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Original Article

The impact of macroeconomic variables on socio-economic indicators of agricultural section based on government development programs

O impacto das variáveis macroeconômicas nos indicadores socioeconômicos do setor agropecuário com base nos programas de desenvolvimento do governo

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Abstract

In this paper, the short-term and long-term effects of macroeconomic variables on socio-economic indicators of agricultural sector, including price index, rural unemployment and gross domestic product (GDP) over the first to six government development programs were investigated. The auto-regressive distributed lag approach (ARDL) was used. The results showed that in the short run, inflation rate with a delay has a significant and negative effect on employment in the agricultural sector and increases the level of rural unemployment. The findings suggest that the effects of liquidity and inflation rate in the short run on the GDP are negative and government spending in the short run has a positive effect on the agricultural price index. In the long run, the effect of these variables on agricultural inflation is similar to the short term, but with the difference that the elasticities were larger.

Keywords: socio-economic indicators, agriculture sector, rural unemployment, macroeconomic variables.

Resumo

Neste artigo, foram investigados os efeitos de curto e longo prazo das variáveis macroeconômicas sobre os indicadores socioeconômicos do setor agrícola, incluindo índice de preços, desemprego rural e produto interno bruto (PIB) sobre os primeiros seis programas de desenvolvimento do governo. Foi utilizada a abordagem de atraso distribuído autorregressivo (ARDL). Os resultados mostraram que no curto prazo a taxa de inflação com atraso tem um efeito significativo e negativo sobre o emprego no setor agrícola e aumenta o nível de desemprego rural. Os resultados sugerem que os efeitos da liquidez e da taxa de inflação no curto prazo sobre o PIB são negativos e os gastos do governo no curto prazo têm efeito positivo sobre o índice de preços agrícolas. No longo prazo, o efeito dessas variáveis sobre a inflação agrícola é semelhante ao de curto prazo, mas com a diferença de que as elasticidades foram maiores.

Palavras-chave: indicadores socioeconômicos, setor agropecuário, desemprego rural, variáveis macroeconômicas.

Introduction

During the world economic development, developed countries, by relying on comparative advantages, have been able to use domestic economic capacities as well as international opportunities to grow, increase per capita income and improve other development indicators (Baek and Koo, 2007). Today, most of the developed countries in the world have chosen agriculture as an infrastructure sector of economic development and by using the abundant capacities of this sector, in addition to providing appropriate inputs for the growth of other sectors, have also been able to achieve the development of other sectors. The agricultural sector has several roles in the process of economic growth and development of different countries (Baek and Koo, 2007; Mekonen, 2020). The most important of which are optimum usage of native resources, supply of raw materials needed by upstream industries, supply of inputs such as labor, some products and by-products, and consumption of other products. Industrial sectors such as fertilizers, chemical pesticides, food and feed manufacturing, agricultural machinery, currency for the country and financing of other infrastructure sectors are some affected parts from agriculture (Mekonen, 2020).

In addition, the country health and food security is directly dependent on the products of the agricultural sector (Khan et al., 2021). Any disruption in the agricultural production process can directly threaten the food security and even the country political security. In developed countries, here has been a lot of sensitivity about the

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quantity and quality of consumption of agricultural products, especially healthy and organic food, which indicates the high attention of policymakers and consumers to healthy products in the agricultural sector. Therefore, paying attention to the production of healthy and economic products in the agricultural sector and developing the necessary infrastructure in this sector to produce more and healthier, based on the comparative advantages of a country, is an issue that cannot be easily ignored and must move towards it with a principled, comprehensive, and coordinated planning. The discussion in recent decades has been shaped by Johnston and Mellor's classic article (Yana et al., 2022), in which they identify five types of inter-sectoral linkages that highlight agriculture's role in economic growth. These forward and backward linkages, operating through both production and consumption, include: 1) Providing food for domestic consumption, 2) Releasing labour for industrial employment, 3) Enlarging the market for domestic industrial output, 4) Increasing the supply of domestic savings, and 5) Earning foreign exchange. Recent empirical work on the regional level has specifically measured the Johnston-Mellor linkages, finding substantial growth multipliers from exogenous increases in agricultural income. In general, these studies have found the growth multipliers from agriculture to exceed those from non-agriculture. Therefore, the agricultural sector can play a unique role in the process of economic development in Iran. Excellent geographical location, climatic diversity for planting different crops, having a suitable workforce in villages and production centers, having a sufficiently educated workforce in fields related to agriculture, the existence of God-given comparative advantages in the field of valuable products such as saffron, pistachios, medicinal plants, food industry products and handicrafts related to the agricultural sector and etc. are among the existing advantages of the Iranian agricultural sector. However, there are some challenges such as water shortage, excessive consumption of chemical inputs, small production units, production to meet domestic consumption, excessive import of some crops, lack of processing infrastructure for agricultural products, and inability to export, and produce inorganic products.

