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Survey of trade liberalization Effects on Inflation of Agricultural Sector (Case study: Iran)

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ABSTRACT

Background: Although trade liberalization has many advantages for the economy of countries, it has some negative side effects too. **Objective:** Adversity of these side effects is various, depending on the countries readiness to face this phenomenon. So the countries that have infra-structure preparations for this phenomenon and have done sufficient studies before entering World Trade Organization (WTO) can change threats into opportunity and use advantages to the best. Therefore we have tried to study trade liberalization effects on this small sector of the economy of Iran. **Results:** To this aim by proposing a hypothesis, an economic mathematical model was designed and has been tested. In order to study and analyze the relations among variables, we used annual time series data of 1979-2010 and by using of Microfit software and Johansen convergence method, and it was already known that there is a long term balance relation among variables and estimated the coefficients of model. Gained results of "Johanson-Juselius" tests confirmed long term co-integration relation among the variables of model and the existence of two co-integration vectors. **Conclusion:** Also in order to study structural failure and the stability of estimated coefficients of model we used "accumulation sum of recursive residuals" test that gained results of this test showed the stability of gained coefficients and finally by estimating models and analyzing of variance, it was cleared that trade liberalization index has effect on dependent variable of model.

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INTRODUCTION

Today trade liberalization is almost synonym with countries joining to World Trade Organization and membership in this organization. Although membership in World Trade Organization has many advantages for the economy of countries, it won`t be costless, so every country must study its potentialities and then decide on membership to minimize negative results of membership (Anonymous, 1997). Observations show that in near future most world trade will be excluded for the members of this organization and the countries that are not member will be in solitude and pay unfair costs just because of the lack of membership in this organization. It is necessary to mention that each country should accept some negative effects when it wants to become member. According to an old tradition, different countries of world generally have supported agriculture sector during recent years. Agricultural product importing countries by exerting tariffs and import limitations, have immunized agricultural sector from the competition of imported substituted goods and versus, the countries that export these products by paying export subsidies make their agricultural sector active in world markets (Kalbasi and Jalaee, 2002). So every dependent country that is not a member of WTO (like Iran) will not have immunity in world economy against negative results whether it demands membership in WTO or not, but it can decrease these undesired and negative effects by exact studies and if it intends to have membership, it should regulate its membership protocol in a way that include all considered advantages for developing countries. Now there is a question, if countries demand WTO membership or trade liberalization and elimination of governmental supports from agriculture sector and paying subsidies to this sector, what is its effect on the inflation of agriculture sector (Gujarati, 2002). By studying the situation of Turkey, Pakistan and Kirgizstan in trade liberalization, that have been done before, we found out that only membership in WTO does not mean trade liberalization and enjoying advantages of this organization and each country based on talents proportion and its potentials can reap the benefits of its advantages. Not only is trade liberalization modeled as removal of a tariff,

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Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 799-806

but also applies to analysis of reductions in other trade measures that open up or increase trade between countries (Nielsen, 2009).

Four plans are under consideration by WTO in order to liberalize global agricultural trade. These plans were submitted to the WTO ministerial meeting in Hong Kong, in 2005 but the members refuse to accept them. All the formulas include a reduction in border tariff, domestic farm support and export subsidy (Chang, 2007).

There are different ideas about the advantages and disadvantages of globalization (Komijani and Noori, 2000). First dispute of UNIDO is that globalization process is not a zero summation play but it has a potential to accelerate industrialization process in developing countries and transferring ones and so brings considerable profit for countries (Navazesh Ali, 1998). But changing potentials into actual needs efficient management, both in international and national level to minimize social costs policies (Assaf, 1998). So under this condition, which countries can take advantage of trade liberalization process or economy globalization?

Rothenberg and others did a study on the impact of trade liberalization on agriculture. The results of this study showed that trade liberalization provided conditions for the growth of agricultural exports (Wurtenberger, 2006).

Santos and Paulino used datas of 22 countries to examine the impact of liberalization on export growth, import growth, the trade balance and balance of payments. The results showed the impact of trade liberalization on import growth was more than export growth, thus worsening the trade balance and balance of payments. In other words, trade liberalization reduces production growth in these countries (Santos-Paulino, 2004). Meanwhile, some believe that increased trade liberalization level between 1950 and 1980 was associated with an increase in global exports (Teitel, 2005).

