



The Role of the Agricultural Sector in Achieving Economic Development

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Abstract: The agricultural sector is one of the important economic sectors have an important contribution to the GDP, employment, food needs and agricultural products industries. Ardabil province is considered as one of Iran's agricultural hubs. Ardabil province's agricultural exports accounted for a significant share of non-oil exports of the province which can increase the foreign exchange earnings of the province. Therefore, this study is trying to deal with the impact of agriculture on the economic development of Ardabil province of Iran using quarterly data from 2003 to 2015 and ARDL method. The results of the study show that lending to the agricultural sector and an increase in exports of agricultural products can be a factor in increasing growth and economic development. So that it can be confirmed because of the capacity for the production and export of agricultural products Ardabil, with the improvement of conditions can provide much more growth and economic development of the province.

Keywords: Export, Agricultural Production, Economic Growth, Using ARDL.

1. Introduction

In today's world, communications, exchanges, information and technology have expanded and developed more than before. Producers and exporters of the products, compared to the past, have a better opportunity to compete in these international markets and make their domain bigger by this.

Improving the ability of exports result increase of domestic production, employment and the added value in different fields like (agriculture, industry, mining, etc.) quality improvement of domestic products and making competition opportunities, according to the possibility of more and better providing of the products and stabilizing the balance of payments in the countries. The agriculture sector is known as one of the important economic sectors which are the provider of a portion of production and food demands (Esna ashari and Karbasi, 2009, 140).

The agriculture sector can also have a lot of effects on the cooperation of other sectors. The share of agriculture sector in massive economic indexes like gross domestic production, the number of employed people and non-oil exports is significant. Agriculture, as the oldest production activity, has been the most important economic activity of the countries since the past years. Also today, agriculture is the biggest part of national economy in developing countries, so that economic growth and development of these countries has a close relation with the overall development of the agriculture sector of those counties and in other words, agricultural development is discussed in the field of national development of a country (Heydari et al, 2005, 155).

We must say that in developed rich countries, passing from the traditional economy to monetary economy has accompanied technical improvement and increasing the productivity of the agriculture sector. And so, some of the labor force of agriculture have been freed and joined the industrial sector, and also agricultural surplus has provided an opportunity for industrialization. This hasn't been done in undeveloped countries, so the modern economy sector has entered the countries without any relation with traditional economy, and without having any organic relation with its activity, is continuing its activity (Taghdisi and Ahmadi, 2012, 134).

So we can say that focusing on agriculture sector and increasing the amount of agricultural products in the countries can be very important and necessary and can provide the opportunity for economic growth and development. For this purpose, the present study is considering the effect of agriculture sector on economic growth and development of Ardabil province of Iran.

2. Theoretical Foundations

Generally, from an economic development view, the role of agriculture because of its help for advancement of the growth and development is more visible. The agriculture sector has some important roles in economic development and growth, among which we can mention providing food and food security for the growing population, providing foreign currency for importing capital goods by increasing exports, supplying raw material needed for the industry and helping for improving productive activities. Improving agriculture will cause increasing agriculture and livestock products, and fisheries and forestry and increasing the production of the mentioned products, besides making job opportunities and helping economic growth, will also help food security and feeding improvement in third world countries.

Although exporting agriculture products for gaining foreign currency comparing to exporting mineral and underground raw materials, but it is more economical, because first of all, agriculture products are renewable sources, so it's a permanent and unfailing for providing currency. Second, producing and exporting agriculture products makes more new job opportunities and developing activities related to producing and exporting these products causes more growth and efflorescence in national economy. On the other side, agriculture sector development, because of the activities in this sector basically needs less foreign currency. Also agriculture sector lessens the need for foreign currency for importing foreign food products by providing food for domestic demands (Tehranchiyan, 2008).

Different activities of agriculture sector can have positive effects on environment, if we avoid using chemical fertilizers and pesticides. Agriculture, forestry and rangeland activities can have an effective role in refining the status of the environment and pollutions of it (Garforth and Lawrence, 2004). Anyway, agriculture development show creating differences in agriculture sector and making these changes needs creating a suitable situation for it to happen so as a result, the farmers will have good opportunities to create some stabilizations in economic and social structure, establishing appropriate physical infrastructure, creating and founding the required social structure for improving agriculture and determining appropriate prices for agriculture products are some of these situations (Shah-abadi and Bashiri, 2011, 106).

