



Effect of Temporary and Permanent Shocks of Total Factor Productivity on the Demand for Agricultural Imports in Iran

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Abstract

Economic theories show that the direction and magnitude of the fluctuations of economic variables depend on the type and magnitude of the shocks they are faced with. Various reasons are noted for fluctuations in demands for imports, including productivity shocks. Accordingly, this research was aimed at identifying the effects of Total Factor Productivity (TFP) shocks of the agricultural sector on the demand for agricultural imports during the period 1982-2014. These shocks were divided by the Blanchard-Quah technique into two groups: permanent and temporary. Then, the effects of shocks on agricultural imports were studied by the Structural Vector Auto Regression (SVAR) Method. The results showed that, in the short and longrun, temporary and permanent TFP shocks of the agricultural sector have had a significant effect on the demand for agricultural imports, and the effect of temporary shocks was stronger than the effect of permanent ones. Therefore, if the policymakers seek to reduce the demand for agricultural imports, the agricultural TFP must continuously be incremented.

Keywords:

Blanchard-Quah technique, productivity shocks, demand for agricultural imports, Total Factor Productivity in agricultural sector

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INTRODUCTION

Increasing production by increasing Total Factor Productivity (TFP) is an inevitable necessity, especially given that imports constitute supply for some agricultural products that requires spending on scarce financial resources. Therefore, increasing productivity greatly helps the economic development of developing countries (Imami-meybodi, 2005). Iran is a relatively small country, but an influential one in some import- and trade-related aspects. In fact, imports account for the most part of the trade in the agricultural sector (Comijani, 2001). Unplanned imports of agricultural products will negatively affect agricultural production (Malekan, 2013). Once productivity increases, the Gross Domestic Product (GDP) will increase too, and imports will decrease accordingly.

The importance of the agricultural sector for food security requires serious attention to imports in this sector. Regarding the significance of TFP shocks in economic growth and development, it is important to know the effect of temporary and permanent shocks in the agricultural sector on demand for agricultural imports. Accordingly, we can make better decisions for large-scale planning aiming at achieving sustainable economic development. Here, we briefly review research on the analysis of productivity, income, and exchange rate shocks by different methods and their effects on macroeconomic variables.

Mohammadi and Akbarifard (2008) studied productivity shocks based on the pattern of the business cycles. In order to calculate the TFP in Iran's economy, they used the Törnqvist index. The shocks were decomposed using the Blanchard-Quah technique. The results showed that the shocks on the demand side had no significant effects on economic growth (i.e., the impact on production changes has been transient) while the shocks on the supply side exhibited significant cumulative impacts on economic growth.

Kooshesh (2009) decomposed income shocks into temporary and permanent components, using Blanchard-Quah technique, and examined their effects on the balance of

trade in Iran's economy during the period 1990-2007. While temporary income shocks were the main drivers of changes in the balance of trade, permanent income shocks did not play an important role.

Mirzaei Khalil Abad et al. (2009) examined the effects of monetary shocks on the agricultural sector using the Vector Auto-Regressive (VAR) model and the Hodrick-Prescott Filter. The results indicated a weak relationship between the monetary system and the agricultural sector.

Moghaddasi et al. (2010) derived productivity shocks and production gap by using the Hodrick-Prescott and Kalman filters and examined their effects on the price of nutrients in Iran, by using the Johanson test and the VAR model over 1976-2008. The effect of the productivity shock on the growth of nutrient prices was found to be negative while the effect of the production gap was positive. Accordingly, the productivity shock had a stronger effect on increasing the price of nutrients.

Hemmati and Mobasherpour (2011) studied the sources of fluctuations in real and nominal exchange rates in Iran's oil-reliant economy assuming neutrality of nominal shocks of the real exchange rate in the long run by the use of Blanchard-Quah technique and seasonal data of 1990 to 2008. The results revealed that real shocks played the dominant role in accounting for the variations of the real exchange rate.

