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Trade Protection Measures, Agricultural and Food Prices

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January 2004

The Central Bank of the Republic of Turkey

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Abstract

There is a firm relationship between agricultural and consumer prices, which is intuitively expected as well as supported by statistical analyses. This relationship is positive when examined through cross-correlations. VAR analysis also suggests that rises in agricultural prices will reflect on the food prices and the consumer prices, in a statistically significant manner. Based on these assessments, food prices could adversely affect the Turkish inflation process. Due to the fact that instability in food prices mainly stems from the performance of the agricultural sector and the related seasonal production patterns, the importance of the supply management of agricultural and food products can be highlighted. Consequently, this study examines the possible changes in the current import regime about agricultural and food products regarding their impacts on inflation. The main policy proposal of the study is the discretionary management of the import quotas so as to absorb the temporary inflationary pressures, instead of abolishment of existing tariffs; staying cautious about the nutritional capacity of the sector and employment aspects.

Key Words and Phrases: Inflation, Agriculture, Food, Consumer Prices, and Import Regime.

JEL Classification Codes: C50, C51, E31 and F13.

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1. Introduction

There is a firm relationship between agricultural and consumer prices, which is intuitively expected as well as supported by statistical analyses. When the relationship is examined through cross-correlations between WPI agricultural prices, CPI food prices and total CPI, the correlation between agricultural prices inflation and food prices inflation is found 67.6 % and statistically significant, while the correlation between agricultural prices inflation and CPI inflation is 55.9 %.[1] In addition to these observations, these cross correlations are also found to be positive and statistically significant when examined at different lags of the data series. Detailed analysis of the relationships via VAR analysis also suggests that rises in agricultural prices will reflect on the food prices and the consumer prices in a statistically significant manner. That is, a 10 % shock in agricultural prices inflation results in 5.1 % rise in food prices within six months, whereas 2.6 % rise in CPI inflation.[2] Analysis of selected CPI items reveals that monthly average inflations of these items displayed historically high levels and the price volatility are considerably high.[3]

Based on these assessments, the volatility (and thus instability) in food prices could adversely affect the Turkish inflation process. Due to the fact that instability in food prices mainly stems from the performance of the agricultural sector and the related seasonal production patterns, the importance of the supply management of agricultural and food products can be highlighted. [4]

Consequently, this study examines the possible changes in the current protection measures on agricultural and food imports regarding their impacts on inflation. Following the research and analyses on the concept, the main policy proposal of the study is the discretionary management of the import quotas so as to absorb the temporary inflationary pressures, instead of abolishment of existing tariffs; staying cautious about the nutritional capacity of the sector and employment aspects.

The study consists of three main parts. After reviewing the literature on the issue in the second section, the third section briefly discusses the main characteristics of the current import regime. Proposals for possible changes in import regime regarding its effects on

[1] For the cross-correlations among the variables of concern, see Appendix A.
[2] For the Vector Auto Regressive models, see Appendix B.
[3] For the average inflation and inflation variability figures of selected food and agricultural items, see Appendix C.
[4] Supply management can be defined as the regulation of the commodity supplies by considering the domestic production and foreign trade opportunities together, without deviating from the basic market economy principles.

agricultural and food inflation are taking place in the fourth section, while detailed analyses on various concepts about the study are handled in appendices at the end of the paper.

2. Literature

There exist a number of studies dealing with food prices and the inflation of food prices. While some of these studies pinpoint and elaborate the effects of food prices on the general price level, some others emphasize the relationship between agricultural sector and food prices. In this section, we summarize the findings of some recent studies in a non-exhaustive manner.

Mohanty and Klau (2001) note in their study that the exogenous shocks to food prices contribute to the inflation process, after examining 14 emerging market economies for the 1980s and 1990s. In these economies, food prices have a larger share in the consumer price indices as compared to the case of the industrialized countries. Furthermore, the food prices tend to be more volatile owing to the climatic conditions and foreign trade restrictions. Domaç and Yücel (2003) investigate the inflationary episodes in 15 developing economies using *probit* models and conclude that an increase in the growth rate of food production decreases the probability of the start of rising-inflation episodes.

Dostie et al. (2002) study the agricultural performance and poverty in Madagascar and emphasize that seasonal production patterns eventually affect the food prices and consumption patterns.[5] In their study, the role of seasonal import policies to handle these seasonal problems is also discussed. Seasonal import policies can be viewed as tools to maintain the price stability through managing the agricultural commodity supply. Dostie et al. (2002) note that such policies are effective in managing the adverse effects of seasonal shortages and the sudden price peaks; yet, they also emphasize that the import tendencies of the importers may fall due to the general fall in the food prices.

Del Ninno and Dorosh (2001) examine the measures taken in the Bangladesh economy to overcome the food shortage after the devastating flood of 1998 and highlight that government reduced the trade restrictions for rice imports. As far as their devastating effects are considered, such natural disasters should be elaborated in specific in the case of Turkey.