2.1. The Roles of Agriculture Sector in Economic Development

The agriculture sector is one of the most important economic sectors and considering the relation between the effective factors on exports, is very important, this sector, in spite of providing food, has an effective role in economic development, employment and non-oil exports of countries. Iran also, isn't an exception and agriculture sector is very important in this country and has always had a significant role in non-oil exports (Khalilian and Farhadi, 2002, 3).

On the other hand, mutual dependence between the countries of the world has caused increase of experience between them. So according to the trading theories, if a country reduces its trading barriers, the advantages will be for that country itself not the others, because of free trading the consumers have access to better and cheaper products and the producers always are under pressure of competition, so they become more productive (Abrishami and Mehrara, 2006, 2).

The agriculture sector is usually the most important economic sector of developing countries, because in most of these countries the duty of producing and providing food products and saving a big share of the country's currency is mostly done by this sector. So considering the fact that this sector includes a big mass of human power, advancing of agriculture must be one of the big economic and social aims. It's clear that considering the importance of agriculture in development and improvement of any of the countries that have a low growth rate, the general structure must be compatible with that country's features and then conclusion and presentation must be done. Historically, a big share of agriculture sector in increasing production and economic development is considered through two ways of increasing agriculture productivity and using agricultural residues. Because increasing productivity usually causes agriculture to transform from a closed economy and self-consistent units into an economic unit relying on market and right from this level on agriculture residues are categorized as human power residues, real residues and financial residues.

According to experience in developed countries, after reaching a special level of development especially rural development, a significant portion of agriculture labor force must be transferred to urban

industrial sectors or complementary rural industries. But in the present economic situation of the country, in which industrial employment opportunities aren't present, this high ratio of employment can be criteria for necessity of investment in rural and agricultural society. But in the future, a part of this population can be functioning in complementary industrial activities or in urban industries. Comparison of employment share and the added value of this sector to other sectors with the investment of this sector show that agriculture sector hasn't been focused on at all. Of course the high ratio of employment of the agriculture sector in undeveloped countries doesn't show the good productivity, but reminds us of its importance in the present economic situation (Esfandiyari and Tarahomi, 2009, 97).

According to the potential role that agriculture may have in industry development sector, development economists have insisted that if there is going to be a big change in products and work labor in long run, for making it happen we must have successful agriculture policies (Campos and Rodriguez, 2011).

In the beginning of industrial development, agriculture sector can help by providing food and raw materials for other developing sectors, providing an Excess investable product as savings and tax for providing investment in other sectors, making demands for industrial products in rural areas by through cash sell to cities, providing the required cash for the new industry by exporting agriculture products. Generally, and as Kuznets says, agriculture sector helps both agriculture sector and industry in two ways, institutional participation or "factors of production" and "market sharing".

Chinsinga and Chasukwa (2018) studied the effects of agricultural policy, employment opportunities and social mobility in rural Malawi. The paper argues that even though agricultural production is the main occupation in Malawi, young people do not value agriculture as a means of upward social mobility. Furthermore, youth and agriculture policy frameworks provide little support to youth in terms of access to affordable farm inputs, land, extension services, value addition initiatives, and markets. It is argued that Malawi is missing the strategic policy direction by not implementing non-traditional agriculture interventions that would engage the youth in a bid to reduce massive youth unemployment.

Ketabforoush et al. (2017) is trying to consider the effects of human development on the value added of the agriculture sector in selected developing countries in period of 2006 to 2014 using the panel-data method. The results of the studies show that human development has a positive and meaningful effect on the value added of the agriculture sector.

Ozdemir (2017) has investigated the causal link between agricultural exports and real exchange rate in India employing linear and nonlinear causality analysis. They carry out their investigation using annual index of the quantity of agricultural exports in India and real US Dollar to Rupee exchange rate data which cover the period between 1961 and 2013. The paper finds that there are no significant changes in the linear and nonlinear causal relations between agricultural exports and exchange rates over the sample period under investigation. However, his investigation does not provide any evidence of bidirectional or unidirectional causality between the agricultural exports to real exchange rate in India.