Baniasadi and Mohseni (2014) studied the effect of permanent and temporary productivity shocks on the energy consumption rate in Iran using the Blanchard-Quah technique and the Structural Vector Auto Regressive (SVAR) model over 2003-2010. The results showed that temporary productivity shocks were the most important source of changes in energy consumption rate in the short run. In addition, permanent shocks of productivity reduced energy consumption rate in the long run. Therefore, in order to reduce energy consumption in Iran, the growth of TFP should be given special attention by policy makers.

Pishbahar et al. (2015) investigated the effects of inflation on different sectors of the economy through an SVAR model by using time series data of 1959-2009. The results showed that the structural shock of inflation affected the production in all economic sectors in the short run. This effect was weak and non-uniform in various sectors. In the mid-term, the impact of the inflation shock on the production in all sectors was sharply reduced and disappeared in the long run. In addition, the inflation shock had the least contribution to the fluctuations in agricultural production among the economic sectors.

Moulaei and Uday (2016) used the Blanchard-Quah technique to decompose the income shocks and applied the SVAR model to investigate the effect of two components of income shocks on Iranian households' consumption during the period 1974-2014. According to the results, household consumptions were almost entirely captured by permanent income shocks during the given period. Therefore, the results confirmed the hypothesis of permanent income for Iran.

Some related studies in other countries are reviewed below.

Haffmaister and Roldos (1997) compared business cycles in Latin America and Asia using the Blanchard-Quah technique. The results indicated that the supply-side shocks such as productivity (structural reforms) and labor supply were the main source of production fluctuations, even in the short run.

Veselkoa and Horvath (2008) decomposed income shocks into temporary and permanent components for transitional countries of Central Europe (Poland, Uruguay, Czech Republic, Lithuania, etc.) using the Blanchard-Quah technique. The results revealed that temporary income shocks were the most important factors in the fluctuations of the trade balance.

By estimating the production gap in Mongolia by different methods, Bersch and Sinclair (2011) found that the Blanchard-Quah technique provided a more accurate estima-

tion of the production gap for joint production and inflation model compared to other traditional methods of decomposition.

Bardalez and Zea (2014) examined the relationship between the exchange rate and TFP in Chile, Mexico, and Peru using seasonal data. In this regard, TFP was first estimated using the general equilibrium model for a small open economy. Then, it was decomposed into internal and external components related to the exchange rate using the Blanchard-Quah technique as an SVAR model. The results indicated the short, mid- and long-run effects of the exchange rate on TFP. In addition, the short-term and mid-term effects dominated the long-term effects.

As can be seen, the effects of productivity shocks on demand for agricultural imports have not been investigated in Iran yet, so the present research work focused on this issue.

Methodology

In order to achieve the research objectives, the agricultural productivity was first determined and its shocks were decomposed into permanent and temporary shocks. Then, their effects on agricultural imports were investigated. The annual data requirements for the period 1982-2014 on the base year of 2005 was acquired from the economic reports and balance sheets of the Central Bank of the Islamic Republic of Iran, the yearly statistical letters, and the national accounts of Iran.

Productivity calculation

This research used the Solow residual method to calculate productivity. Compared to non-parametric methods, the main advantage of this method is its testability and potential capabilities. The Solow economic growth model considers the role of technology in addition to the role of the two main inputs of production (capital and labor). While all inconsistencies of economic growth in the real world cannot be attributed to productivity, the Solow model uses the concept of productivity correctly (Soltani, 2013; Tahami Pour and Shahmoradi, 2007).

The Solowresidual is calculated as follows:

$$TFP = V - \alpha K - \beta L - \gamma E \quad (1)$$

where V denotes the value added of the agricultural sector (a proxy for production), K represents the value of capital stock, L is the number of employees, and E represents energy used in the agriculture sector. Also, α , β and γ are the capital, labor, and energy contribution to production, respectively.