As mentioned by Jayne and Jones (1997), regarding East and South African countries, Berg Report (1981) advocates the liberalization of markets yet reserving the importance of

[5] For the effects of harvest time on prices, see Dostie et al. (2002).

public regulations in the staple food markets. This importance stems from the sensitivity of social and economic balances to food prices. Alston et al. (1999) is another study to highlight the importance of the cheap-food policies in the less-developed countries.

Timmer (2000), having analyzed the linkages between food price stability, economic growth and income distribution, lays stress on the contributions of food price stability to equality and reduction of poverty by reducing the sensitivity of the poor segments of the society to sudden increases in food prices.

Lamb (2000) analyses the consumption composition of domestic production for the case of African countries, i.e. producing for domestic consumption versus for exports, and finds that increases in food prices induces higher production for domestic consumption. On the other hand, production is oriented toward exports when export prices rise in relation to domestic prices.[6]

3. Current Situation of the Import Regime

During the import liberalization process in Turkey, which started in 1984, membership to World Trade Organization (WTO) and Customs Union (CU) agreements were adopted, while protectionist character of the trade tariffs has considerably fallen according to the related agreements with the said organizations.[7] On the other hand, domestic sectors can be protected with trade policy measures compatible with the agreements against unfair competition in imports.

Import Regime Decree[8] that is valid since January 1, 1996, assigns the Undersecreteriat of the Prime Ministry for Foreign Trade (UFT) authorized to publish regulations and communiqués about the subjects included in the Decree, to give permissions and instructions mentioned in the Decree, to decide for necessary modifications and measures at any stages of imports, to control or force to control import prices if necessary, to analyze and conclude particular cases. When the Undersecreteriat decide for a measure that is needed to prevent domestic sectors against possible harmful effects of imports, factors such as;

- Import volume (whether it increases excessively related to domestic production or consumption)

[6] The interested reader may want to see the analytical framework of Lamb (2000), though it is not directly related to the current study.
[7] For the international agreements about Import Regime, see Appendix D.
[8] Disseminated in the Official Gazette (Repeated Release) dated 31.12.1995 and numbered 22510.

- Import prices (if there exists a considerable diversion from domestic price of the same good or its direct rival good)
- Production, capacity utilization, stocks, market share, employment, profits, returns of the invested capital, cash flows, domestic prices (preventing or suppressing price increases)

are considered.[9]

4. Proposals on Import Regime about Agricultural and Food Prices

For cases when upward pressure on agricultural and food prices, or such a tendency is observed, our proposals for possible measures concerning Import Regime are stated as follows;

- The sectors are highly sensitive sectors regarding their nutritional capacity, employment and income aspects especially in middle-low income regions. Thus, one should stay very cautious about deciding for important changes in protection measures towards these sectors.

- Trade tariffs imposed on agricultural and food products in order to protect domestic producers are mostly determined at the highest possible rates. A reduction in tariffs aiming a fall in general price level will cause cheaper imports, which may result in shifts in demand of both producers and consumers towards imported goods. Such a development will inevitably give rise to falling employment in these sectors, together with various social and economic problems. The most effective measure to take in order to prevent fall in domestic production and thus employment due to tariff reduction, is the subsidies given to domestic producers. However, such a solution will lead to subsidy expenses in addition to forsaken tariff revenues, which means increased burden on the budget. [10]

- Besides, reversal of a considerable reduction in tariff rates would not be that much easy due to the high sensitivity of the sector.

- Consequently, we do not recommend a reduction of the tariff rates on agricultural and food imports aiming a contribution to the falling inflation rates. In fact, with regard to the cost of imports, given that the height of tariff rates are compensated to a great extent by the fall in foreign exchange rates in 2003, we can presume that problems arising in the imports of

[9] For the details regarding the Import Regime and Policies, see Appendix E.

particular goods in this period must have resulted from quantity restrictions rather than tariff rates.

- Following the determination of the problematic products in the sector by the UFT, State Planning Organization (SPO), Undersecreteriat of Customs, and Ministry of Agriculture, which are directly related to agriculture and food sector, as well as protection measures in the imports of the said sectors, import quotas for pre-determined periods can be open for these products. Hence, by increasing imports of the products that will meet its excess demand in uneasy periods for these specific products, the temporary upward pressure on inflation would be avoided without disturbing the existing social/economic balance. During the choice process of the time period of the import quota practice, cyclical (such as temporary rise in demand of meat and livestock during Sacrifice Bayrams), seasonal (as unexpected excessive rain -leading to flood- or drought in agricultural production areas) and climatic factors (fall in output in specific periods due to the climate of the region of production) should be considered.[11]

- Thanks to country, product and amount restrictions, imports via border trade also contain opportunities to relax temporary troubles in agricultural products leading to price pressure, by use of import quotas.

