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AGRICULTURAL EXPORT DETERMINANTS IN IRAN

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Abstract

This paper attempts to examine determinants of agricultural export in Iran over the period 1966 - 2012. To investigate the short-run and long-run relationship in the model, unit root test, co-integration test, ordinary least square and error correction methods were used. According to the result, in long run, agricultural export is significantly affected by the major selected explanatory variables such as gross domestic product, domestic consumption, agriculture value added and GDP per capita of major trade partner. But, in the short run, gross domestic product has no impact on the agricultural export performance while other explanatory variables over a period were found to affect the dependent variable significantly.

Keywords: agricultural export, GDP, domestic consumption, agriculture value added, Iran

INTRODUCTION

Foreign trade plays a prominent role in the economic development of any country. The classical and neo-classical economists attached so much importance to foreign trade in a nation's development that they regarded it as an engine of growth. Over the past several decades, the economies of the world have become greatly connected through international trade and globalization. Foreign trade has been identified as an instrument and driver of economic growth (Frankel and Romer, 1999). In fact, foreign trade provides foreign exchange, expands the market and encourages the producers, increases the scale of production and national income, helps to bring stability in price level, etc. Therefore, the desire for rapid economic growth in developing countries is attained through more trade and suggested that growth of export stimulates economic growth.

In Iran, the development of non-oil export and emancipation of economic mono-product oil is an inevitable necessity. Great capability of the country in production and supply of

agricultural products has led the bulk of country's exports are accounted for these products. About importance of agriculture in the national economy should be said that 14% of GDP and 9% of food consumption production and 23% of employment by this sector can lead to self-sufficiency in production of some strategic goods and on the other hand the foreign exchange earned from the export of these products will be increased considerably. This sector has significant advantages and characteristics such as climate variability, appropriate temperature, diversity of land, cheap labor and less dependent on sophisticated technology. Thus, in order to strengthen the agricultural sector and an increase in exports of products of this sector, study and determination the factors affecting the export of agricultural products is essential. Because, basically, the formation of a strong and long-term sector requires appropriate policies and these policies without study and identification of important factors, cannot be implemented. Therefore, the present research aims to study and determine the factors affecting agricultural exports in Iran.

LITERATURE REVIEW

In the case of agriculture sector export of Iran and factors affecting it, a number of studies have been conducted that some of them are mentioned below:

Khalilian & Farhadi (2002) examined factors affecting agricultural exports for the Iranian economy during 1962-1999. The results of this study show that gross domestic product, export relative prices and domestic consumption had significant effects on the agricultural exports, while impact of effective export exchange rate was insignificant. Hosseini & Homayoonpoor (2012) investigated determinants of agricultural exports for economy of Iran during 1976-2006. Findings showed variables of relative price index, real exchange rate, commercial terms of trade and agriculture sector value added affect positive and significant on agricultural exports in Iran, while GDP had positive and statistically insignificant impact. Mohammadi & Hemmati (2010) studied factors influence agricultural exports in Iran during the period 1999-2008. Results show that the export prices influences negatively significant and GDP affects positively significant on exports of three agricultural products of Dates, Apple and Pistachio. Pakravan et al. (2010) examined effective variables on supply and demand of agricultural exports in Iran for the period of 1966-2007. Results reveal that variables of real exchange rate, relative prices, quantity of production, domestic prices and dummy variable of war were as effective variables on export demand and supply equations. Aghel et al. (2008) estimated export function of export products like Pistachio, Almond, Saffron, Date and Apple with panel data method by utilizing data for the period 2000 to 2005. Results showed consideration of export standards have positive and significant effort on agricultural exports. Najafi Alamdarlo et al. (2012) examined factors