Agriculture sector in developing countries in terms of abilities and considerable capacities has special importance in providing people`s food and first material of some industries. This issue reinforces the connection of agriculture sector with other economic sectors and the economy of Iran is not excepted from this rule. Agricultural share in employment, gross national production and export and also its changes in economic development trend reflect dependence degree of economy on agriculture and recent agricultural situation (Nasiri, 2003). Since Iran is geographically a vast country and has various climates, its agriculture sector is expanded and has considerable potentiality to supply goods to world markets (Khajeh Pour, 2004). By having this reflection, in this research, we have tried to study trade liberalization effect on agricultural sector of Iran.

Methodology:

Agricultural and industrial sectors from the view point of trade liberalization have significant differences. In industry, some pressures (relative advantage, costs, production factor surplus and deficit, transportation costs and …) led to create value adding firms in the industry of different countries and produce goods segments and components, this trend is usually called global integration.

In this research, for studying trade liberalization on agricultural sector of Iran, we have used Integration of international trade (IIT) index that measures global integration of one industry or sector. This criterion is Loyd and Grubel standard index and is calculated as follows (Loyd, 1998):

$$IIT=1-[|(X_t-M_t)|/(X_t+M_t)] \quad (1)$$

Research importance and necessity:

Nowadays agricultural sector in different countries has various governmental and nongovernmental supports as subsidy and tariff supports but after trade liberalization and membership of country in World Trade Organization, because of production and trade competition, no country and no government is permitted to support economic sector and they have to eliminate all helps as the support of agricultural sector. So the importance of this research is that after the elimination of these supports that cause artificial prices in market, does inflation have any effects on agricultural sector or not? And if it has effect, is it increasing or decreasing? Also this study has general purpose of trade liberalization effects recognition on agricultural sector of Iran and special purpose of trade liberalization effects on inflation of agricultural sector to show whether trade liberalization will have effect on completed price of agricultural products or not.

Research variables

In this research, economic model has been defined as follows:

$$LPA=\beta_1 LQ+\beta_2 GDP_A+\beta_3 IIT+\beta_4 LCA+DU_{72}+\varepsilon_t \quad (2)$$

In this model (LPA) as dependent variable, is the amount of inflation in agricultural sector and independent variables respectively are (LQ), the amount of liquidity or allocated credits of banks to this sector, (GDP_A), the amount of products in agricultural sector, globalization index or globalization integration index, (LCA),

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 799-806

weighted mean of the price of agricultural sector`s factors, (DU_{72}), figurative variable for studying structural failure of variable exchange rate in 1993 and finally (ε_t) is disturbance or error term.

Research method:

This study is applied type and we have used vector autoregressive model (VAR) and Johansen co-integration method to estimate function. Nowadays this method is one of frequent methods in studying and determining long term balance relations among some time series economic variables that we have used in this study. According to research frame, applied method is library and documentary type. Statistic and data collection have been done by using of Central Bank reports, statistical year-book of Iran, statistical year-book of customs, reports of economic journals of management and planning organization, business ministry, statistical year-book of agricultural ministry and statistical center of Iran and some existing data of statistical centers that could be useful in this research. Studied time period of this research is 1979 – 2007 years and studied geographical limit is Iran.

Applied econometric method of this research is VAR method and co-integration method of Johanson by Microfit software.

Data analysis method:

First step for analyzing time series variables is studying variables stationary. In this research, we have studied it by Augmented Dickey-Fuller (ADF) test and then by co-integration test in Vector Error Correction Model (VECM) based on special values test, integration vectors number is determined in mentioned models and finally to analyze long term and short term relations among variables, VAR and co-integration models have been used by Microfit software.

RESULTS AND DISCUSSION

Integration rank test of model variables:

In fact, most variables of economic time series are non-stationary. So when these variables are used in a model, first it's necessary to determine integration rank of variables by test. It is not essential to have all variables with identical rank (except when k=2) to prevent false regression. When model variables are a set of I(0), I(1) and I(2), it is possible to have a linear combination of I(0) and co-integration (Noferesti, 1999). Applying normal and traditional methods in econometrics for estimating the coefficients of model by using of time series data show that variables are stationary. Having non-stationary variables in model lead to have invalid F and t-tests and false regressions, so in facing time series, first, it is necessary to test variables in terms of being static and study their stationary and then estimate coefficients.