- Another possible area to interfere without disturbing the existing social/economic balance is the imports made by means of inward processing regime. Cost advantages via tariff exemption are provided for intermediate goods imported to be used in the production of goods to be exported at a specific date. In 2003, Import contracts for food and beverages within the scope of inward processing regime formed 5.8 % of total imports contract within the scope of the said regime. Enlarging import quotas of agricultural goods imports within the scope of inward processing regime would also ease the temporary price pressures is specific periods.

[10] The possible economic effects of tariff reductions are briefly discussed in Appendix F.
[11] For the items to be considered owing to their shares in the WPIU and CPI, see Appendix C.

APPENDICES

Appendix A: Analysis of the Cross-Correlations between Agricultural, Food and Total Consumer Prices

Cross-correlations can provide an important amount of preliminary information while assessing the relationships between economic variables. In this section, cross correlations between agricultural price inflation, food price inflation and consumer price inflation are examined. All the inflation variables are computed as monthly percentage changes and they are first used without seasonal adjustments.

In the first and second columns of Table 1a, the cross correlations between WPI agricultural price inflation, CPI food price inflation, and total CPI inflation are presented. Having a look at these columns, it is seen that the contemporaneous correlations (when the lag order is zero) are positive and statistically significant. The contemporaneous correlation between agricultural price inflation and food price inflation is 80.4 % and that between agricultural price inflation and total CPI inflation is 61.6 %. This positive relationship is robust up to the first lag of the agricultural price inflation. However, the correlation figures presented in the first two columns of Table 1a, as a whole, do not reveal the self-promoting process of inflation in Turkish economy.

In order to assess the reliability and robustness of the above observations, we regenerate the above-discussed cross-correlations using de-seasonalized[12] data and present our results in columns 3 and 4 of Table 1a. In these columns, all cross-correlations are positive and they are statistically significant at almost all lags. The contemporaneous correlation between agricultural price inflation and food price inflation is 67.6 % and it is 55.9 % between agricultural price inflation and total CPI inflation.

In Table 1b, the linear regression coefficients for our variables of interest are presented. In the first column of that table, when we try to explain the food price inflation by agricultural price inflation, the coefficient estimate of the agricultural price inflation turns out to be 0.7. If constant term is also included in this equation, this coefficient estimate becomes 0.6 (column 2). If the same exercises are repeated by using de-seasonalized data, these coefficient estimates are obtained as 0.9 (column 3) and 0.6 (column 4), respectively. The coefficient estimate of the agricultural price inflation is 0.6 (column 5) while explaining total

[12] Tramo/Seats procedure is used in de-seasonalizing the data series.

CPI inflation, and it becomes 0.3 (column 6) having the constant term added to the equation. In columns 7 and 8, the coefficient estimates are provided for the de-seasonalized series as 0.8 and 0.3. Based on these estimates, it can be concluded that there is a firm relationship between our variables of interest. However, if numerical precision and consistency are required, the cross-correlations presented in Table 1a would be of more benefit.

All the statistical relationships discussed above point at strong linkages between the variables. However, the direction and mechanism of the affections are not clearly depicted. Therefore, the relationships between the variables are reconsidered within a VAR (Vector Auto Regressions) framework in Appendix B.

Table 1a: Cross-Correlations Among the Variables (%)

	Not de-seasonalized		De-seasonalized	
Lags	**Cross-correlations between Agricultural price inflation and Food price inflation**	**Cross-correlations between Agricultural price inflation and total CPI inflation**	**Cross-correlations between Agricultural price inflation and Food price inflation**	**Cross-correlations between Agricultural price inflation and total CPI inflation**
-6	-14.7	11.0	5.4	24.7*
-5	-13.9	9.9	0.4	21.2*
-4	-11.1	9.7	6.0	23.5*
-3	7.3	19.5*	22.1*	33.7*
-2	38.2*	29.7*	46.8*	44.0*
-1	65.4*	51.5*	62.1*	56.1*
0	**80.4***	**61.6***	**67.6***	**55.9***
1	53.1*	36.6*	41.6*	43.9*
2	9.1	4.7	19.2*	27.3*
3	-23.5*	-13.4	4.4	15.5
4	-34.4*	-15.1	8.4	20.6*
5	-29.2*	-9.0	14.5	19.2*
6	-12.8	4.7	15.5	16.5

Explanations:
Lags denote the number of months by which agricultural price inflation series lags the other variables. For example, when lags equal +4, the correlation between the agricultural price inflation and food price inflation 4 months later is considered. (*) indicates statistical significance at the level of 95 %. Standard errors of the cross-correlations are computed using the formula $1/\sqrt{n}$, n being the number of observations used in computation.