The Iranian authorities have adopted a comprehensive strategy of market-based reforms in their 20-year economic vision document and sixth, 5-year development plan for the 2016/17 to 2021/22. The plan is comprised of three pillars, namely: the development of a resilient economy, progress in science and technology, and the promotion of cultural excellence. On the economic front, the development plan forecasts annual economic growth of 8% (Busari and Kehinde, 2021). Among the main priorities of the government during the five-year period are the reform of state-owned enterprises, financial and banking sectors, and the allocation and management of oil revenues.

In all economic development programs of the government, the agricultural sector has always been seen as a pivotal and vital sector (Aslam et al., 2021). However, the average annual value-added for the agricultural sector is estimated to be 4.5% (Shakoori, 2006). In many of these programs, the goals of the program in the agricultural sector have not been achieved. This has been due to internal and external economic turmoil, instability of government variables and economic policies, and institutional and structural weaknesses. With such an approach, the purpose of this study is to investigate the relationship between macroeconomic and agricultural sector variables in Iran. Considering the impact of agricultural sector variables such as price, import, export, and added – value on macroeconomic variables; investigation of the relationship between them can be useful and effective in selecting optimal policies and strategies to maintain agricultural growth in the face of economic instability.

Materials and Methods

In applied econometrics, the Nasrullah et al. (2021) and Cho et al. (2021) proposed the Autoregressive Distributed Lag (ARDL) Cointegration technique or bound test of Cointegration (Pesaran and Shin, 1999; Pesaran et al., 2001) and Johansen and Juselius (1990) developed the Cointegration techniques as the solution to determining the long run relationship between series that are non-stationary, as well as reparameterizing them to the Error Correction Model (ECM) (Nkoro and Uko, 2016). The reparameterized result gives the short-run dynamics and long run relationship of the underlying variables. However, given the versatility of cointegration technique in estimating relationship between non-stationary variables and reconciling the short run dynamics with long run equilibrium, most researchers still adopt the conventional way of estimation even when it is glaring to test for cointegration among the variables under consideration. When examining the behavior of time series multivariate, it is necessary to consider the interrelationships of these variables in the form of a model of a system of simultaneous equations. If the equations of this model also have intervals of variables, it is called a system of dynamic simultaneous equations. In this case, many studies have used the Johansson technique (consequently VAR and VECM) to examine the long-run relationship between variables. However, in recent research, a new approach called the self-descriptive method with autoregressive distributed lag (ARDL) has been proposed (Johansen and Juselius, 1990). The latter method has some advantages over the previous approach including: 1) The ARDL approach is suitable for smaller samples, while larger samples are needed to trust the results of the Johansson approach (VAR and VECM models). 2) Also, other cohesive or cumulative methods such as Johansson, require the same degree of aggregation of variables, and if only one of the variables stays with one degree of differentiation, the first-order difference of all variables (even stable variables) must remain (Johansen and Juselius, 1990). This can cause a large amount of information to be lost that has stable variables, but the ARDL method can be used for variables with different degrees of aggregation. 3) In the ARDL approach, it is possible to consider the different optimal intervals of each variable at different stages of estimation, while in the Johansson approach it is not possible. 4) The ARDL method estimates are also efficient and unbiased due to the avoidance of problems such as autocorrelation

and indigenousness, and 5) This method also estimates the long-term and short-term relationships between the dependent variable and other pattern descriptive variables simultaneously.