In this research, we have used ADF statistic. Gained results show in all variables, we cannot reject zero hypothesis based on unit-root existence in variables level. One of the most famous solutions in converting no-stationary variables to stationary ones is differentiation method and since Johanson method that was used in this research has been designed for I(0) and I(1) variables (although having I(2) variables among model variables, do not deny getting a stationary relation) (Noferesti, 1999), all non-stationary variables of ADF statistic have been tested in first differentiation. Gained results are shown in Table (1).

Table 1: Augmented Dickey-Fuller (ADF) test- by one differentiation

Statistic / Variable	Calculated statistic	ADF statistic in 5% confidence level	Optimal lags number based on Schwartz-Bayesian	Convergence degree
LPA	-2.6834	-2.6397	3	I(0)
LQ	-4.8921	-2. 6397	1	I(1)
GDP_A	-5.1865	-2. 6397	1	I(1)
IIT	-6.5852	-2. 6397	0	I(1)
LCA	-5.9736	-2. 6397	1	I(1)

According to gained results of ADF tests in Table (1), we can observe that all variables are in stationary level or at most by one differentiation become stationary, so by making sure of not having false regression, we can use long term method of Johanson to estimate model.

Determining optimal degree of VAR:

As we mentioned before, for determining optimal degree of VAR, (AIC), Schwartz-Bayesian (SBC) and (LL) statistics are used that in this research based on Schwartz-Bayesian criterion, optimal lags number has been got 2.

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 799-806

Testing the rank of matrix II:

To determine the rank of model matrix, λ_{trace} and λ_{Max} were used and gained results of mentioned tests are in Table (2).

Table 2: The results of testing matrix rank by statistics of maximum special value and effect tests

H0	H1	Status(1)	Status(2)	Status(3)	Status(4)	Status(5)
λ_{max} r=0	r=1	65.4356	61.2387	59.9731	63.2256	59.4122
r<=1	r=2	31.9871	44.6573	39.2345	41.6589	40.8105
r<=2	r=3	*25.1853	25.8883	27.6091	28.9751	24.5560
r<=3	r=4	10.3179	*10.8123	*6.3451	*17.7492	*15.6572
r<=4	r=5	2.4368	4.7645	0.54672	4.9865	0.12546
λ_{trace} r<=0	r=1	105.6582	126.3267	123.6098	136.8712	129.8762
r<=1	r=2	60.0936	67.8723	63.7249	89.8178	82.9796
r<=2	r=3	26.7972	37.8044	*22.3837	48.5549	42.7634
r<=3	r=4	12.6759	*14.9161	5.7202	*21.4578	*16.7628
r<=4	r=5	2.4368*	4.7645	0.54672	4.9865	0.12546

*Values that are less than critical values in 5% confidence level

According to the results of Table (2) ,in the first stage, without constant and time trend, λ_{Max} statistic shows three vectors existence and λ_{trace} shows two vectors existence in 5% confidence level. Also in the second stage, with constrained constant and without time trend, both mentioned statistics show the existence of two vectors and third state, with unconstrained constant and without time trend, λ_{Max} statistics show that there are three vectors and λ_{trace} two vectors fourth and fifth states, with unconstrained constant and constrained time trend and with unconstrained constant and unconstrained time trend, both statistics of maximum special value and effect statistic show two convergence vectors existence. In model based on Johansen`s suggestion and economic theories and model situation, first vector of fourth state means with unconstrained constant and constrained time trend is the most suitable co-accumulation vector and it interprets model situation better than other states.

Table 3: Co-integration vectors of model

Vector 1	Vector 2	Vector 3	Variable
.025670 (-1.0000)	-.0037577 (-.10000)	-.044005 (-1.0000)	**(**LPA**)**
.1621E-4 (-.6313E-3)	-.9122E-5 (-.0024276)	.2653E-4 (.6030E-3)	**(**LQ**)**
.0019347 (-.075371)	-.0016598 (.44171)	-.0058956 (-.13398)	**(**GDP_A**)**
-5.3344 (207.8124)	-3.7490 (-997.7024)	0.72155 (16.3972)	**(**IIT**)**
-.0016449 (.064081)	-.0026294 (-.69975)	.0050191 (.11406)	**(**LCA**)**
-.067545 (2.6313)	.013610 (3.6220)	0.35552 (8.0791)	Trend

As we know in Johansen method after determining how many long term balance relations or on the other hand how many co-integration vectors there are, it is necessary to determine whether these vectors are unique or not, and if they are unique, which concept do they represent in relation to long term structural economic relations.