Table 1b: Contemporaneous Linear Regression Coefficients

	Dependent Variables							
	Food price inflation		**Food price inflation (de-seasonalized)**		**Total CPI inflation**		**Total CPI inflation (de-seasonalized)**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Constant term		1.536		1.392		2.971		2.598
Agricultural price inflation	0.736	0.581			0.556	0.255		
Agricultural price inflation (De-seasonalized)			0.851	0.614			0.788	0.346

Explanations: In this table food prices inflation and total CPI inflation are explained with agricultural price inflation. In the first column of that table, when we try to explain the food price inflation by agricultural price inflation, the coefficient estimate of the agricultural price inflation turns out to be 0.7. If constant term is also included in this equation, this coefficient estimate becomes 0.6 (column 2). If the same exercises are repeated by using de-seasonalized data, these coefficient estimates are obtained as 0.9 (column 3) and 0.6 (column 4), respectively. The coefficient estimate of the agricultural price inflation is 0.6 (column 5) while explaining total CPI inflation, and it becomes 0.3 (column 6) having the constant term added to the equation. In columns 7 and 8, the coefficient estimates are provided for the de-seasonalized series as 0.8 and 0.3. Based on these estimates, it can be concluded that there is a firm relationship between our variables of interest. However, if numerical precision and consistency are required, the cross-correlations presented in Table 1a would be of more benefit.

Appendix B: VAR Models of Agricultural and Food Price Inflations

In this appendix, vector auto regressive models explaining the relationship between agricultural and food price inflations, exchange rate and total CPI inflation are presented. The variables of concern are the monthly depreciation rate of the official currency basket of the Central Bank of Turkey[13], monthly rate of inflation of WPI agricultural prices, monthly rate of inflation of CPI food prices, and monthly rate of inflation of CPI non-food prices. The data set is at monthly frequency, and monthly dummies for January to November are used to capture the seasonal variations of the considered relationships. Furthermore, to account for the odd year – even year phenomenon, which is an important determinant of agricultural performance, a corresponding dummy variable is used as a control variable.

The optimal lag order is determined as 1 month for all the models considered. In the first base model of our investigation, the variables are ordered as WPI agricultural price inflation, CPI food price inflation, and total CPI inflation. Monthly dummy variables and the dummy variable indicating the financial crisis of the year 2001 are included as exogenous variables. In this model, a one standard-deviation positive innovation to agricultural price inflation is revealed to increase the food price inflation in a statistically significant manner. Similarly, food price inflation increases the total CPI inflation significantly.

In the second stage, another base model is constructed for checking the robustness of the findings of the first base model, considering that food prices are already a sub-component of total CPI. In this model, the variables are ordered as agricultural price inflation, food price inflation and non-food price inflation. According to the results of this model, agricultural price inflation continues to affect food price inflation positively and in a statistically significant manner. However, food prices do not affect non-food prices in a significant manner.

Collecting together the findings of these models, we can say that the effects of food prices on total CPI are because the former is a sub-component of the latter.

Below variants of the base models are further investigated to see the effects of exchange rate pass-through and the odd year – even year phenomenon:

i. Monthly rate of depreciation of the currency basket are added to our models in either of the following ways:

[13] The official currency basket of the CBRT is composed of 1 USD and 0.77 euro. (For the time period before the circulation of euro, 1 USD and 1.5 DEM are used.)

a. It is included as an endogenous variable as the first variable of the contemporaneous ordering; or

b. It is employed as an exogenous control variable.

ii. Odd year – even year dummy variable is added to both models as an exogenous control variable.

Our initial findings from the two base models are robust up to all combinations above. Moreover, depreciation of the exchange rate increases all inflation variables in a significant manner.

In Figure 1 and Figure 2, the impulse-response functions obtained from the base models under the widest possible range of above variations are presented. Individual findings from the other models are not presented separately since they are invariant to the inclusion of additional variables. In each panel of the figures, the response of the variable being affected to a one standard-deviation impulse from the affecting variable is presented. The central line in each panel demonstrates the impulse-response function, whereas the upper and lower bounds show the 95 % confidence interval. The findings of our examination can be summarized, based on Figure 1 and Figure 2, as follows:

I. Currency depreciation affects agricultural prices, food prices, non-food prices and the total CPI positively.

II. Agricultural prices increase the food prices. However, its effects on non-food prices are significant only in the first two months following an innovation.

III. Food prices increase the total CPI inflation significantly, whereas its effects on non-food prices are significant for only one month after an innovation.

IV. Agricultural prices are affected by food prices positively, but it is not affected by the total CPI inflation and non-food price inflation.

The results presented in Figure 1 and Figure 2 are numerically summarized in Table 2. For ease in reading the table, the responses are presented for 10% innovations to the affecting variables, owing to linearity of the VAR models. As seen in Table 2, a 10% depreciation of the currency basket is reflected on food price inflation from the 2^{nd} to 6^{th} months as increases of 1.4%, 1.3%, 1.1%, 0.9%, and 0.7%. It reflects on the agricultural prices from 3^{rd} to 6^{th} months at the rate of 1.2%, 1.2%, 1.0% and 0.8%.