In discussing economic (monetary and fiscal) policies, it is noteworthy that the impact of descriptive variables is met with significant delays. For example, the effect of an expansionary monetary policy on the variables is delayed, or the effect of new investments on production capacity and output is delayed. Delayed effects indicate that if the value of X changes today, its effect will appear today and future. The models presented to investigate the delay effects are known as Distributed Lag (DL) models, and one of the newest methods for these studies is the ARDL method. In this model, the dependent variable is affected by the interruptions of this variable and other independent variables (Pesaran and Shin, 1999; Pesaran et al., 2001). The autoregressive distributed lag model of order p and n, ARDL (p and n), is defined for a scalar variable y_t as (Equation 1):

$$Y_t = \mu + \sum_{j=1}^{p} \gamma_j T_{t-j} + \sum \beta_j X_{t-j} + u_i \quad (1)$$

On the right side of the regression model, there is a variable dependent on different intervals and a variable or independent variables with different lags (p and q are the lags of the model variables). If there are several different independent variables to the right of the regression, the lags rate of each variable is considered in writing the ARDL model, respectively.

According to Pesaran et al. (2001) the ARDL model can be used for stationary (I(0)) as well as one-order (I(1)) integrated variables. This method does not cause problems related to the correlation of variables and the deletion of some of them and will be suitable for small samples. The main advantage of this method is that in addition to estimating the coefficients of the long-run model, it can also have an error correction model. This model adjusts the short-term to long-term imbalance. In other words, this model states how long it takes to compensate for a short-term imbalance in the long run. The main form of ARDL convergence model presented by Pesaran et al. (2001) for the variables of this study can be explained as the following formula (Equation 2):

$$\begin{aligned} \Delta LnYt = {} & \propto 0 + \sum_{i=1}^{n} \propto 1 \Delta LnYt - i + \sum_{i=1}^{n} \propto 2 \Delta LnIFt - i + \\ & \sum_{i=1}^{n} \propto 3 \Delta LnERt - i + \sum_{i=1}^{n} \propto 4 \Delta LnMOt - i + \sum_{i=1}^{n} \propto 5 LnGt - \\ & i + \partial 1\ LnYt - 1 + \partial 2 \Delta\ LnIFt - 1 + \partial 3\ LnERt - 1 + \partial 4\ LnMOt - 1 + \partial 5\ LnGt - 1 \end{aligned} \quad (2)$$

Where, Y_t is the vector of dependent variables of the agricultural sector including price index, rural unemployment and GDP; IF, economic inflation rate; ER, the official exchange rate of the central bank; MO, the volume of liquidity in the economy; G, level of government spending; n, represents the optimal interrupt of each variable; And coefficients $\propto$ and ∂ express the partial elasticities of the descriptive variables affecting the model in the long run and short run. The linear part of the above equation represents the error correction pattern that includes the ECT or error component that reflects the adjustment rate.

Regarding the estimation of this model, according to the theory of Pesaran and Shin (1999), the modeling process in the ARDL model includes the following three basic steps: 1) Determine the optimal lag lengths of variables using one of the Akaike information criterion (AIC), Schwartz-Bayesian criterion (SBC), and Hanan Quinn criterion (HQC). Typically, in samples smaller than 100, the Schwartz-Bayesian index is used to determine the maximum optimal lags of model variables. The reason for using this criterion is that this criterion saves in determining interruptions and, as a result, has a greater degree of freedom and is therefore very suitable for small samples. Accordingly, in this study, this index was used to determine the optimal interruption. 2) Using the Bound test and the F-value of Pesaran and Shin (1999), the long-run relationship between the variables and the length of the intervals should be confirmed. The condition for the tendency of the estimated dynamic model in the self-recursive method with distributive intervals towards the long-run equilibrium is to prove the existence of a long-run relationship between the variables under study. Therefore, in this study, to examine the existence of a long-term relationship between research variables, the boundary test to the collective or the same as the Bound test (parent test) presented by Pesaran et al. (2001) was used. 3) After confirming the long-run relationship between the research variables, in this step, the long-term coefficients of the model are estimated.