It should be mentioned that convergence vectors of this method are statistic equations which their choosing criterion is economic justifications and theories.

As it is observed from the results of Table (3), third vectors coefficients justify the effect of independent variables on dependent variable of model based on economic theories better than other vectors. Gained results show one unit increase in gross domestic production (GDP) in agricultural sector leads to 0.13 unit decrease in this sector and one unit increase in the average of agricultural factors price increase public level of prices as 0.11 unit and also it is observed that the effect of cash changes or paid bank credits to this sector was too weak and finally by one unit increase in trade liberalization index that is the main matter of this research, inflation amount of this sector is increased 16.4 units and it confirms first hypothesis of research that is trade liberalization effect on inflation in agricultural sector of Iran.

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 799-806

Study of extensive shocks effect on co-accumulation vectors:

In this section we study extensive shocks effect on co-accumulation vector. As it is observed in Fig. 1, all three considered co-accumulation vectors have inclination to long term balance relation, among these three vectors, third vector has higher convergence speed than two other vectors.

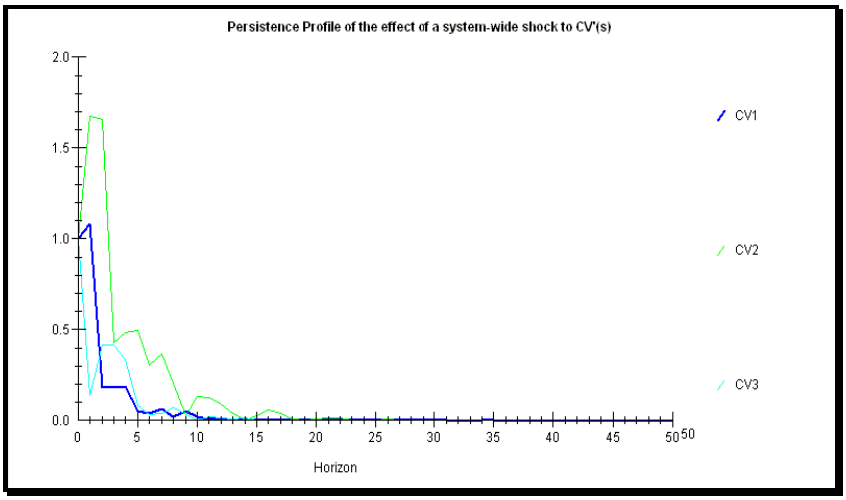

Fig. 1: Extensive shock effect on co-accumulation vector

Study of shock effect of floating exchange rate on co-accumulation vector:

As we know, in 1993 in enforcing economic balance policies, government floated exchange rate that this matter had severe shock on import goods price especially and on international trade generally that it`s effects boundary were dragged to all economic sectors of country. In this section we have tried to study the effects of this economic shock on both co-accumulation vector and all variables of model. As it has been shown in Figs. 2 and 3, inserted shock effect on considered co-accumulation vector is eliminated during the time.