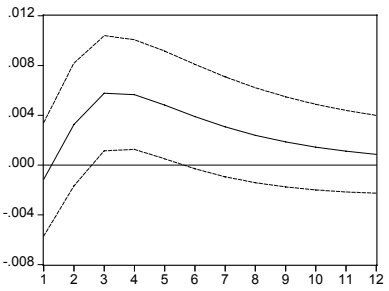
A 10% shock on agricultural prices affect the food prices by 2.2%, 1.3% and 0.7% in the first three months following the innovation. A complete list of findings is separately available in the Explanations to Table 2.

The responses for each month described in Table 2 are presented in accumulated form in Table 3. This table suggests that, as of the 6th month after a 10% innovation to agricultural prices, CPI food price inflation increases by 5.1%. For the same time span, CPI non-food prices increase by 1.9%. WPI agricultural price inflation responds to CPI food price inflation by 6.1%. Finally, a 10% shock to agricultural price inflation affects the total CPI inflation by 2.6% in six months.

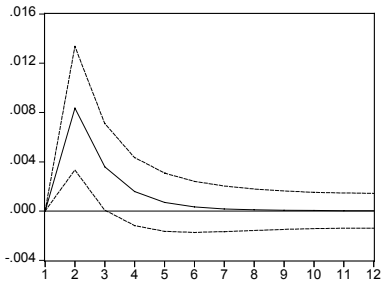
All the results presented in Figure 1, Figure 2, Table 2 and Table 3 are such that the factors increasing the agricultural prices affect the food prices and the total CPI in undesired directions.

Figure 1: Impulse-Response Functions

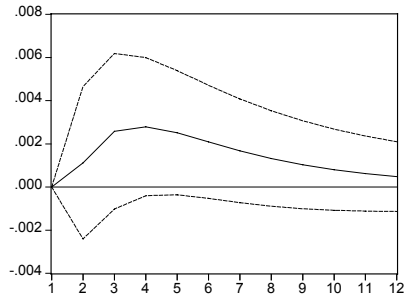
1. Response of WPI Agricultural Price Inflation to Currency Depreciation



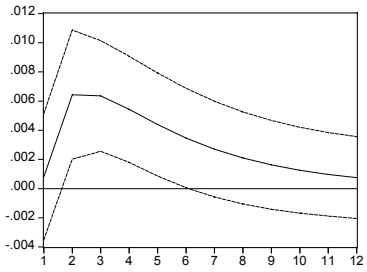
2. Response of WPI Agricultural Price Inflation to CPI Food Price Inflation



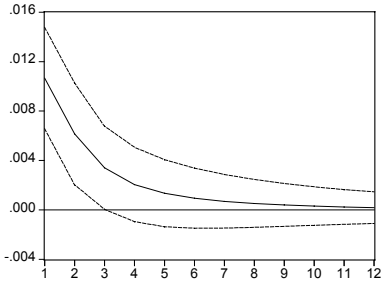
3. Response of WPI Agricultural Price Inflation to total CPI Inflation



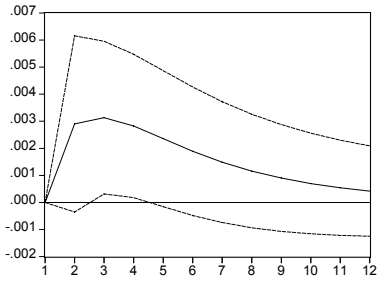
4. Response of CPI Food Price Inflation to Currency Depreciation



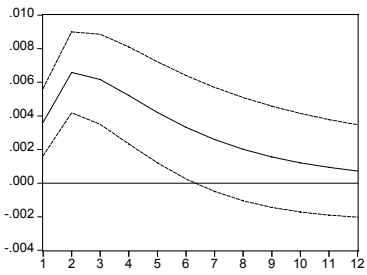
5. Response of CPI Food Price Inflation to WPI Agricultural Price Inflation



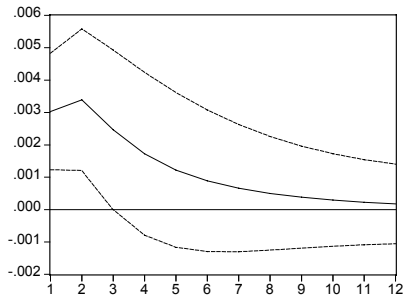
6. Response of CPI Food Price Inflation to total CPI Inflation



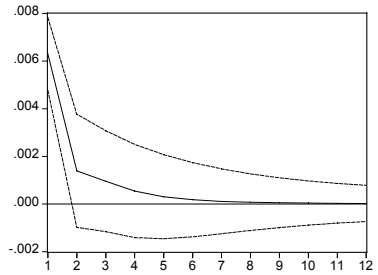
7. Response of total CPI Inflation to Currency Depreciation



8. Response of total CPI Inflation to WPI Agricultural Price Inflation



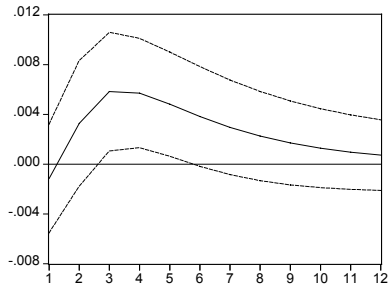
9. Response of total CPI Inflation to CPI Food Price Inflation



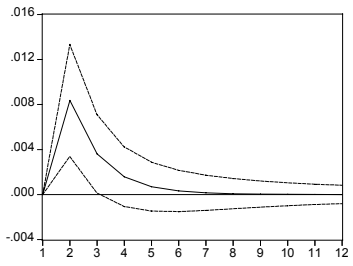
Note: The central line in each panel shows the impulse-response function, and the upper and lower bounds are for 95% confidence intervals.