Milic and Solesa (2017) in study identify the factors of the greatest impact on the banking sector liquidity in order to support agricultural business. The main goal of the research is based on the assessment of whether and how the variation of macroeconomic factors affects the exposure of the banking sector to liquidity risk, which is determined by the willingness of the banking sector to respond to the growing financial needs of agriculture. The obtained results confirm inflation and unemployment rates as determinants of liquidity in the banking sector. More importantly, this can help to plan, i.e. predict the funds for agricultural sector.

Mehnatfar et al (2015) studied impact of value-added economic sectors on economic growth in the fourth development plan with emphasis on agriculture sector by using panel data method in period 2005 to 2009. The results show that growth of the agriculture sector in province of the country has positive and significant effect on GDP growth.

Ketabforoush et al (2015) have investigated the effects of trade and agriculture value added on income inequalities in the period 2004-2010 using panel data for 11 selected OECD countries. The results show that trade has a significant and negative effect on income inequalities; however, agriculture value added has a positive effect on income inequalities.

Nasri (2014) in a study has considered the effect of non-oil and oil exports on economic growth of Iran and the growth of agriculture sectors, industry and services in period of 1965 to 2010 using ARDL method. The results show that non-oil exports and oil exports have a positive effect on gross domestic product in long run and short-run. In agriculture sector, oil exports in both long run and short-run are effect less on its growth but non-oil exports have had positive effect on it in long run and it is effect less on it in short-run.

Ceylan and Ozkan (2013) have studied the relationship between agricultural value added and economic growth in the European Union accession process. using two samples of 25 and 30 EU member and candidate states respectively for the periods 1995-2007 and 2002- 2007. According to the two-way random effects estimation results, the agricultural value added elasticity of per capita income was 0.025 for the 1995-2007 period, and 0.22 for the 2002 2007 period. It was estimated that average per capita income is 5.6 % higher among EU members.

Armand et.al (2013) has analyses the effect of export of agriculture products on economic growth of Cameroon in period of 1975 to 2009 using the VECM model. The results show that export of agriculture products has a significant positive effect on economic growth of Cameroon in the studied period.

Bezhani (2013) in an analytical study has considered the economic effect of agriculture products on economic growth of Albania. The results show that improving the situation of agriculture products and increasing the amount of production, has a positive effect on Albania's exports.

Mucavele (2013) studied the real share of agriculture in economic growth and reduction of poverty in 3 countries including Malawi, Mozambique and Zambia. The results show that in all 3 countries, agriculture has an impressive role in economic growth and poverty reduction.

Olajide et al (2012) in a study analyzed the relation of agriculture sources and economic growth in Nigeria in period of 1970 to 2010 using the least squares method. The results show that the relation between gross domestic production and agriculture is positive.

Susanto et al (2012) studied the structural reforms and the function of agriculture exports in period of 1980 to 2010 in 78 selected countries using the panel-data method. The results show that if structural reforms are done the right way, we can see an increase in the amount of agriculture products in the studied countries.

Najafi et al (2012) studied the effective factors on Export of agriculture products in Echo Basin countries between 1992 to 1010 using panel-data method. The results show that the index of export price variables and gross domestic products and the positive effect of exchange rate and currency fluctuations and the population of the countries have a negative effect on export of agriculture products in the studied countries.

Paggi et al (2011) in a study investigated the role of agriculture exports and imports in economic growth of the U.S in 2009 in a descriptive way and showed that western and central states of U.S have had more growth comparing to northern regions through exports of agriculture products in 2009.

Shaukat et al (2011) studied the effectiveness of agriculture and monetary sectors on cotton exports in period of 1971 to 2008 using the ECM method. The results show that commercial policies have a positive effect on increasing cotton exports. Competition and increasing the rate of commercial openness have a significant positive effect on Pakistan's exports in the studied period.

Kannan, E., Sundaram (2011) analyzed the process of agriculture growth in India in 2 periods of 1967 to 1968 and 2007 to 2008. The results from the growth model show that capital formation in the studied periods has increased and the first facilities required for agriculture has also improved.