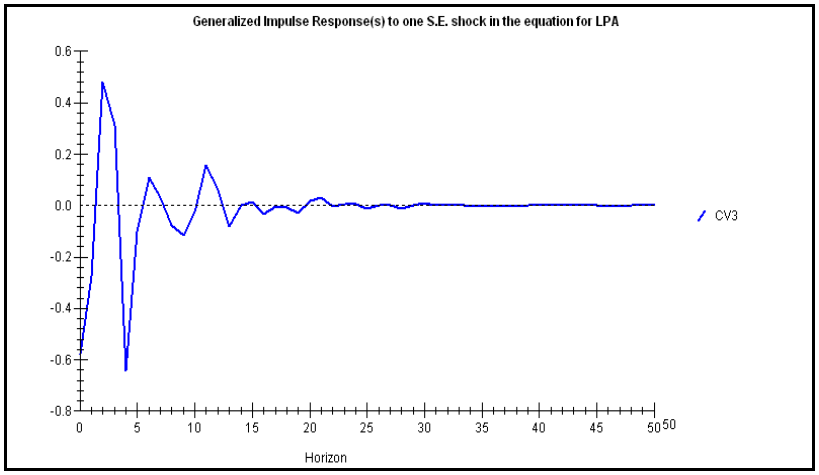

Fig. 2: Floating shock effect of exchange rate on co-accumulation vector

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 799-806

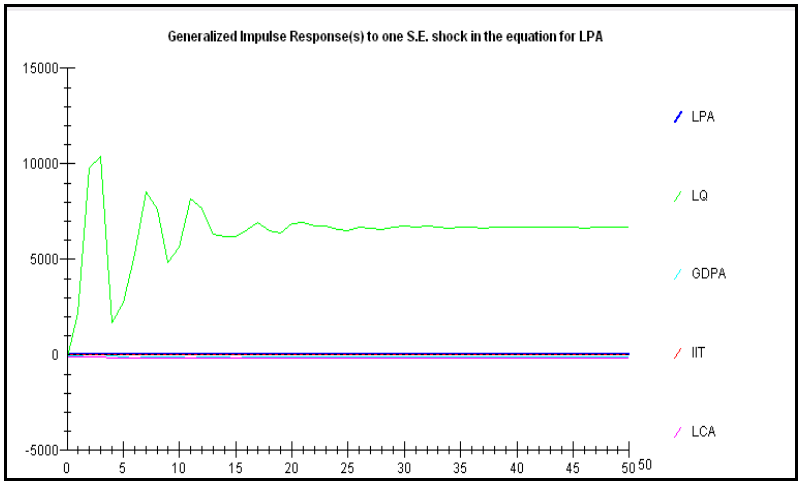

Fig. 3: Floating shock effect of exchange rate on variables of model

Study of structural failure existence and variables stability in model:

In this research, the stability of estimated coefficients of model has been tested by accumulation sum of recursive residuals test, Fig. 4.

Gained results of this test show estimated coefficients are stable and because of having the diagram in 95% confidence interval, zero hypothesis based on not having structural failure in model is accepted.

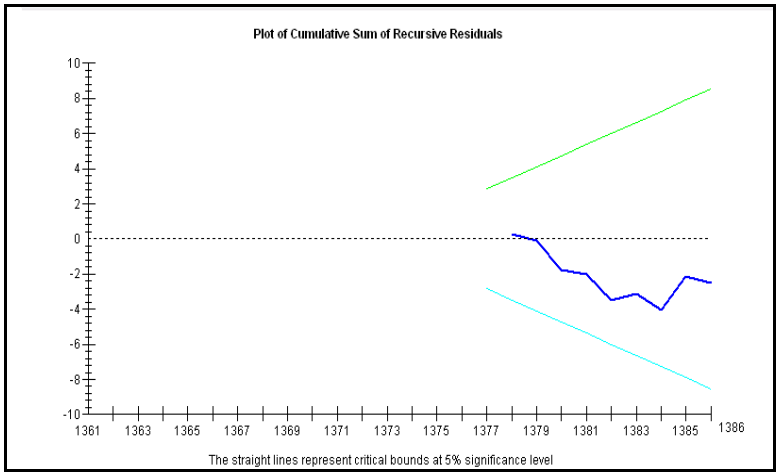

Fig. 4: Coefficients stability test

*Right lines of figure show 5% confidence level

Analysis of variance:

Analysis of variance is used to study variables instability share in justifying one special variable (Tashkini, 2005). By using of variance analysis method, fluctuations share of each variable toward exogenous shocks of model is determined. In this research, fluctuations share of each variable toward exogenous shocks of model has been determined by means of variance analysis method. Gained results of this study by Microfit software that have been brought in Table (4) shows inflation in agricultural sector has been described by gross national production growth of this sector and weighted mean of factors price and also by trade liberalization index that the role of allocated bank credits to this sector in comparison with other variables seems to be weaker. Fluctuations of trade liberalization index variable have had increasing share on inflation of agricultural sector in short term and after twelfth period, these effects are continued by partial fluctuations but in long term, these effects are almost eliminated.