affecting agricultural exports in ECO countries during 1992-2010.The study found that variables of export price index, GDP, exchange rate have a positive effect and the effect of exchange rate fluctuations and countries' population have been negative on agricultural exports in the period under study. Moghaddasi & Alishahi (2007) analyzed the effects of Iran Pistachios and Raisins prices, exchange rate values and their volatilities on Iran market shares among the three rival exporting countries including Iran, U.S. and Turkey. The results show that relative Pistachios and Raisins export prices and exchange rate are important factors affecting Iran market shares, implying that higher Iran prices and exchange rate values have detrimental effects on Iran market shares. Also, the variable of volatility of export relative prices have negative effects, while relative volatility of exchange rate are not statistically significant and this implies that importers are sensitive to price volatility. Dadras Moghaddam & Zibaee (2009) investigated impact of monetary policies and exchange rate on supply, price and agriculture sector exports for Iranian economy during 1961-2005. Results indicate that to avoid increasing the prices of agricultural products and agriculture sector inputs should not rely solely on monetary policies. But in the long run all macroeconomic variables must also be considered. Also, the results show that changes in macroeconomic variables affecting the agricultural sector, but the reverse is not true. Ahangari & Zinivand (2004) examined the effect of exchange rate policies through devaluation compared with the effect of trade policies through the paid subsidies to exporters on agricultural exports. Also, the study estimated the relationship between effective exchange rate and agricultural exports. The results show that effect of devaluation exceeds that of subsidy policy and effective exchange rate has a significant effect on agricultural exports in Iran. Hojabr Kiani & Nik Eghbali (2000) studied qualitative effective variables on supply of agricultural exports for economy of Iran. Results indicate that deviation of real exchange rate from long run equilibrium path, real exchange rate fluctuations and pressure of domestic demand for exportable goods have negative effect and technical improvement has positive effect on agricultural export supply. Fotros (1996) examined effects of fiscal and monetary policies on value added, investment and export of agricultural sector during 1971-1991. Findings show that fiscal and monetary policies have positive impact on agricultural value added and negatively affect on agriculture sector investment. Also, fiscal policies have insignificant impact on agricultural exports while monetary policies influence positively on agricultural exports in Iran. Moghaddasi & Farhadi (2003) investigated impact of fiscal and monetary policies on agricultural sector in Iran for the period of 1971-2001. The results reveal that effect of fiscal policies on growth of agriculture sector production was more than impact of monetary policies, while monetary policies in long run have considerable effect on prices level. Also, fluctuations and

volatility of monetary policies have negative effects on investment, production and agricultural exports.

METHODOLOGY

Based on the empirical literature reviewed and objective of this study, our model is specified as follows:

$AGX = f(GDP, CONS, AVA, Y)$

The log linear regression model of above equation econometrically is given as follows:

$$ln\ AGX = C + \beta_1\ ln\ GDP + \beta_2\ ln\ CONS + \beta_3\ ln\ AVA + \beta_4\ ln\ Y + \beta_5\ AR(3) + \beta_6\ MA(2)$$

Where, AGX indicates the agricultural exports value, C is the intercept, β is the variables coefficient, GDP represents the real gross domestic product of the country, CONS is the domestic consumption, AVA is the agriculture value added, Y indicates the GDP per capita of major trade partner (European Union), and AR (3) is the third degree auto-regressive error, MA (2) is the second type of moving average. The expected signs of the explanatory variables, namely GDP, AVA and Y should be positive, while CONS affects negatively agricultural exports.

The study uses annual time-series data sets for the period 1966-2012. This period has been chosen for analysis purposes because almost in the mid-60s, import substitution policy was implemented in Iran that Iran's economy, including the agricultural sector until decades later significantly affected. The main data source was Central Bank of Iran. We also use Maddison Project Database to get data on European Union GDP per capita. The data on European Union GDP per capita and agricultural exports were originally in US$ which have been converted later on into Iranian Rials currency by using exchange rate of the corresponding period.

To see the short-run and long-run relationship in the model, unit root test, co-integration test, ordinary least square and error correction methods will be used and the empirical results were tested using Eviews 8.

EMPIRICAL RESULTS

Unit Root Test

The stationarity properties of the variables have been investigated by using Augmented Dickey-Fuller (ADF) unit root test. To determine the order integration of time series, unit root test is performed on level as well as on first difference. The table1 shows the results of ADF unit root test.

Table 1: Unit Root Test Result

variables level	ADF stats	prob	variables First Difference	ADF stats	Prob	Results
LAGX	-0.160054	0.9361	D(LAGX)	-5.873436	0.0000	I(1)
LAVA	-0.864374	0.7906	D(LAVA)	-8.645271	0.0000	I(1)
LCONS	-2.361346	0.1581	D(LCONS)	-4.159836	0.0020	I(1)
LGDP	-1.721223	0.4140	D(LGDP)	-3.644505	0.0085	I(1)
LY	0.006947	0.9543	D(LY)	-7.628654	0.0000	I(1)

*NOTE: * denotes significance at 5% I (1) Indicates Unit Root in level and Stationary after first difference*.

The results in table 1 show that the hypothesis of a unit root is rejected in first differences at 0.05 level of significant which state that all variables are integrated of degree one, I (1). That means all the variables achieve stationarity only after first difference.

Co-integration Test

In the next step, Johansen co-integration test is examined, since all the variables are non stationary and are integrated of same order, i.e., I (1).