Decomposition of productivity shocks using the Blanchard-Quah technique

The Blanchard-Quah technique was used to decompose the TFP of the agricultural sector. The advantage of this technique is that there is no single method for decomposing a variable into its permanent and temporary components. The Blanchard-Quah technique is a subset of the SVAR models. By applying a constraint, this technique decomposes the shocks into temporary and permanent groups. These models are a system of simultaneous dynamics equations that allow us to classify and study the impacts of shocks on variables. In this method, variables are chosen in such a way that at least one of them is non-stationary since the stationary variables have no permanent component. This method cannot be used if both variables are stationary. Finally, both variables appear to be stationary in the model. In the absence of the permanent component, bivariate moving average (BMA) for the sequences of productivity and imports demand will be represented as follows (Enders, 2010; Baniasadi and Mohseni, 2014):

$$\Delta TFP_t = \sum_{k=0}^{\infty} C_{11}(k) \varepsilon_{1t-k} + \sum_{k=0}^{\infty} c_{12}(k) \varepsilon_{2t-k} \quad (2)$$

$$\Delta M_t = \sum_{k=0}^{\infty} C_{21}(k) \varepsilon_{1t-k} + \sum_{k=0}^{\infty} c_{22}(k) \varepsilon_{2t-k} \quad (3)$$

Or more briefly:

$$\begin{bmatrix} C_{11} & C_{12} \\ C_{21} & C_{22} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} = \begin{bmatrix} \Delta TFP_t \\ \Delta M_t \end{bmatrix} \quad (4)$$

so that ε_{2t} and ε_{1t} are independent white noise disturbance terms with identical variance and $C_{ij}(L)$ is polynomials in terms of the lag operator (L). We normalize the shocks so that $\text{var}(\varepsilon_1) = \text{var}(\varepsilon_2) = 1$. If Σ_ε is the variance-covariance matrix of disturbance, then we will have:

$$\Sigma_\varepsilon = \begin{bmatrix} \text{var}(\varepsilon_1) & \text{cov}(\varepsilon_1, \varepsilon_2) \\ \text{cov}(\varepsilon_1, \varepsilon_2) & \text{var}(\varepsilon_2) \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (5)$$

The sequences $\{TFP\}$ and $\{M\}$ are considered as endogenous variables. The sequences have the same properties as an exogenous variable according to the economic theory. The important point in decomposing the permanent and temporary productivity is that it should not be affected by import shocks in the long run regarding the theoretical base of the model. It is assumed that the import shocks do not have a permanent effect on TFP. In fact, productivity shocks lead to changes in imports. This dichotomy between permanent and temporary effects paves the way for complete identification of structural disturbances of the VAR model to solve the equation and to obtain the coefficients by applying this constraint. The overall effect of a shock on the TFP sequence should be equal to zero. In the equation, therefore, the coefficients must be as follows:

$$\sum_{k=0}^{\infty} C_{12k} = \mathbf{0} \quad (6)$$

In order to identify the invisible structural shocks, it is necessary to apply certain identification constraints on the non-constrained VAR model. In this regard, a lower triangular matrix is formed in which the element $C_{12}^{12}(L) = 0$.

$$\begin{bmatrix} C_{11}(L) & \mathbf{0} \\ C_{21}(L) & C_{22}(L) \end{bmatrix} \quad (7)$$

Here, nominal and real shocks are not noticeable, so they are extracted from the estimated VAR model.

Assuming stationary variables, the VAR model is as follows:

$$\begin{bmatrix} \Delta TFP_t \\ \Delta M_t \end{bmatrix} = \begin{bmatrix} B_{11}(L) & B_{12}(L) \\ B_{21}(L) & B_{22}(L) \end{bmatrix} \begin{bmatrix} \Delta TFP_{t-1} \\ \Delta M_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \quad (8)$$

Importantly, the residuals of the VAR model are combinations of pure disturbances of ε_{1t} and ε_{2t} . For example, e_{1t} is the prediction error of a forward period of TFP_t , or in other words:

$$e_{1t} = \Delta TFP_t - e_{t-1} \Delta TFP_t \quad (9)$$

Based on the BMA model, the prediction error of a forward period is:

$$e_{1t} = C_{11}(0) \varepsilon_{1t} + C_{12}(0) \varepsilon_{2t} \quad (10)$$

Similarly, since e_{2t} is the prediction error of a forward period to M_t , the following equation is obtained:

$$e_{2t} = C_{21}(0) \varepsilon_{1t} + C_{22}(0) \varepsilon_{2t} \quad (11)$$

By combining the two equations, the following pattern is obtained:

$$\begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} = \begin{bmatrix} C_{11}(0) & C_{12}(0) \\ C_{21}(0) & C_{22}(0) \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (12)$$