Shah-Abadi and Bashiri (2011) have analyzed the role of knowledge index in growth of the added value of agriculture sector of Iran in period of 1968 to 2007. The results show the little effect of domestic and foreign R&D accumulation and also meaninglessness of domestic and foreign R&D effect on growth of agriculture sector's added value.

Idsardi (2010) has studied the effective factors on growth of agriculture exports in South Africa in period of 2002 to 2009. The results show that factors like trade costs, market size, and level of economic development, exchange rate fluctuations and business are some of the factors effective on exports of agriculture products in South Africa in the studied period.

Alijani et al (2010) have studied the effect of economic policies on agriculture and industrial exports of Iran in period of 1971 to 2007 using the static test and Johansson test and immediate shocks. The results showed that monetary policy has a significant positive effect on industrial and agriculture exports in short-run; while the Changes in interest rates and costs of the government respectably have had a direct and significant effect on agriculture and industry exports. Trading policies have also had a parallel effect with agriculture and industry.

3. Econometric Methodology and Research Model

3.1. Autoregressive-Distributed Lag Modeling (ARDL)

In this study, autoregressive-distributed lag modeling approach is utilized, which is presented by Pesaran and as well as Pesaran and Shin:

$$\alpha(L, P)y_t = \alpha_0 \sum_{i=0}^k \beta_i (L, q_i)x_{it} + u_t \quad i = 1, 2, \dots, k \quad (1)$$

In which L is the lag factor, α_0 is Y-intercept y_t is the dependent variable, and for L (lag factor) we have:

$$L^j y_t = y_{t-j} \quad (2)$$

Therefore:

$$\alpha(L, P) = 1 - \alpha_1 L^1 - \dots - \alpha_p L^p \quad (3)$$

$$\beta_i(L, q_i) = \beta_{i0} + \beta_{i1}L + \beta_{i2}L^2 + \dots + \beta_{iq_i}L^{q_i}$$

In order to use ARDL, Microsoft software would estimate all of the above equations for possible combinations. Equation selection is based on Hannan-Quinn (HQ), Schwartz Bayesian (SBC), Akaike Information criterion (AIC) . Long run explanatory coefficients are deduced as below:

$$\hat{\theta}_t = \frac{\hat{\beta}_{10} + \hat{\beta}_{12} + \dots + \hat{\beta}_{1q}}{1 - \hat{\alpha}_1 - \hat{\alpha}_2 - \dots - \hat{\alpha}_p} \quad (4)$$

If the sum of variables' coefficients with the corresponding lag is less than one, the dynamic pattern has a tendency towards long run equilibrium. Therefore, for tests of co-integration, it is necessary to conduct the following hypothesis test:

$$H_0: \sum \alpha_i - 1 \geq 0 \quad (5)$$

$$H_1: \sum \alpha_i - 1 < 0$$

We calculate the following statistic to conduct the hypothesis test:

$$t = \frac{\sum \hat{\alpha}_i - 1}{\sum \sigma_{\hat{\alpha}_i}} \quad (6)$$

If the absolute value of t is greater than the critical absolute value, presented by Banerjee, Dolado and Master the null hypothesis is then rejected, and long run relation is accepted.

3.2. The Error Correction Model (ECM)

When x and y are co-integrated, there is an equilibrium relation between them. Yet, in short-run there might be some disequilibrium. In this case, the following error line could be assumed as equilibrium error.

$$y_t = \beta x_t + u_t \quad (7)$$

Now this error could be used to link the short-run behavior of y with its value for long run equilibrium. For this matter, the following is proposed:

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta x_t + \alpha_2 \tilde{u}_{t-1} + \varepsilon_t \quad (8)$$

In equation (8), \tilde{u}_{t-1} is the part for error of the previous regression estimation with a lag. This pattern is known as the error correction pattern.