Table 2: Co-Integration Test Result (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	5% Critical Value	Prob.**
None*	0.696554	98.59159	69.81889	0.0001
At most 1	0.384348	46.11925	47.85613	0.0721
At most 2	0.294547	24.77604	29.79707	0.1696
At most 3	0.151096	9.423804	15.49471	0.3276
At most 4	0.049120	2.216175	3.841466	0.1366

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level.

** denotes rejection of the hypothesis at the 0.05 level.*

*** MacKinnon-Haug-Michelis (1999) p-values.*

Table 3: Co-Integration Test Result (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	5% Critical Value	Prob.**
None*	0.696554	52.47234	33.87687	0.0001
At most 1	0.384348	21.34321	27.58434	0.2560
At most 2	0.294547	15.35224	21.13162	0.2650
At most 3	0.151096	7.207629	14.26460	0.4649
At most 4	0.049120	2.216175	3.841466	0.1366

Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level.

** denotes rejection of the hypothesis at the 0.05 level.*

*** MacKinnon-Haug-Michelis (1999) p-values.*

At 5 per cent significance level, the trace test and the maximum eigenvalue test indicate that there is 1 co-integrating equation among the variables.

Estimation of the Long Run and Error Correction Models

After co-integration test and its confirmation, the next task is estimating the long run and error correction models. The estimation of the equation by direct ordinary least square gives the following results:

Table 4: Result of the Estimated Long Run Model

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	-30.84654	1.549768	-19.90397	0.0000
LAVA	5.009842	0.431904	11.59945	0.0000
LCONS	-2.345203	0.186899	-12.54799	0.0000
LGDP	1.089857	0.134813	8.084189	0.0000
LY	0.408468	0.073775	5.536702	0.0000
AR(3)	-0.556886	0.142539	-3.906893	0.0004
MA(2)	-0.379340	0.164790	-2.301959	0.0271
R-squared	0.994829	Mean dependent var		14.00140
Adjusted R-squared	0.993990	S.D. dependent var		2.879374
S.E. of regression	0.223220	Akaike info criterion		-0.016408
Sum squared resid	1.843605	Schwarz criterion		0.267440
Log likelihood	7.360974	Hannan-Quinn criter.		0.088857
F-statistic	1186.303	Durbin-Watson stat		2.021882
Prob(F-statistic)	0.000000			
Inverted AR Roots	.41-.71i	-.41+71i	-.82	
Inverted MA Roots	.62	-.62		

The findings of the estimated equation are as follows: The results reveal that real gross domestic product, domestic consumption, agriculture value added and GDP per capita of major trading partner are found with expected sign and statistically are significant at 1% level of significance. Real gross domestic product, agriculture value added and trade partner GDP per capita are found to be directly related to the agricultural export value in case of Iran. The coefficient of GDP suggesting that 1 percent increase in GDP leads to 1.089 percent increase in AGX in the long run. AVA is inducing AGX at 1 percent level of significance implying that AGX will increase by 5.009 percent due to 1 percent increase in AVA in the long run. In the same manner, if Y will be raised by 1 percent, AGX will increase by 0.408 percent in the long run. With regards to domestic consumption, as expected, it is having inverse effects on AGX.

The results of various diagnostic tests such as Breush-Pagan-Godfrey test for Heteroskedasticity (table 5), Breush-Godfrey LM Test (table 6) for serial correlation and Jarque-Bera test for normality (table 7) did not detect any problem of serial correlation, hetroskedasticity, and non-normality.