Figure 2: Impulse-Response Functions

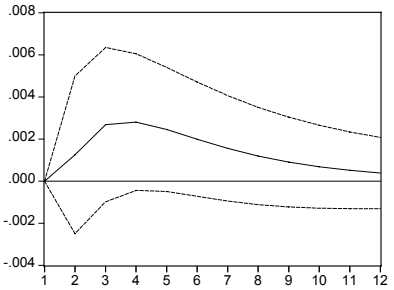
1. Response of WPI Agricultural Price Inflation to Currency Depreciation



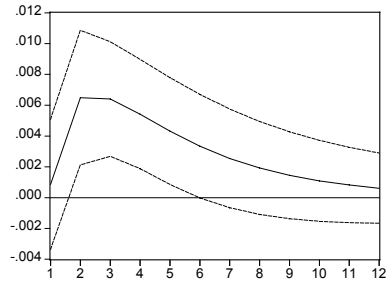
2. Response of WPI Agricultural Price Inflation to CPI Food Price Inflation



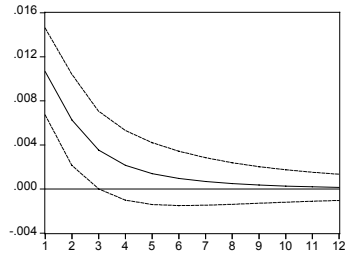
3. Response of WPI Agricultural Price Inflation to CPI non-food Inflation



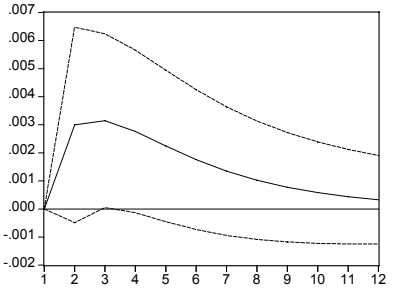
4. Response of CPI Food Price Inflation to Currency Depreciation



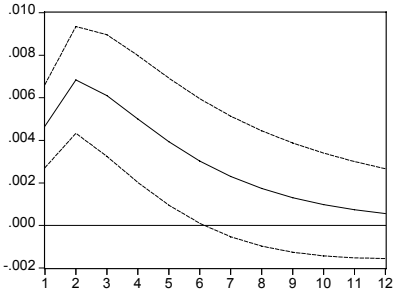
5. Response of CPI Food Price Inflation to WPI Agricultural Price Inflation



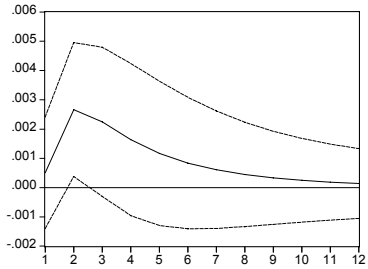
6. Response of CPI Food Price Inflation to CPI non-food Inflation



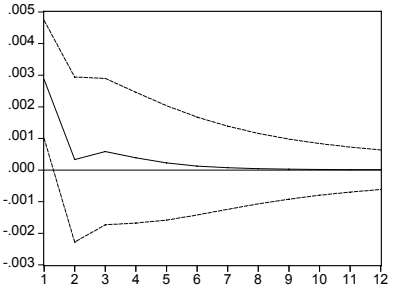
7. Response of CPI non-food Inflation to Currency Depreciation



8. Response of CPI non-food Inflation to WPI Agricultural Price Inflation



9. Response of CPI non-food Inflation to CPI Food Price Inflation



Note: The central line in each panel shows the impulse-response function, and the upper and lower bounds are for 95% confidence intervals.