The present study examines the impact of four macroeconomic variables including exchange rate, government spending, inflation rate, and liquidity volume separately on GDP and agricultural price index, considering the three stages of the ARDL modelling process. The information of this research is in the form of time series and is related to the time period of implementation of the first six development programs of Iran. The required data have been collected from the statistical database of the Central Bank of the Islamic Republic of Iran (2022).

Results

The data of this study were time series, so before estimating the model, the stationarity variables were examined. Although ARDL test does not need to test unit root in the data, still it is essential to perform unit root test to check the stationarity of data and that they are not integrated of order more than 1 so that ARDL approach can be used. Augmented Dickey-Fuller test experiences from low power and lack size properties thus for this purpose, Phillips-Perron test is also applied along ADF test to check the unit root of the variables. The results of stationarity test show that all variables are nonstationary at level and become stationary at first difference.

To investigate the existence of a long-run relationship and the non-artificial regression, the cointegrationary relationship must be confirmed. When the stationary

level of the variables is zero and one, the ARDL method is the best way to examine the cointegraionary and the relationship between the variables. An ARDL model has many applications in areas where the sample size is small and the number of descriptive variables of the model is high and has more efficient results than the cointegration analysis (Pesaran and Shin, 1999). Other methods such as Johansson method (Yaya et al., 2021); require the same degree of accumulation of variables, and if only one of the variables remains with a differential degree, the first-order difference of all variables (even variables that are at the stable level must be first-order to be used. This causes a large amount of information to be lost that contains stable variables, but the ARDL method can be used for variables with different degrees of accumulation.

The estimation of the ARDL model for the GDP variable of the agricultural sector in the short run presented in Table 1. Based on Schwartz-Bayesian SBC criteria, the number of optimal interrupts selected by the software for the dependent variable of agricultural added-value of one interval, were 1, 0, 1, 1, and 0 for the descriptive variables of inflation rate (P), liquidity volume (M), government expenditure (G), and exchange rate (ER), respectively (ARDL (1,0,1,1,0)). As it is extracted from this table, in the short run, the GDP of the agricultural sector in the t^{th} year has a positive relationship with the amount of a previous period, which indicates the direct effect of income of agricultural production at the present time on the income of this sector in the future.

The variable of inflation rate had a negative relationship with GDP of agricultural sector and its elasticity in the short term was -0.03, which indicates that the growth of the price index of the economy can reduce income in the agricultural sector. This can be reflected in the transfer of inflation to the agricultural sector by increasing the price of agricultural inputs, followed by a decrease in income and a decrease in farmers' production incentives. The volume of liquidity in the short run with a break had a negative effect on the GDP of the agricultural sector, which indicates that the implementation of expansionary monetary policy and the growth of money supply in the short run with a break could have the opposite effect on GDP. This result may reflect the important point that the growth of liquidity in Iran has only an inflationary effect and has no effect on production, and it is possible that the inflationary effect may increase the desire for speculation and reduce production. Government spending had a positive effect on GDP with a time lag (Table 1). This result is consistent with the theories of economics and indicates that the implementation of expansionary fiscal policies of the government by increasing spending and in the form of investment in infrastructure and manufacturing can have a positive effect on the output of economic sectors. In the short run, the exchange rate had a positive effect on GDP, which is also consistent with economic theory, because an increase in the exchange rate will increase the export of agricultural products and the marketability of these products, boost production and employment in this sector. At aggregate level, considerable studies were undertaken that investigate the effect of inflation on economic growth. For instance, Getachew (2018), Ashagrie (2015), Girma (2012), Putra et al. (2021), and Gokal and Hanif (2004) shown the relationship between inflation and economic growth.

After estimating the ARDL model in the short run and examining the relationships between the variables, in the second stage, the long-term relationship between the variables was investigated. For this purpose, Bound test was used (Table 2). According to this test, if the F-value is higher than their critical values at the upper or lower

Table 1. Estimation of short-term coefficients of ARDL model (1, 0, 1, 1, 0; dependent variable is agricultural GDP (LnVAg)).