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 799-806

Table 4: Gained results of variance analysis for variable (LPA)

Horizon	LPA	LQ	GDP_A	IIT	LCA
0	1.0000	0.015478	0.024387	0.047554	0.46722
1	0.69865	0.032456	0.021876	0.22543	0.54367
2	0.68723	0.029468	0.051726	0.24171	0.44276
3	0.68987	0.042565	0.063451	0.23876	0.43607
4	0.65498	0.110321	0.063134	0.23981	0.38934
5	0.60765	0.17543	0.057365	0.21652	0.34687
6	0.54368	0.24258	0.042659	0.17487	0.26498
7	0.42509	0.34876	0.047878	0.18158	0.26578
8	0.31765	0.40628	0.035920	0.17653	0.17843
9	0.22645	0.49391	0.21707	0.14576	0.11657
10	0.19556	0.57783	0.012412	0.13876	0.087621
11	0.13564	0.66215	0.011905	0.11987	0.061896
12	0.12654	0.72437	0.011459	0.12229	0.040958
13	0.091543	0.73487	0.011189	0.11276	0.024876
14	0.065348	0.76234	0.017542	0.11825	0.0165489
15	0.062435	0.76634	0.022087	0.119876	0.013876

Study of short term relations in (LPA) model:
Error Correction Model (ECM):

Having co-integration among a set of economic variables provides statistical base for using error correction method (ECM). These models have increasing fame in empirical affairs. The main reason of error correction models fame is that it relates variables short term fluctuations to their long term balance amounts and show short term dynamic structure and adjustment speed to long term (Noferesti, 1999). In fact, these models are partial adjustment models that effective forces in short term and approaching speed to long term balance amount are measured by inserting stationary residual in a long term equation. So in this research, after estimating long term relation among variables, error correction method has been estimated. Gained results of estimation show that coefficient of error correction term of third vector in a level near to 95% is significant and it`s amount is about -0.46 that means about 46% of unbalance of inflation variable in agricultural sector from long term balance amounts is eliminated after passing one period and it`s a desirable adjustment speed.

Conclusion:

For using time series that frequently is for predicting the behavior of one variable based on past amounts of variable, variables should be stationary because if variables are not stationary, we may face false regression and get incorrect results (Noferesti, 1999). Therefore all used variables of mentioned model were tested by Microfit software in terms of being static and after making sure that some of variables are stationary and some others become stationary and one differentiation, we test the existence of long term balance relations among model variables by using of Johansen method and get the number of convergence vectors after determining optimal lag of model for different states. In this research, annual time series data of 1979-2007 have been used for studying and analyzing the relations among variables and nominal variables were adjusted to base price of 1982.

Gained results of Johanson-Juselius confirmed the existence of long term co-integration relation among model variables and also three co-integration vectors.

In this model, trade liberalization coefficient by positive amount of 16.4 has the most effect on inflation in agricultural sector and bank credits variable shows the least effect.

Also by estimating error correction method in model, the coefficient of error correction method was gained about -0.46 that shows in each unbalance period, inflation in agricultural sector is adjusted from one period toward previous period.

Also in order to study structural failure in model and to study the stability of estimated coefficients of model, accumulation sum of recursive residuals test was used. Gained results of test show estimated coefficients are stable and because of staying in 95% confidence interval, structural failure in model is rejected.

Model estimation and variance analysis of model showed that trade liberalization index has the most effect on dependent variable of model.

Suggestions of research:

Positive effect of trade liberalization variable on inflation of agricultural sector was worrying but by the coefficient of other variable of model means gross domestic production of agricultural sector which after liberalization index variable has the most effect on inflation of agricultural sector in converse direction of mentioned variable, these suggestions are offered:

1-Now Iran has accepted as a supervisor in World Trade Organization, so governors should seize the opportunity until it`s complete membership and it should increase production potential in production level by enforcing supportive policies for this sector and converting traditional and semi-mechanized agriculture to modern and full-mechanized agriculture and by increasing production efficiency of farmers get high production

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 799-806

growth in this sector and minimize the effect of trade liberalization index on inflation of agricultural sector by gross domestic production increase during first years of trade liberalization.

2-Governors should stop some political prejudices and decrease unplanned tariff supports of producers of this sector and enforce policies including educational and encouraging policies to persuade farmers to use modern and mechanized methods to increase production efficiency of this sector and also they should enforce policies that are coordinate to trade liberalization policy and accept the recommendations of World Trade Organization and draw all members attention to provide preliminaries of complete membership in this organization.

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