If the values of $C_{11}(0)$, $C_{12}(0)$, $C_{21}(0)$, $C_{22}(0)$ are known, it is possible to extract ε_{1t} and ε_{2t} from regression residuals (e_{1t} and e_{2t}). Blanchard and Quah showed that the relationship between Equation (12) and the BMA model with a long-run limitation creates precisely four constraints which can be used to obtain the four above coefficients. We can estimate the $\text{var}(e_1)$, $\text{var}(e_2)$ and $\text{cov}(e_1, e_2)$ by using the VAR model residuals. The four constraints described earlier are summarized as follows:

Constraint 1:

$$\text{var}(e_{1t}) = \text{var}(e_1) = C_{11}(0)^2 + C_{12}(0)^2 \quad (13)$$

Constraint 2:

$$\text{var}(e_{2t}) = \text{var}(e_2) = C_{21}(0)^2 + C_{22}(0)^2 \quad (14)$$

Constraint 3:

$$\text{cov}(e_1, e_2) = C_{12}(0) C_{22}(0) + C_{11}(0) C_{21}(0) \quad (15)$$

Constraint 4:

$$0 = C_{11}(0) \{1 - \sum a_{22}(K)\} + C_{21}(0) \sum a_{12}(K) \quad (16)$$

Along these four constraints, there are four equations that can be used to obtain the unknown values of $C_{11}(0)$, $C_{12}(0)$, $C_{21}(0)$, and $C_{22}(0)$. All terms of the sequences ε_{1t} and ε_{2t} can be calculated using the following equations:

$$e_{1t-i} = C_{11}(0) \varepsilon_{1t-i} + C_{12}(0) \varepsilon_{2t-i} \quad (17)$$

$$e_{2t-i} = C_{21}(0) \varepsilon_{1t-i} + C_{22}(0) \varepsilon_{2t-i} \quad (18)$$

Variance decomposition of response functions

The sequences ε_{1t} and ε_{2t} can be used to analyze the instantaneous response functions and decompose the variances, like a usual VAR model although here the interpretation of response is more specific. Using this method, the historical decomposition of every single series can be achieved. For example, all values of the sequence $\{\varepsilon_{1t}\}$ can be set to zero and using the values obtained for the series ε_{2t} , the permanent changes in the sequence $\{TFP_t\}$ can be calculated from the following equation (Enders, 2010):

$$\Delta TFP_t = \sum_{k=0}^{\infty} C_{11}(K) \varepsilon_{2t+k} \quad (19)$$

RESULTS AND DISCUSSION

Productivity calculation

In order to estimate the coefficients α , β and γ in Equation (1), the time series of labor, capital stock and energy consumed in the agricultural sector during the period 1982-2014 in Iran were used. To show the experimental relations of production in a more realistic way in the chosen function as well as error reduction in expressing the relationships between inputs and outputs, it is nec-

essary to precisely select the production function model. Therefore, the Transcendental, Translog and Cobb-Douglas forms as the most widely used functions in the agricultural sector were fitted by the Eviews soft-

ware package. Finally, according to JB, LM, F, and DW statistics presented in Table 1, the Cobb-Douglas function was picked as the most fitted form for the agricultural sector.

Table 1

The Comparison of the Translog, Transcendental, and Cobb-Douglas Functions

Functions	No. of coefficients (No. of significant)	JB	LM	F	DW
Translog	11(1)	0.69(0.70)	0.75(0.48)	317.7	1.92
Transcendental	8(6)	0.85(0.65)	0.60(0.55)	354.2	2.19
Cobb-Douglas	5(5)	0.77(0.67)	0.84(0.44)	329.9	1.51

Based on the comparisons of Translog and Cobb-Douglas functions, as well as the transcendental and Cobb-Douglas, the LR statistic values were calculated as to be 0.58 and 0.41, respectively, both of which are less than the critical value of χ^2 . Thus, the null hypothesis concerning the existence of a constraint

(i.e. the Cobb-Douglas function) is accepted. So, this function is used to obtain TFP. The Augmented Dickey-Fuller (ADF) test was used to examine the stationary situation of the variables. The results are presented in Table 2.