Table 2: Responses of the Affected Variables to 10% Positive Innovations to the Affecting Variable in the 1st to 6th Months, (%)

	1	2	3	4	5	6	7	8
Month	Response of CPI Food Price Inflation to WPI Agricultural Price Inflation	Response of CPI non-food Price Inflation to WPI Agricultural Price Inflation	Response of WPI Agricultural Price Inflation to CPI Food Price Inflation	Response of CPI non-food Price Inflation to CPI Food Price Inflation	Response of Total CPI Inflation to WPI Agricultural Price Inflation	Response of WPI Agricultural Price Inflation to Currency Depreciation	Response of CPI Food Price Inflation to Currency Depreciation	Response of CPI non-food Price Inflation to Currency Depreciation
1	**2.189***	**0.105**	**0.000**	**1.203***	**0.623***	**-0.241**	**0.182**	**0.984***
	(5.425)	(0.549)	(0.000)	(3.088)	(3.408)	(-0.518)	(0.420)	(4.469)
2	**1.288***	**0.548***	**3.517***	**0.140**	**0.697***	**0.690**	**1.367***	**1.440***
	(2.981)	(2.265)	(3.380)	(0.255)	(3.185)	(1.312)	(2.872)	(5.246)
3	**0.727***	**0.462**	**1.522***	**0.245**	**0.506***	**1.228***	**1.348***	**1.285***
	(2.074)	(1.725)	(2.125)	(0.518)	(2.076)	(2.500)	(3.247)	(4.108)
4	**0.442**	**0.337**	**0.668**	**0.164**	**0.354**	**1.203***	**1.143***	**1.054***
	(1.420)	(1.264)	(1.213)	(0.393)	(1.414)	(2.678)	(2.901)	(3.195)
5	**0.288**	**0.240**	**0.295**	**0.094**	**0.251**	**1.016***	**0.909***	**0.829***
	(1.044)	(0.964)	(0.642)	(0.260)	(1.053)	(2.421)	(2.398)	(2.481)
6	**0.198**	**0.173**	**0.135**	**0.053**	**0.183**	**0.807***	**0.703***	**0.637***
	(0.816)	(0.768)	(0.347)	(0.171)	(0.837)	(2.061)	(1.930)	(1.928)

Explanations:

1. In this table, the impulse-response functions of Figure 1 and Figure 2 are presented numerically.
2. The numerical figures are so as to represent the responses (%) to 10% innovations to the affecting variables.
3. The numbers in parentheses are the t-statistics and (*) shows statistical significance at 95% level of significance.
4. Findings in Table 2 which are statistically significant can be summarized as follows:
   Column 1: A 10% shock to WPI agricultural price inflation raises the CPI food price inflation in the 1st, 2nd and 3rd months by 2.2%, 1.3% and 0.7%.
   Column 2: A 10% shock to WPI agricultural price inflation raises the CPI non-food price inflation in the 2nd month and by 0.5%.
   Column 3: A 10% shock to CPI food price inflation reflects on WPI agricultural price inflation on the 2nd and 3rd months and by 3.5% and 1.5%.
   Column 4: CPI non-food price inflation rises by 1.2% in the first month after a 10% positive innovation to the CPI food price inflation.
   Column 5: Total CPI inflation rises by 0.6%, 0.7%, and 0.5% in the first three months after a 10% innovation to the WPI agricultural price inflation.
   Column 6: A 10% depreciation of domestic currency reflects on the WPI agricultural price inflation by 1.2%, 1.2%, 1.0% and 0.8% in the 3rd, 4th, 5th, and 6th months after the innovation.
   Column 7: A 10% depreciation of domestic currency reflects on the CPI food price inflation by 1.4%, 1.3%, 1.1%, 0.9%, and 0.7% in the 2nd, 3rd, 4th, 5th, and 6th months after the innovation.
   Column 8: A 10% depreciation of domestic currency reflects on the CPI non-food price inflation by 1.0%, 1.4%, 1.3%, 1.1%, 0.8% and 0.6% in the first six months after the innovation.

Table 3: Accumulated Responses of the Affected Variables to 10% Positive Innovations to the Affecting Variable in the 1st to 6th Months, (%)

	1	2	3	4	5	6	7	8
Month	**Response of CPI Food Price Inflation to WPI Agricultural Price Inflation**	**Response of CPI non-food Price Inflation to WPI Agricultural Price Inflation**	**Response of WPI Agricultural Price Inflation to CPI Food Price Inflation**	**Response of CPI non-food Price Inflation to CPI Food Price Inflation**	**Response of Total CPI Inflation to WPI Agricultural Price Inflation**	**Response of WPI Agricultural Price Inflation to Currency Depreciation**	**Response of CPI Food Price Inflation to Currency Depreciation**	**Response of CPI non-food Price Inflation to Currency Depreciation**
1	**2.189***	**0.105**	**0.000**	**1.203***	**0.623***	**-0.241**	**0.182**	**0.984***
	(5.349)	(0.501)	(0.000)	(2.967)	(3.162)	(-0.510)	(0.393)	(4.534)
2	**3.477***	**0.653**	**3.517***	**1.343**	**1.320***	**0.450**	**1.549***	**2.424***
	(5.144)	(1.718)	(3.526)	(1.727)	(3.700)	(0.529)	(2.092)	(5.607)
3	**4.204***	**1.114**	**5.040***	**1.588**	**1.827***	**1.677**	**2.897***	**3.709***
	(4.403)	(1.866)	(3.251)	(1.381)	(3.219)	(1.358)	(2.783)	(5.306)
4	**4.646***	**1.451**	**5.708***	**1.752**	**2.181***	**2.881**	**4.039***	**4.763***
	(3.850)	(1.760)	(2.905)	(1.171)	(2.737)	(1.817)	(3.013)	(4.857)
5	**4.934***	**1.692**	**6.003***	**1.847**	**2.432***	**3.897***	**4.949***	**5.591***
	(3.452)	(1.624)	(2.619)	(1.023)	(2.379)	(2.044)	(3.014)	(4.437)
6	**5.133***	**1.864**	**6.138***	**1.900**	**2.615***	**4.704***	**5.652***	**6.229***
	(3.160)	(1.507)	(2.397)	(0.918)	(2.123)	(2.129)	(2.908)	(4.071)

