultural sector. They attributed this issue to two main reasons namely the lack of efficient allocation of production factors and inaccurate measurement of productivity. As revealed in the above-mentioned studies, one of the most important factors in improving production and productivity factor is the government and good governance indicators. Moreover, without a doubt, the most serious challenge encountered by the agricultural sector in most countries, especially developing countries, is the low level of production as well as productivity. Thus, economic development in the agricultural sector requires an increase in production and productivity (Moradi, 2003). The government and its policies play a vital role in this regards (Bayyurt & Arıkan, 2015; Khaleghifar, Qassemi, Hemati, & Farahmand, 2015). The main motivation of this study is the lack of reliable information on agricultural specific effects of good governance. Therefore this study aims to examine the impact of governance on total agricultural output in developing nations for the period 2000-2015.

Methods

Econometric Model

Since the 1990s, development economists have focused on good governance as a means of both achieving development and development objective. The World Bank defined good governance based on six indicators including rule of law (RL), control of corruption (CC), government effectiveness (GOVEF), regulatory quality (RQ), voice and accountability (VA), and political stability (PS). These indicators have been introduced by a number of researchers as well as the World Bank as the best tool to detect the role of government in this regard as follows:

VA : measures the extent to which citizens of a country are able to participate in the selection of government.

PS : measures the perceptions of the likelihood that the government in power will be destabilized or over-thrown by possibly being unconstitutional.

GOVEF: refers to the provision, by government agencies, of public goods and services, and quality thereof, such as infrastructure and government agricultural research programs.

RQ : captures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

RL : refers to the extent to which agents have confidence in and abide by the rules of society.

CC : captures the perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (Bayyurt & Arıkan, 2015; Kaufmann, Kraay, & Mastruzzi, 2005; Méon & Weill, 2005).

The aggregate agricultural production function takes the form of Cobb-Douglas, which is the most common specification used in the literature (Lio & Liu, 2008). In this study, this function has been selected to check the conditions of production in developing countries. Basically, the agricultural production function of the i^{th} country in the year t (panel data) is as follows:

$$\ln AGTP_{it} = \alpha_0 + \alpha_1 \ln GII_{it} + \alpha_2 \ln LABOR_{it} + \alpha_3 \ln LAND_{it} + \alpha_4 \ln LIVESTK_{it} + \alpha_5 \ln FERT_{it} + \alpha_6 \ln TRAKTOR_{it} + \alpha_7 EDU_{it} + \alpha_8 PRECIP_{+it} + \alpha_9 LANDLOCK_{it} + \varepsilon_{it} \quad (1)$$

Table1. Expected signs of the parameters

Variables	effect	variables	effect
GII	+/-	FERT	+/-
LABOR	+	TRACTOR	+
LAND	+	EDU	+/-
LIVESTK	+	PRECIP	+
LANDLOCK	+/-		

In equation (1) AGTP is agricultural value added. For the estimation of the aggregate agricultural total production function, five main agricultural inputs are used, including arable and farming land (LAND), livestock (LIVESTK), fertilizer (FERT), agricultural labor (LABOR) and machinery (TRACTOR), and its level of governance (GII is the average of the six World Bank governance indicators)[1]. In addition to the education level (EDU), the control variables include climate condition (PRECIP) and LANDLOCK (which is zero for landlocked countries and one otherwise). Expected signs of the parameters are reported in Table (1). We expect a direct effect of main inputs such as labor, land, livestock, tractor, and precipitation on agricultural production. Since in many developing countries, fertilizer is being used beyond the economic optimum level, the corresponding parameter may take both positive and negative signs. For education, also, we expect both direct and indirect impacts as sometimes educated farmers suffer from lack of experience and, it may lead to inverse influence on production. For the variable of interest, namely GII, due to the interactions between agriculture and other sectors, both positive and negative effects are reported in the literature.