Table 2

Unit Root Test of Variables in Agricultural Production Function

Variables	Label	ADF test statistic (with trend and intercept)		Critical value	Stationary possession
		Level	First difference		
Ln Y	Log of value added	-2.33	-6.62**	-4.28	I(1)
Ln E	Log of energy	-3.06*	-	-2.95	I(0)
Ln K	Log of capital stock	2.92	-3.10*	-2.96	I(1)
Ln L	Log of labor	-5.18**	-	-4.35	I(0)

* $P < 0.05$, ** $P < 0.01$

As the variables are integrated of order zero and one, the Auto Regressive Distributed Lag (ARDL) model was employed to estimate the agricultural production function. According to the Schwarz-Bayesian criterion, the ARDL model (0, 0, 1, 1) was selected as the best estimated model by the Microfit software package. The results of diagnostic tests for

dynamic pattern indicate that the estimated residuals are normally distributed based on the JB statistics (0.91(0.63)). According to the LM statistics (0.93(0.76)), there was no serial auto-correlation and no variance heterogeneity (0.45(0.83)) in the residual of the model. Therefore, the functional form was properly selected. After estimating the dy-

dynamic equation based on t-statistic (-6.88) and comparing it to the critical value of Banerjee, Dolado and Master table (-5.27), the null hypothesis implying the absence of a long-run relationship is rejected and the long-run relationship between variables is accepted at the significance level of 99%. The results of the long-run estimation of the production (value added) function are presented

in Table 3. The Dummy variable is related to the year 2008 when severe frostbite reduced the value added of the agricultural sector to a greater degree than the previous years.

Based on the results of production function and Equation (1), the TFP of the agricultural sector was estimated whose results over the period of study are presented in Figure 1.

Table 3

Long Run Estimation of Production Function in the Agricultural Sector, ARDL (1, 0, 0, 0)

Variables	Label	Coefficients	t- statistics	P-value
Ln L	Log of labor	0.11	1.87	0.071
Ln K	Log of capital	0.52	10.93**	0.000
Ln E	Log of energy	0.83	9.39**	0.000
C	Intercept	0.59	0.61	0.542
D	Dummy variable	-0.54	-10.57**	0.000

** $P < 0.01$

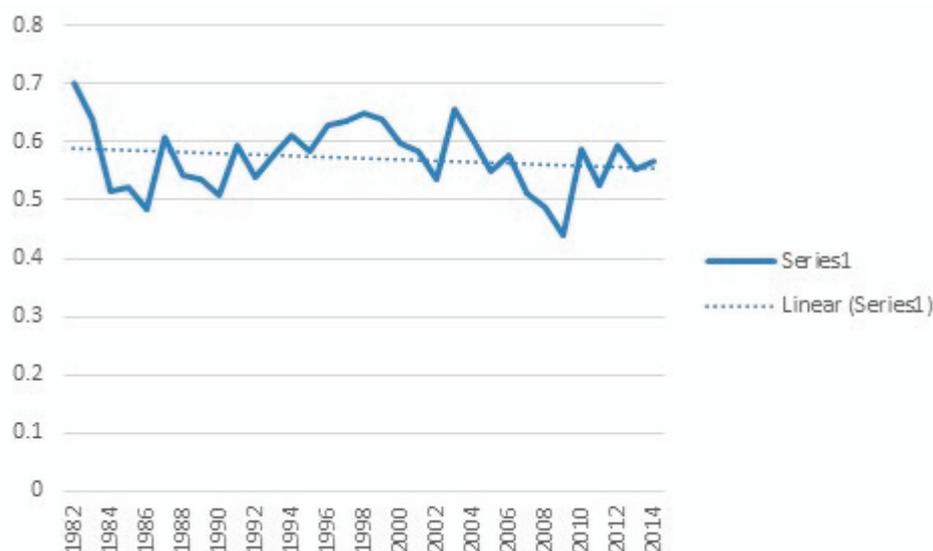


Figure 1. Trend of Agricultural TFP for the period 1982- 2014

Decomposition of productivity shocks using the Blanchard-Quah technique

As in the Blanchard-Quah technique, variables should be chosen in such a way that at least one of them is non-stationary. The variables were first checked for their unit root properties using the standard ADF test. The

results in Table 4 show that agricultural factor productivity and imports are stationary in level and first difference, respectively.