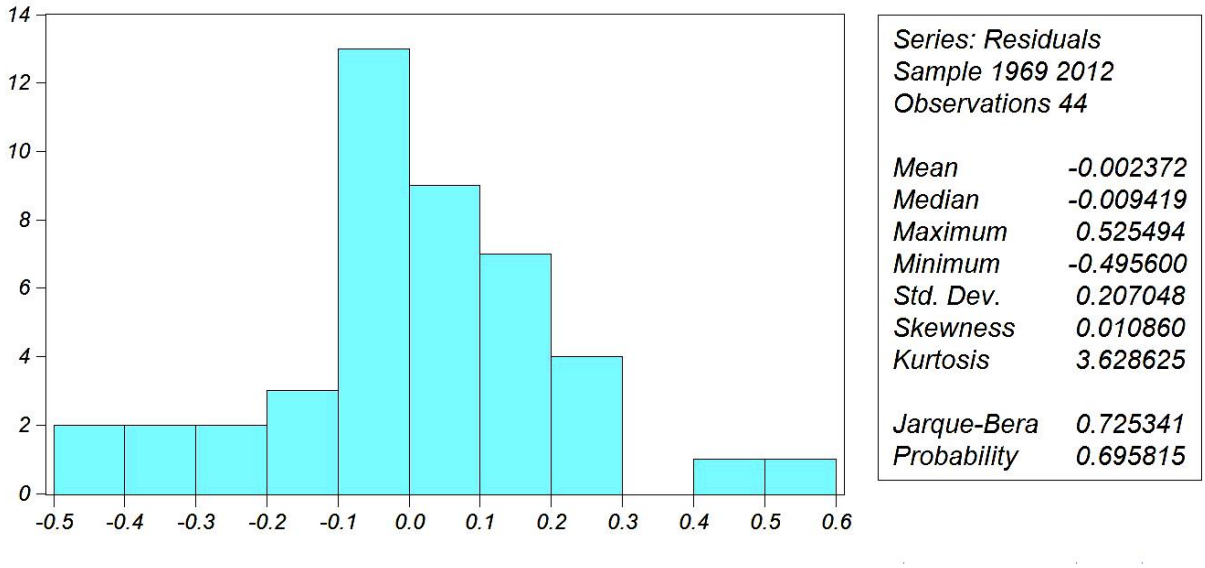
Table 5: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.106612	Prob. F(4,39)	0.9795
Obs*R-squared	0.475915	Prob. Chi-Square(4)	0.9758
Scaled explained SS	0.442196	Prob. Chi-Square(4)	0.9789

Table 6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.001723	Prob. F(2,35)	0.15038
Obs*R-squared	4.511007	Prob. Chi-Square(2)	0.1048

Table 7: Normality Test



The next step will be estimation of coefficients of the short-run dynamics that have important policy implications. Therefore, error correction model has been estimated using the ordinary least square technique and the results are summarized in table 8 below.

Table 8: Error Correction Estimates

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	0.127017	0.052554	2.416889	0.0203
D(LAVA)	2.498644	0.656732	3.804663	0.0005
D(LCONS)	-1.518024	0.557883	-2.721043	0.0096
D(LGDP)	-0.144858	0.552723	-0.262081	0.7946
D(LY)	0.403355	0.119723	3.369082	0.0017
ECM(-1)	-0.647710	0.129039	-5.019505	0.0000

R-squared	0.577037	Mean dependent var	0.222161
Adjusted R-squared	0.524166	S.D. dependent var	0.307496
S.E. of regression	0.212113	Akaike info criterion	-0.142292
Sum squared resid	1.799670	Schwarz criterion	0.096227
Log likelihood	9.272705	Hannan-Quinn criter.	-0.052941
F-statistic	10.91417	Durbin-Watson stat	1.718141
Prob(F-statistic)	0.000001		

The estimation results of the short run error correction model in table 8 show the coefficient of the error correction term is significant with expected negative sign (-0.6477). Its magnitude indicates that deviation from the long run equilibrium is adjusted fairly quickly where 64.7% of the disequilibrium is removed each period. The result of R^2 is also 0.57.7 reveals that of Iranian

agricultural export performance is caused by the explanatory variables included in the model, while 42.3% is by other variables which were not included in the model. Furthermore, F-statistic is significant with a probability of 0. 0001 implies that the model fit.

Furthermore, coefficients of the short run model show that agriculture value added, domestic consumption and trade partner GDP per capita are significant; indicating that the variables significantly affect the agricultural export performance of Iran in the short run. However, real gross domestic product affected insignificantly the agricultural export in the short run and its sign is different from what already expected.

The result shows that a 1% increase in agriculture value added will lead to 2.498% increase in the agricultural export supply. The coefficient of trading partner GDP per capita is also positive and significant as expected. That means an increase in trade partner GDP per capita by 1% will lead the agricultural exports to increase by 0.403%. When we come to domestic consumption its coefficient is significant and negative in sign as expected. It shows that an improvement by 1% in domestic consumption will lead to 1.518**%** decrease in the total agricultural exports of the country.

On the other hand, as the estimated result obviously shows, the sign of the coefficient of real gross domestic product is negative which does not match with what already expected and it is also statistically insignificant. This implies that gross domestic product has no impact on agricultural export performance of Iran in short run.

In the case of short run model, also the results of various diagnostic tests such as Breush-Pagan-Godfrey test for heteroskedasticity (table 9), Breush-Godfrey LM test for serial correlation (table 10) and Jarque-Bera test for normality (table 11) did not detect any problem of serial correlation, hetroskedasticity and non-normality.