Variables	coefficients	t-value	significant
LN VAG(-1)	0.36	2.12	*
LN P	-0.03	-1.33	-
Ln M	0.30	1.87	-
LN M(-1)	-0.32	-2.32	*
LNG	-0.19	-1.46	-
LNG(-1)	0.20	1.57	
LN ER	0.11	3.47	**
C	6.57	3.54	**
	Prob (F)=0.000	F=36.1	=0.94 R^2

*Significantly at the level of 5%; **Significantly at the level of 1%.

Table 2. Aggregate shores test (F test) for long-term relationship (dependent variable of agricultural GDP, LnVAg).

H0	Critical values of F at the level of 95%		Critical values of F at the level of 99%		Calculated F-value
	I(0)	I(1)	I(0)	I(1)	
Lack of long-term relationship between variables	3.74	5.06	2.86	4.01	1.72
Test result	There is no long-term relationship between agricultural GDP and macroeconomic variables				

limit, then the null hypothesis is rejected and the long-run relationship is confirmed, but if it is less than one of its critical values, then the null hypothesis is confirmed. It shows that there is no long-term relationship between variables. If the calculated F value is located between the upper and lower edges, the test result is uncertain and another test should be used. The value of the calculated F value is equal to 1.72, which is lower than its critical values at both the upper and lower limits at both 99% and 95% levels, and therefore the null hypothesis is not rejected (Table 2). Therefore, it can be concluded that there is no long-term relationship between the GDP variable of the agricultural sector and macroeconomic descriptive variables.

Table 3 shows the estimation results of the ARDL model for the dependent variable of the agricultural price index in the short run. Based on Schwartz-Bayesian SBC criteria, the number of optimal interruptions selected by the software for the agricultural price index variable, for the descriptive variables inflation rate (P), liquidity volume (M), government expenditure (G) and exchange rate (ER), respectively, It was zero, zero and zero (ARDL (1,1,0,0,0)). In the short run, the price index of the agricultural sector in year t has a positive relationship with the value of a previous period, which indicates the direct effect of inflation in the agricultural sector at the present time on inflation in this sector in the future. As expected, the inflation rate variable has a positive relationship with the price index of the agricultural sector both at the present time and with a time lag, and its elasticity is 0.30 in the short run, which indicates that a 10% growth in the price index of the economy can be the price of the sector. Increase agriculture by 3%.

The volume of liquidity in the short run had a negative effect on the price index of the agricultural sector, which was not as expected. Given that the coefficient of this variable is not statistically significant, so it can be seen that the growth of liquidity does not have a significant direct effect on inflation in the agricultural sector in the short term.

Government spending had a positive effect on the agricultural price index in the short run (Table 3). This result is consistent with theories of economics. This result indicates that the implementation of expansionary fiscal policies by the government with the growth of government spending, in the short term has an inflationary effect on economic sectors. The exchange rate also has a short-term positive effect on the price index of the agricultural sector, which is also consistent with economic theory because the increase in the exchange rate causes import inflation and increases the prices of agricultural products and inputs, especially imported agricultural inputs.

After estimating the ARDL model in the short run and examining the relationships between the variables, the long-term relationship between the descriptive variables and the price dependent variable of the agricultural sector was investigated. The value of the calculated F -value is equal to 5.76, which is higher than its critical values at both the upper and lower extremities, both at the level of 99% and at the level of 95%, and therefore the null hypothesis is not confirmed. Therefore, it can be concluded that there is a long-term relationship between agricultural sector prices and macroeconomic descriptive variables (Table 4).

Considering the confirmation of the long-run relationship between the dependent variable of agricultural price and descriptive variables, the ARDL model was estimated in the long run (Table 5). The situation is similar

Table 3. Results of estimation of short-term coefficients of ARDL model (1, 1, 0, 0, 0) (dependent variable of agricultural price index LnPg).