In the absence of cointegration vectors, the Blanchard-Quah technique can be used. Therefore, the Johansen-Juselius method was applied to examine the existence of a co-inte-

gration between the model variables. The results of the maximum eigenvalue and the Trace test are presented in Table 5. According

to the results, the co-integration vector is not confirmed.

Table 4
Unit Root Test of the Blanchard-Quah Variables

Variables	Label	ADF test statistic(with intercept)		Critical value	Stationary possession
		Level	First difference		
Ln M	Log of agricultural imports	-0.93	-10.24	-3.66	I(1)
Ln TFP	Log of agricultural TFP	-6.28	-	-3.66	I(0)

Table 5
Johansen-Juselius Co-Integration Test

Null hypotheses	Trace statistics	Critical value	maximum eigenvalue statistics	Critical value
No vector	12.53	15.49	12.19	14.26
At least one vector	0.34	3.84	0.34	3.84

Then, temporary and permanent shocks were decomposed by estimating a VAR model on the basis of Blanchard method given the short and long run constraints. The results are presented in Table 6. Given the existence

of temporary and permanent shocks, the temporary shock has no long-run effect on import demand while the permanent shock has a long-run effect on it.

Table 6
Structural VAR Estimation for Decomposing Permanent and Temporary Shocks

Structural VAR is just- identified				
Model: $Ae = Bu$ where $E[U\hat{U}] = I$				
Restriction type: Long-run text form long-run response pattern:		C(1)	C(2)0	C(3)
Level of significance	Z statistics	Standard error	Coefficients	
0.000	7.8740**	2.2597	17.9727	C(1)
0.017	2.3871*	3.3535	8.0052	C(2)
0.000	7.8740**	0.0062	0.0489	C(3)
Log likelihood -40.39537				
Estimated A matrix: 0.00001.00001.00000.0000				
Estimated B matrix: -6.408728.45980.00760.0000				

* $P < 0.05$, ** $P < 0.01$

As in the Blanchard-Quah technique in which the variables must be integrated of

order zero, a bivariate program including first differences of the log of agricultural

imports and log of total factor productivity of the sector was run. The results are as follows:

$$\Delta LM_t = -864 - 392 LTFP_{t-1} - 0.6 \Delta LM_{t-1}$$

$$LTFP_t = 0.35 + 0.84 LTFP_{t-1} - 0.000002 \Delta LM_{t-1}$$

The results show a negative relationship between demand for imports and TFP in the agricultural sector. Also, the estimation results of the structural auto-regressive model show that imports have an indirect relationship with its previous period. In addition, TFP of the agricultural sector in the previous period is indirectly related to the imports of the agricultural sector. In these periods, improving TFP of the sector had a moderating effect on the imports fluctuations. The permanent and temporary shocks of the agricultural TFP are also presented in the appendix.

Impulse responses

The impulse response functions show the dynamic behavior of the variables over time per one standard deviation when shocks happen. Therefore, they are also called the single shocks. The dynamic response of demand for agricultural imports as a result of productivity shocks was examined. The results of the instantaneous and the integrated response shock functions of demand to the permanent and temporary shocks of TFP derived from the SVAR are shown in Figures 2 and 3. The

primary response of imports to the permanent shock of TFP is downward (-6.40%). In the 19th period, these zigzag changes reach a new level of equilibrium (a little upper than 0). The initial response of imports is upward in relation to the temporary shock of TFP (with the amount of 28). This is rapidly reduced to zero after 10 periods and fluctuates around it. Productivity shocks initially affect the import demand due to their structure, but they are gradually moderated. The initial effect of the temporary shocks is normally greater than the permanent ones. Importantly, because of the slow changes in productivity as well as their gradual impacts on import demand, it is expected that the shock change in productivity will be corrected and gradually tended to approach zero. Therefore, considering the contribution of the imported inputs to demands for imports in this sector as well as the structure of agricultural production, it can be well expected that the impact of the productivity shocks will initially affect the demand for imports in a fluctuating way, but this effect will tend to approach zero over time. Therefore, it can be concluded that the fluctuating effect of productivity shocks in the early periods is due to their effect on import demand. Tending to zero results from negligible impacts of productivity on the demand for agricultural imports in Iran.