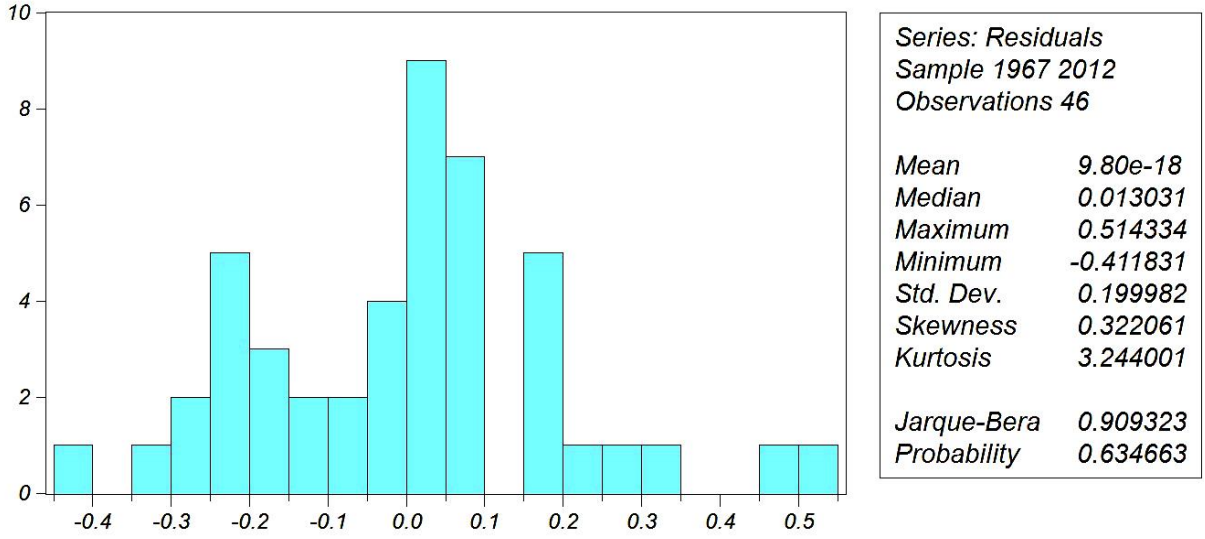
Table 9: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.475339	Prob. F(5,40)	0.7924
Obs*R-squared	2.579907	Prob. Chi-Square(5)	0.7644
Scaled explained SS	2.188777	Prob. Chi-Square(5)	0.8225

Table 10: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.136964	Prob. F(2,38)	0.3315
Obs*R-squared	2.597231	Prob. Chi-Square(2)	0.2729

Table 11: Normality Test



CONCLUSIONS

The main question studied in this paper is whether or not agricultural export is significantly affected by the major selected explanatory variables such as gross domestic product, domestic consumption, agriculture value added and GDP per capita of major trade partner. To investigate this question, time series data ranging from the year 1966 up to 2012 was utilized. In this study agricultural export was used as dependent variable and the above mentioned variables expected to affect agricultural export performance of the country are used as explanatory variables.

The first step was estimation using Ordinary Least Square technique to test the relationship between agricultural export performance and explanatory variables. Pre-estimation tests of the statistical behavior of the variables using Augmented Dickey Fuller test for the presence of unit root showed that all the variables were stationary at first difference. Thus, they are regarded as integrated of order one. The next step was co-integration test which helps us to know the presence of long run relationship between the dependent variable and the explanatory variables. Co-integration test was conducted using Johansen co-integration procedure and its presence was confirmed. The long run equation was estimated and according to the result, all the variables were found significantly affect the agricultural export performance of the country. Next, the Error Correction Model (ECM) was estimated to show the short run relationship between the dependent and explanatory variables. Accordingly, the regression result shows that the error correction term is significant and negative in sign as expected and gross domestic product was insignificant in the short run. That means in the short run this variable has no

impact on the agricultural export performance of Iran. On the other hand except this explanatory variable, other variables such as agriculture value added and trade partner GDP per capita over a period were found to affect the dependent variable significantly and positively as already anticipated. Also, the effect of domestic consumption was significant and negative as already expected.

This study has concentrated on impact of selected explanatory variables on agricultural exports. According to the crucial role of government in the economy, including development of the agricultural sector, it would also be advisable for forthcoming studies concerning the determinants of agricultural exports, consider the relationship between supportive government policies and agricultural exports, the impact of these policies and offering the solutions to increase agricultural exports.

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