Data

Table2. Descriptive statistics of the variables

Variables	Obs	Min	Mean	Median	Max
AGTP	864	0.08	3.73	15.75	2481.8
CONCOR	864	-1.45	-0.82	-0.41	2.32
GOVEFF	864	-1.34	-0.83	-0.16	2.12
POLSTA	864	-2.37	-0.65	-0.26	1.67
REGQUA	864	-1.75	-0.26	-0.19	2.08
RULELAW	864	-1.54	-1.24	-0.37	1.84
VOIACC	864	-1.86	-0.32	-0.35	1.72
GII	864	-1.68	-0.2	-0.31	1.91
LABOR	864	7.1	765.09	875.7	365858
LAND	864	0.01	0.58	1.84	160.77
LIVESTK	864	1.4	340.36	544.5	44801.6
FERT	864	35.16	131926	404335	8.3E+07
TRACTOR	864	14.01	173545	25336.4	3017683
EDU	864	44.65	95.89	91.4	99.89
PRECIP	864	1.05	4.44	2.51	18.73

[1] Since Governance Indicator values published by the World Bank range between -2.5 to 2.5, GII index with simple averaging would be in the same period. On the other hand, the production function GII is used in a logarithmic form and the log of a negative number is undefined. So, using the formula (X-min)/(max-min), these values are normalized - between 0 and 1, and then the subsequent calculations are performed.

All data used in this research were taken from the (FAO (Food and Agriculture Organization of the United Nations), 2017; World Bank, 2017) statistical databases. The aim of this study is to explain the interaction between good governance and agricultural growth for 54 developing nations, selected based on data availability, from 2000 to 2015. Summary statistics for our data are reported in Table (2). Figures in this table, provide an overall picture of the variables' status in the countries considered. For example data on labor, shows a high degree of heterogeneity between countries as the minimum and maximum workforce involved in agriculture are 71 and 365858 units, respectively.

Results and discussion

Before estimating the models, the stationarity properties of the variables are checked by Im, Pesaran, and Shin (IPS) panel unit root test (Im, Pesaran, & Shin, 2003). The results are reported in Table (3). According to the results, the series are stationary at levels. Table (4) shows the estimation result of four equations. In the first equation, the impact of the five main agricultural inputs and education levels on the value of total agricultural production in developing countries was measured and GII is logarithmically entered into the model in the second equation. In the first two equations, two variables of PRECIP and LANDLOCK are not included; but in the next two equations, the impact of these two control variables on the value of total agricultural production in developing countries was also examined.

When data for selected countries are analyzed, it can be seen that the first equation, the coefficients of 5 agricultural inputs, LABOR, LAND, LIVESTK, FERT, and TRACTOR, also positively and significantly correlated with total agricultural production. The coefficient on GII in the second and fourth equations is negative and significant, showing that government policies are not in line with the needs of farmers and require major reforms.

The coefficient of EDU is positive and significant, that coefficient is very small; this might be due to the lack of synchronization of production needs with the level of education in the agricultural sector or the non-applicability and non-relevance of education in this sector in the developing world. Lio and Liu (2008) in their studies showed that education has a positive effect on total agricultural production, but the calculated coefficient is very small and the lack of relevance of university education to agricultural science resulted from this.

The PRECIP variable in the equations (3) and (4) exhibit a significant and positive impact on the total agricultural production in the developing countries, which is in line with our expectation. In the third equation, the elasticity of rainfall is 0.235, which indicates that for every 1% increase in rainfall led to raising the agricultural output by 0.235%.

LANDLOCK is another control variable that has a negative and significant sign for target countries. Lio and Liu (2008) and Faye, McArthur, Sachs, and Snow (2004) in their research also found a negative impact on agricultural production.

The results showed that the highest partial elasticity in the first two equations is attributed to the land, indicating that the increase of the land or horizontal development of cultivation is the most important factor in the improvement of total agricultural production in developing countries during the studied period. Following the LAND variable, LIVESTK has been introduced as the second most important factor of production in the agricultural sector. After these two variables, the highest elasticity is attributed to LABOR, confirming that agricultural activities are still traditional and labor-intensive in most developing countries.