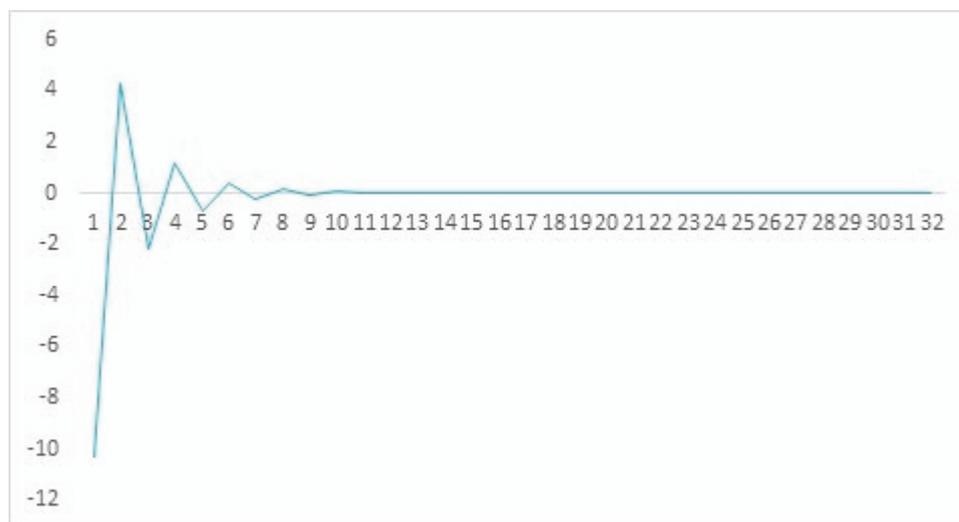


Figure 2. Import Demand Response of the Agricultural Sector to Permanent Impulse of TFP

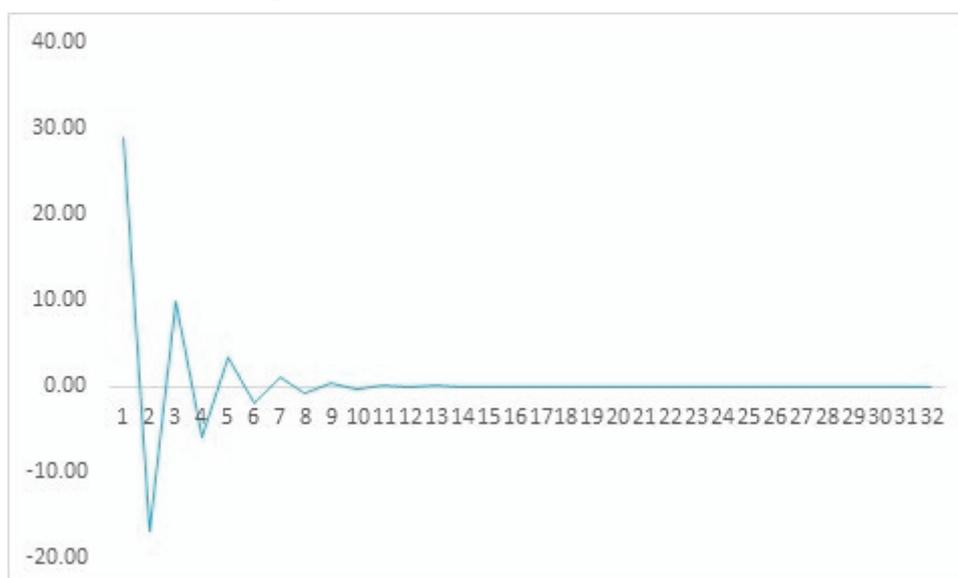


Figure 3. Import Demand Response of the Agricultural Sector to Temporary Impulse of TFP