3.3. Estimating Model

The model presented in this research paper inspired by [Armand et al \(2013\)](#) and [Ceylan and Ozkan \(2013\)](#) is as follows:

$$\text{LnGDP} = \beta_0 + \beta_1 \text{LnX} + \beta_2 \text{LnDE} + \beta_3 \text{LnEM} + \beta_4 \text{INF} \quad (9)$$

As the GDP is Ardabil’s gross domestic production, X is exports of agriculture products, DE is the amount of facilitations provided by the banks to agriculture section, EM is employees of agriculture section of Ardabil, INF is inflation rate and Ln is the natural logarithm. Ln shows the natural logarithm. Also the method used in the estimation is in the form of ARDL and Microfit software is used. The statistical data related to considered variables are gathered from annual reports of management and planning organization of the shire, Balance sheet of the central bank, governors and customhouse of Ardabil. Also the data are from 2003 to 2015 and are used in estimation seasonally.

4. The Results of Estimation

4.1. Checking Stationary of Variables

If the time series are non-stationary, the estimated coefficients will lead to a spurious regression. So before estimating the model it is required to check the stationary statues of all variables used in the estimates. Therefore, in this study for checking stationary of variables have been used Augmented Dickey-Fuller test. The ADF unit root test results have been shown in table (1).

Table 1. Results of the ADF test

Variable	Statistic	Prob
LnGDP	-0/6192	0/8508
DLnGDP	-4/3332	0/0021
LnX	-0/0938	0/9424
DLnX	-6/0748	0/0000
LnDE	-5/7244	0/0000
LnEM	-6/0110	0/0000
INF	-5/6666	0/0003

Sources: Research Findings

According to the values of ADF indexes and comparison of that to values of critical zero suppose, existence of a unit root for all variables hasn’t been rejected. Including the two variables of gross domestic production and exports weren’t stable in surface and has been stabilized by differencing once. It must be mentioned that critical values in surface 1, 5 and 10 percent were respectably 3/689, 2/971 and 2/625.

4.2. The Analysis of the Short-Run ARDL Model and Results

According to the study of Pesaran et al (2001) using ARDL method and applying suitable pauses, we can get the long run compatibility ratios between the intended variables in a model. Based on the study of Pesaran et al (2001) using the ARDL method and by applying suitable pauses, the long run compatibility ratios can be resulted. The clear difference between ARDL method and Johansson method is that in ARDL method for each and every one of the variables, optimized pauses are applied using criteria such as Schwarz-Bayesian, Akaike and Hannan Quinn; while in Johansson mode, equal pauses are applied for all variables. Also a big advantage of ARDL method compared to others is that the ability of estimating long run and short-run relations in situations that even the stable model variables aren’t permanent from zero degree and are permanent from one degree can be estimated and the compatibility will be revealed. The results of estimating the model are in table 2 below:

Table 2. Results of ARDL short-run estimation

Variable	Coefficient	Standard error	T statistics	Prob
LNGDP(-1)	0/0810	0/0079	10/1821	0/000
LNx	0/3603	0/0948	3/8001	0/001
LNx (-1)	-0/2750	0/1035	-2/6563	0/013
LNDE	0/0295	0/0202	1/4581	0/156
LNEM	0/0636	0/0279	2/2801	0/030
INF	-0/1057	0/0640	-1/6511	0/110
R ² =0/9805		R ² bar=0/9770		D-W=1/51

Sources: research findings

The results of the estimation show existence of short-run meaningful and dynamic relations of the model, as the estimated model has high R² which means high explaining ability of independent variables. Durbin-Watson is 1/51 which means the lack of autocorrelation in the model.

4.3. Diagnostic Tests

For studying the intended pattern, diagnostic tests must be accurately considered. For this purpose, table 3 shows the results of these tests.

Table 3. Results of Diagnostic tests

Test Statistics	Statistic	Prob
Serial Correlation	0/14	0/71
Functional Form	0/21	0/64
Normality	0/28	0/86
Heteroscedasticity	1/39	0/24

Sources: research findings

The results of dynamic pattern diagnose shows that the estimated model in the meaningful surface of 5 percent has self-correlation, heterogeneity of variance, inappropriate conditioned form and distribution of disturbance terms is normal.