Variables	coefficients	t-value	significant
LN AVG(-1)	**0.36**	**1.90**	*
LN P	**0.30**	**2.6**	*
Ln P(-1)	**0.26**	**1.75**	-
LN M	**-0.05**	**-1.83**	-
LNG	**0.37**	**2.66**	*
LN ER	**0.10**	**0.95**	
C	**-4.01**	**-3.7**	**
	Prob (F) = 0.000	**F=116.7**	**=0.97 R^2**

*Significantly at the level of 5%; **Significantly at the level of 1%.

Table 4. Aggregate shores test (F test) for long-term relationship (dependent variable of agricultural price index, LnPg).

H0	Critical values of F at the level of 95%		Critical values of F at the level of 99%		Calculated F-value
	I(0)	I(1)	I(0)	I(1)	
Lack of long-term relationship between variables	3.74	5.06	2.86	4.01	5.76
Test result	There is long-term relationship between agricultural price and macroeconomic variables				

Table 5. Results of estimation of long-term coefficients of ARDL model (dependent variable of agricultural price).

Variables	coefficients	t-value	significant
LN P	**0.89**	**4.27**	**
LN M	**-0.08**	**-2.37**	*
LN G	**0.59**	**4.90**	**
LN ER	**0.16**	**0.95**	-
C	**-6.34**	**-6.5**	**

*Significantly at the level of 5%; **Significantly at the level of 1%.

Table 6. Results of estimating the error correction model for the price variable of the agricultural sector.

Variables	coefficients	t-value	significant
DLN P	**0.30**	**2.64**	*
DLN M	**-0.05**	**-1.8**	-
DLN G	**0.37**	**2.66**	*
DLN ER	**0.10**	**0.95**	-
ECM	**-0.63**	**-3.28**	*

*Significantly at the level of 5% .

in the short and long run, but the tensions are greater, which makes a lot of sense because many economists agree that economic policies, especially monetary policy, have higher external delays (as opposed to fiscal policies, which have higher internal delays). In other words, its effects on the economy show their economic variables with a time interval and in a period of several years.

In the long run, the relationship between inflation and the price index of the agricultural sector is positive and has a greater than short-term elasticity and is equal to 0.36. In the long run, the variable of government expenditures also had a positive effect on the price of the agricultural sector, which indicates that the growth of government expenditures is not related to infrastructure and construction sectors, but is often in line with covering current government expenditures and consumption. Inflationary effect of government spending growth, in addition to short-term in the long run, also affects the agricultural sector. In the long run, the exchange rate has a positive effect on the price and its elasticity is 0.16, which means that a 100% increase in the exchange rate in the long run can increase the price of agriculture by 16%.

According to Table 6, the error correction model (ECM) here is -0.63, which indicates the speed of adjustment of short-term to long-term imbalances and shows that policies implemented in less than 2 periods show their effect.

The long-run coefficients of the ARDL model for rural unemployment are reported in Table 7. The result shows that macroeconomic variables have a significant impact on the rural unemployment at 1 and 5 percent level. The exchange rate has a significant positive effect on agricultural employment or a negative effect on rural unemployment in the short term with a time interval, which is consistent with economic theory because increasing the exchange rate increases the export of agricultural products and their tradability and As a result, there will be a boom in production and employment in this sector. The liquidity has also had a positive effect on employment in the agricultural sector in the short term, which indicates that the implementation of expansionary monetary policies in the short term can have a positive effect on investment incentives in agriculture and, of course, employment in this sector.

Based on findings of log-run relationship analysis, the value of the calculated F -value is equal to 4.83, which is higher than its critical values at both the upper and lower extremities. Therefore, it can be concluded that there is a long-term relationship between rural unemployment and macroeconomic variables (Table 8).

In the long run, the situation is similar to the short-term, but with the difference that the tensions are greater (Table 9). The coefficient of the error correction term is found to be negative and statistically significant at the 1 percent level. Approximately 86 percent of long-run disequilibrium is adjusted from lagged period error shocks which indicates the speed of adjustment of short-term imbalance to long-term equilibrium and shows that policies implemented in less than 2 periods show their effect.