Residual variance decomposition

In variance decomposition, the short- and long-run contributions of shocks to the variables are determined in residual variance. The response of the variance of agricultural import demand to TFP is presented in Table 7. As can be seen, fluctuations in imports are mainly accounted for by temporary shocks of productivity, and long-run shocks contribution is small. In all periods, temporary shocks of TFP had the greatest contribution in capturing the import variance. In the first period, these shocks account for about 83% of the

changes while the permanent ones account for about 16%. These contributions vary in subsequent periods. The findings show that the temporary shock (with the value of 84.67) in the fourth period and the permanent shock in the first period (with the amount of 16.76) had the largest share in accounting for the variance of imports of the agricultural sector in Iran. Therefore, if the increased productivity does not become endogenous, its impacts on agricultural imports will gradually decrease and even disappear.

Table 7

Percent Contribution in Variance of Demand for Agricultural Imports to the Shocks

Period	Temporary contribution	Permanent contribution
1	83.23	16.76
2	83.33	16.66
3	84.60	15.39
4	84.67	15.32
5	84.56	15.43
6	84.54	15.45
7	84.48	15.51
8	84.46	15.53
9	84.43	15.56
10	84.42	15.57

CONCLUSION AND RECOMMENDATION

The temporary and permanent shocks of agricultural TFP during the period of 1982-2014 were investigated by the Solow residual method. Then, by the use of the Blanchard-Quah technique and a bivariate program, the TFP shocks of the sector were decomposed into temporary and permanent ones. Afterwards, using the bivariate SVAR method, the impulse response and variance decomposition of the demand for imports, its contribution to temporary and permanent TFP shocks were measured. Accordingly, it was found that temporary and permanent shocks accounted for 84.36% and 15.63% of the variance of demand for agricultural imports in the long run (32 periods), respectively. Baniasadi, and Mohseni (2014) showed the stronger effect of temporary TFP shocks on energy consumption. Bardalez and Zea (2014) also showed the stronger effect of exchange rate shocks on TFP in short-run rather than mid- and long-run. The fluctuating impact of productivity shocks in the early periods is due to their impact on import demands. But, the shocks tend to approach zero because of their negligible impact on the demand for agricultural imports in Iran.

Suggestions

In the agricultural sector, most of the imported goods are of consumer type or in other words, they do not complete the agricultural production chain. Therefore, it is suggested that:

1- If the policymakers aim at increasing the efficiency of agricultural TFP, it must be constantly increased and become endogenous to reduce demands for agricultural imports.

2- The positive permanent and temporary changes in the TFP of agricultural sector are provided through investing in the development of science and technology, scientific institutions, research and increased human capital in the agricultural sector. Then, the demand for agricultural imports will be decreased due to increasing agricultural TFP.

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Appendix- Permanent and temporary impulses of Agricultural TFP, the Blanchard-Quah technique

Period	Temporary impulses	Permanent impulses	Period	Temporary impulses	Permanent impulses
1	28.90000	-10.29000	17	0.00580	-0.00110
2	-16.78000	4.32000	18	-0.00340	0.00069
3	9.83000	-2.17000	19	0.00204	-0.00041
4	-5.77000	1.19000	20	-0.00120	0.00024
5	3.40000	-0.67000	21	0.00070	-0.00014
6	-2.00000	0.40000	22	-0.00042	0.00083
7	1.17000	-0.23000	23	0.00024	-0.00049
8	-0.69000	0.13000	24	-0.00014	0.00028
9	0.40000	-0.08100	25	0.00080	-0.00069
10	-0.24000	0.04700	26	-0.00050	0.00098
11	0.14000	-0.02800	27	0.00029	-0.00059
12	-0.08300	0.01600	28	-0.00017	0.00034
13	0.04900	-0.00970	29	0.00010	-0.00020
14	-0.02800	0.00570	30	-0.00060	0.00011
15	0.01700	-0.00330	31	0.00021	-0.00078
16	-0.01000	0.00190	32	-0.00020	-0.00024

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