The information in Table (5) displays the effect of each of the governance indicators. Since interest may be in the impacts of the individual governance indicators on agricultural productivity, in regressions (5)–(10) governance indicators are separately included in the aggregate agricultural production function. Nevertheless, the six governance indicators have not been simultaneously employed as explanatory variables in a single regression model because, as was mentioned earlier,

the correlations between these indicators are very high, which will result in a serious problem of multicollinearity if they are all included in one regression. As shown in Table (5), the governance variables have negative and significant coefficients; however, only the coefficient of RQ variable has a negative but insignificant sign. This indicated that the government had not implemented proper policies and planning in the agricultural sector of developing countries. Among the indicators, CC has the highest coefficient. This variable also has a negative and significant sign, which implies that poor regulations do not discourage total agricultural production, which may indicate that the government's attempt to control corruption and create reliable conditions and environment for farmers in the agricultural sector was in vain and led to an increase in agricultural investment and improved production conditions in the agricultural sector. The coefficient of GOVEF which was specified as the second important indicator influencing agricultural production in developing countries reflects the inefficiency of governmental measures in the agricultural sector.

Table 3. Unit root tests results

	the test statistic(IPS)				**test statistic(IPS)**		
Ln AGTP	-5.61***	268.83***	205.7***	Ln LABOR	-26.81***	290.61***	277.65***
RQ	-2.42***	152.28***	151.55***	Ln TRACTOR	-24.22***	412.65***	339.85***
PS	-4.92***	216.18***	197.6***	Ln LAND	-3.79***	209.89***	167.62***
GOVEF	-3.31***	186.47***	161.39***	Ln FERT	-2.78***	217.31***	155.47***
VA	-1.74**	162.41***	139.04**	EDU	-2.58***	157.27***	159.76***
CC	-3.73***	183.26***	170.36***	PRECIP	-7.78***	334.99***	214.84***
RL	-2.72***	187.99***	156.7***	Ln LIVESTK	-2.58***	156.7***	160.3***
Ln GII	-3.52***	158.57***	176.52***				

Note: Asterisks indicate significance at the 10% (*), 5% (**) and 1% (***) levels, respectively.

Table 4. Estimates of the agricultural total production function

Variables	**Dependent variable: Ln AGTP**			
	(1)	**(2)**	**(3)**	**(4)**
In GII	-	-0.125***	-	-0.13***
		(-3.32)		(-3.43)
In LABOR	0.048***	0.049***	0.048***	0.049***
	(4.7)	(4.84)	(4.74)	(4.84)
In LAND	0.308***	0.296***	0.305***	0.295***
	(8.4)	(8.15)	(8.23)	(8)
In LIVESTK	0.116***	0.106***	0.114***	0.104***
	(8.93)	(8.11)	(8.68)	(7.89)
In FERT	0.047***	0.049***	0.046***	0.048***
	(11.19)	(11.62)	(11)	(11.43)
In TRACTOR	0.04	0.039	0.038*	0.036*
	(1.99)	(1.92)	(1.89)	(1.81)
EDU	0.008***	0.008***	0.008***	0.008***
	(12.61)	(12.49)	(12.59)	(12.39)
PRECIP	-	-	0.235*	0.245**
			(1.84)	(1.92)
LANDLOCK	-	-	-0.223*	-0.22*
			(-1.88)	(-1.84)
Constant	20.49***	20.47***	20.49***	20.45***
	(89.41)	(89.89)	(76.19)	(76.49)
R^2	0.9983	0.9983	0.9982	0.9983

Note: Asterisks indicate significance at the 10% (*), 5% (**) and 1% (***) levels, respectively.

Agricultural productivity is directly related to the provision of public goods and services, such as improving roads, irrigation systems, communications infrastructure, agricultural education and development programs. Furthermore, improving these conditions leads to increased production and productivity of the agriculture sector.

RL is another governance indicator that negative impacts of this factor which may indicate agricultural producers do not have sufficient trust in agricultural laws and regulations and this led to a decline in the production and productivity of the agricultural sector.

VA has a negative and significant coefficient. According to the definition presented by the World Bank, this variable captures perceptions of the extent to which a country's citizens are able to participate in selecting their government. As well as RQ Given that the coefficient of this variable is the lowest among the six governance indicators, it has the lowest impact on agricultural production.