Also it is to be mentioned that the existence of absence test must be investigated. For performing this test ratio with pauses of dependent variable must be differenced from one and divided into standard deviation (Tashkini, 2005, 154). The calculated statistic was -126/5. This value in absolute terms is more than the critical value of Banreji and Dulado. So we can say that the theory of zero based on absence of long run relation is rejected and the opposite theory, existence of long run relation is proved to be right.

4.4. The Analysis of the Estimation of the Long-run ARDL

By accepting existence of long run stability relation between explaining variables of the model, with economic growth, we are considering the estimation of model ratios in long run. The results of the estimation of the model in long run are shown in table (4). The results show significant effect of explaining variables of the model on Ardabil's economic growth.

Table 4. Results of long-run ARDL estimation

Variable	Coefficient	Standard Error	T-Ratio	Prob
LnX	0/3124	0/0931	3/3545	0/002
LnDEB	0/5274	0/1441	3/6585	0/001
LnEM	0/3359	0/1101	3/0498	0/005
INF	0/4685	0/2430	1/9274	0/065

Sources: research findings

According to table 4, long-run elasticity of economic growth than exports is 0/31, which means by one percent increase (decrease) of exports, economic growth increases (decreases) by 0/31 and symbolically it is agreeing with economy theories and also statistically it is meaningful and we can conclude that exports are effective on economic growth in long run. Also the estimated elasticity related to the donated facilitations to agriculture section also is seen equal as 0/52. Which means that by increasing (decreasing) the provided facilitations by one percent, economic growth increases (decreases) by 0/52 percent. Also by one percent increase of the agriculture section employees, the economic growth of the shire increases 0/33 percent in long run. While inflation in short-run has no meaningful effect on growth but in long run, by increasing the general level of prices and as a result, increasing the prices of agriculture products in the shire, motivation for producing these products increases and according to high amount of share of this product in domestic gross production of the shire, economic growth also increases.

4.5. The Results of ECM Test

The pattern of correcting model errors says that in each period, some percentage of the dependent variable's instability gets stabled through long-term relation. The results of error correcting model related to economic growth are in table 5.

Table 5. Results of ECM estimation

Variable	Coefficient	Standard Error	T-Ratio	Prob
dLnX	0/3603	0/0948	3/8001	0/001
dLnDE	0/0295	0/0202	1/4581	0/156
dLnEM	0/0636	0/0279	2/2801	0/030
dINF	0/01057	0/0640	1/6511	0/110
ECM	-0/1893	0/0796	-2/3790	0/024

Sources: research findings

According to the results, error correcting modulus (ECM) in the considered model is meaningful and equal with -0/18 percent. This modulus's being negative means any instability in the pattern, moves towards stability in long-term and 0/18 percent of deviations of the variable from its long-term direction, is corrected by pattern variables in the next period. In other words, it takes about 5 years and 5 months until the short-term error is corrected and the model reaches stability.

5. Conclusion

Knowing and explaining the effects of economic development policies especially commercial development on immense economic variables has been being discussed for a long time. The posture of the affecting of these policies, like replacing imports, developing exports and replacing exports on the level of growth and gross domestic production, is the subject of economists' scientific discussions. Commercial connections that any country has internationally can be effective on economic growth of that country. These connections result using production factors between some sections of any country' economy which has more advantage and this causes improvement of the productivity of all production factors and increasing gross domestic production in any country. According to the subject exports growth and economic growth, the subject export variety gets more attention by many more of the politicians, by which we mean increasing the number of exported products and decreasing dependence to an income source. In other words, the more the combination of a country's exported products is than the number of its exported products, we say that country's exports are more varied. For this purpose, the aim of the present project is determining the effect of exports of agriculture products on Ardabil's economic growth between 2003 to 2015. The results of the study show that in short-term, exports of agriculture products and employees of agriculture section have a meaningful and positive effect on Ardabil's economic growth, while the effect of other explaining variables of the model haven't been meaningful. Also in long-term, exports of agriculture products, amount of facilitations provided by banks, employees of agriculture section and positive and meaningful inflation have had a positive and meaningful effect on Ardabil's economic growth. According to the results, the authorities, by applying decent policies, must try to increase economic growth as much as possible by providing more facilitation by banks for farmers and removing obstacles of exporting agriculture products.

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