The results showed that in the short term, the growth of the economy price index can reduce income in the agricultural sector. This can be reflected in the transfer of inflation to the agricultural sector by increasing the price of agricultural inputs and consequently reducing income and reducing incentives for farmers to produce. The volume of liquidity in the short run with a break has a negative effect on the GDP of the agricultural sector, which indicates that the implementation of expansionary monetary policy and the growth of money supply in the short run with a break can have the opposite effect on GDP. Also, government expenditures and exchange rates with a time lag and delay have a positive effect on GDP.

The findings showed that the growth of liquidity does not directly have a significant effect on inflation in the agricultural sector in the short run. In the short run, government spending has a positive effect on the agricultural price index, which is consistent with economic theories. The expansion of fiscal policies by the government with the growth of government spending, in the short

term has an inflationary effect on the economic sector. The exchange rate also has a positive effect on the price index of the agricultural sector in the short run, which is also consistent with economic theory because an increase in the exchange rate will cause inflation and increase the price of agricultural products and inputs, especially imported agricultural inputs and increase the price of final products.

For the rural unemployment variable, the results showed that in the short run, inflation rate with a delay has a significant effect in the opposite direction on employment in the agricultural sector and increases the level of rural unemployment. Therefore, the growth of the economy price index can reduce job creation in the agricultural sector with a time lag (Table 10).

Table 7. Estimation of short-term coefficients of ARDL model (1, 1, 2, 1, 0; dependent variable is rural unemployment (LnUR)).

Variables	coefficients	t-value	significant
LN UR(-1)	**0.13**	**0.91**	**-**
LN P	**-0.13**	**-1.8**	**-**
LN P(-1)	**0.27**	**4.90**	**
LN G	**-0.12**	**-0.49**	**-**
LNG(-1)	**-0.43**	**-1.68**	**-**
LNG(-2)	**0.66**	**2.67**	*
LN ER	**-0.08**	**-1.01**	**-**
LN ER(-1)	**-0.22**	**-2.07**	*
LN M	**-0.04**	**-3.3**	**
C	**3.5**	**4.8**	**
	Prob (F)=0.000	**F=19.5**	**=0.95 R^2**

*Significantly at the level of 5%; **Significantly at the level of 1%.

Table 8. Aggregate shores test (F test) for long-term relationship (dependent variable of rural unemployment, LnUR).

H0	Critical values of F at the level of 95%		Critical values of F at the level of 99%		Calculated F-value
	I(0)	I(1)	I(0)	I(1)	
Lack of long-term relationship between variables	3.74	5.06	2.86	4.01	4.83
Test result	There is long-term relationship between UR and macroeconomic variables				

Table 9. Results of estimation of long-term coefficients of ARDL model (dependent variable of UR).

Variables	coefficients	t-value	significant
LN P	**0.16**	**2.05**	*
LN M	**0.12**	**1.54**	**-**
LN G	**-0.35**	**-3.7**	**
LN ER	**-0.04**	**-3.8**	**
C	**4.11**	**10.4**	**

*Significantly at the level of 5%; **Significantly at the level of 1%.

Table 10. Results of estimating the error correction model for the UR (rural unemployment).

Variables	coefficients	t-value	significant
DLN P	**-0.13**	**-1.8**	-
DLN G	**-0.12**	**-0.49**	-
DLN ER	**-0.08**	**-1.01**	-
DLN M	**-0.04**	**-3.37**	**
ECM	**-0.86**	**-5.7**	**

**Significantly at the level of 1%.

Conclusion

Despite the long-run relationship between agricultural price-dependent variables and descriptive variables, the ARDL model estimate showed a similar short-term situation in the long run, but the elasticities are larger, which is largely reasonable because economic policies, especially monetary policies, have higher external delays. Its effects on the economy show their economic variables with a time interval and in a period of several years.

Since government spending has no effect on the GDP of agriculture in the long run and the growth of economic liquidity has a negative effect on it, on the other hand, increases the price index, so if the government's fiscal and monetary policies are not controlled in the form of expansionary policies, consumption will have adverse economic effects on the agricultural sector, including rising inflation, rising unemployment and declining exports. Therefore, it is recommended that the implementation of expansionary fiscal policies by the government with increasing expenditures and in the form of investment in infrastructure and manufacturing, and to pay more attention to the correct direction of financial resources and optimal allocation of resources.

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