Since the sum of the coefficients in equations (5)-(10) is less than one, it may be concluded that all the equations of Table (4) for all governance indicators have decreasing returns to scale. This result was confirmed by the Wald test. This finding implies that by increasing all the inputs, the total agricultural production will increase as less of that input is used.

Table 5. The effects of various governance indicators on agricultural total production

	Dependent variable: Ln AGTP					
	(5)	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
	RL	**CC**	**GOVEF**	**RQ**	**VA**	**PS**
Governance indicator	-0.053*** (-3.08)	-0.079*** (-4.53)	-0.055*** (-2.84)	0.011 (0.63)	-0.046*** (-2.72)	-0.023*** (-2.5)
In LABOR	0.049*** (4.88)	0.054*** (5.31)	0.047*** (4.67)	0.048*** (4.7)	0.045*** (4.45)	0.048*** (4.78)
In LAND	0.039*** (8.37)	0.287*** (7.74)	0.282*** (7.56)	0.307*** (8.15)	0.302*** (8.14)	0.31*** (8.38)
In LIVESTK	0.106*** (8.01)	0.108*** (8.47)	0.113*** (8.76)	0.114*** (8.6)	0.103*** (7.73)	0.104*** (7.58)
In FERT	0.045*** (10.78)	0.047*** (11.67)	0.048*** (11.54)	0.046*** (10.59)	0.047*** (11.11)	0.047*** (11.16)
InT RACTOR	0.037* (1.86)	0.035* (1.8)	0.04* (1.97)	0.037* (1.85)	0.036* (1.83)	0.037* (1.85)
EDU	0.008*** (12.22)	0.008*** (11.44)	0.008*** (11.67)	0.008*** (12.19)	0.009*** (12.79)	0008*** (12.85)
PRECIP	0.235 (1.85)	0.241** (1.91)	0.275** (2.19)	0.23* (1.79)	0.225** (1.98)	0.239* (1.88)
LANDLOCK	-0.22* (-1.87)	-0.205* (-1.74)	-0.2* (-1.74)	-0.218** (-1.89)	-0.215* (-1.85)	-0.229** (-1.93)
Constant	20.54*** (76.78)	20.53*** (77. 8)	20.45*** (77.39)	20.49*** (76.4)	20.5*** (77.11)	20.53*** (76.44)
R^2	0.9983	0.9983	0.9983	0.9982	0.9983	0.9983

The positive, but insignificant, impact of the EDU reflects the disproportion between agricultural sciences. There is a mismatch between agricultural and production plans in the agricultural sector in developing countries, therefore, there should be a major overview of the educational policies in these countries in order to improve the agricultural production in these countries.

Conclusion

Today, achieving economic growth is one of the most important economic goals of countries worldwide. One of the factors influencing agricultural production improvement is government intervention and its important role by improving good governance indicators. By improving good governance indicators from one side, the productivity of agricultural production factors can be increased. On the other hand, Lack of macroeconomic policies and unstable political situations are pre-conditions to governance problems. Policy biases, underinvestment, miss-investment and lack of capacities underpin weak governance in agriculture. Considering this issue, this study examined the effect of good governance indicators on agricultural production value in developing countries during the period 2000-2013. The required information was collected from FAO and the World Bank.

The results of the estimation of production functions showed that good governance indicators in the developing countries have a negative and significant effect on the value of agricultural productions and indicates the lack of proper planning and non-alignment of government policies with the goals of agricultural development. The main inputs (LABOR, LAND, LIVESTK, FERT and TRACTOR, PRECIP, EDU have a positive and significant impact on the value of agricultural production, as expected.The results of the study on the effect of each of the good governance indicators on the value of agricultural production in developing countries showed that the CC variable has the highest coefficient.

Since government indicators in the developing countries group have had a negative impact on agricultural production and this is associated with the inappropriateness of the government's policies, therefore, in these countries, the government should act in such a way as to initially take necessary measures to improve the status of these indicators by appropriate planning and then adopt required policies to improve the production status and productivity of agricultural production factors.

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