Explanations:

1. In this table, the impulse-response functions of Figure 1 and Figure 2 are presented numerically.
2. The numerical figures are so as to represent the responses (%) to 10% innovations to the affecting variables.
3. The numbers in parentheses are the t-statistics and (*) shows statistical significance at 95% level of significance.
4. The accumulated responses for the first six months after the innovations can be summarized as follows:
   Column 1: CPI food prices inflation rise by 5.1% six months after a 10% innovation to WPI agricultural price inflation.
   Column 2: CPI non-food prices inflation rise by 1.9% six months after a 10% innovation to WPI agricultural price inflation.
   Column 3: WPI agricultural price inflation rise by 6.1% six months after a 10% innovation to CPI food price inflation.
   Column 4: CPI non-food prices inflation rise by 1.9% six months after a 10% innovation to CPI food price inflation.
   Column 5: CPI inflation rise by 2.6% six months after a 10% innovation to WPI agricultural price inflation.
   Column 6: WPI agricultural price inflation rise by 4.7% six months after a 10% innovation to currency depreciation.
   Column 7: CPI food price inflation rise by 5.7% six months after a 10% innovation to currency depreciation.
   Column 8: CPI non-food price inflation rise by 6.2% six months after a 10% innovation to currency depreciation.

Appendix C: General Tendencies of Agricultural and Food Price Inflations

In this appendix, some descriptive statistics for selected CPI and WPI components for the 1994-2003 time period are examined, as well as the weights of these components in their respective headline indices.[14] The aim of this examination is to pinpoint the items with high inflation rate and variability. Our descriptive statistics can be seen in Table 4 for the periods of 1994-2003 and 2001-2003. First, the monthly rate of inflation is computed for each of the items without seasonal adjustment and three basic statistical measures are reported. These are the ordinary averages, standard deviations and the trend coefficients. The trend coefficients are obtained as the coefficients of time in the equations where the respective series are regressed on the constant term and a time index.

In Table 4, based on the 1994-2003 averages, the top-ten inflation items can be listed as fresh vegetables, fresh fruits, alcoholic beverages, tuber plants, eggs, sugar, tea, marmalade-honey-chocolate-candies, bread, and vegetable oils. For the time period investigated, average inflation rates of these items range between 4.3% and 6.3% and these rates are higher than the total CPI and food price inflation rates. Average inflation rates on meat and meat products behave similar to overall CPI inflation; however, they are both higher than the average food price inflation rate. Same observations stay valid for the average inflation figures computed for the 2001-2003 time period. Table 4 also suggests that the items with high average inflations also have high inflation variability. According to the trend coefficients, almost all items tend to have lower inflation after 2001. Another general observation on Table 4 is that the ratios of standard deviations to the averages are considerably high, indicating high variability of prices.

When the components of WPI are examined, it can be seen that the average inflation rates of the fishery and forestry sectors are higher than those of the WPI inflation rate and agricultural sector. The average inflation rate in the food and beverages production is higher in the public sector than the private sector average. Average inflation rate of agricultural sector is lower than average WPI inflation but higher than private sector average WPI inflation rate and average WPI private manufacturing industry inflation rates.[15]

Based on the above-presented examination of the CPI and WPI components, it can be concluded that the contributions of these components to the inflation process in Turkey are

[14] Data series are compiled from the Electronic Data Dissemination System of the Central Bank of the Republic of Turkey.

[15] In a study entitled "Examination of the Seasonal Movements of WPI, CPI and Their Sub-components" published by the Research Department of the Central Bank of Turkey (1999), it is highlighted that the fluctuations of the WPI can largely be attributed to agricultural prices. In the case of consumer prices, the largest fluctuations are those of the clothing and food prices. Food prices in the CPI behave similar to agricultural prices, yet the deceleration of food prices during spring and winter is relatively lower than that of agricultural prices.

considerable. As far as the staple food items in the CPI are taken into consideration, meat, bread, milk and dairy products, fresh vegetables, fresh fruits, grains, and vegetable oils have the highest weights in the CPI, in that order. Meat and meat products, sugar, bread and oils are also important items of the WPI food manufacturing sub-components. Among the WPI agricultural sector items, wheat, milk, nuts, tomatoes, chicken, lemon, onions, sea-fish, and eggs possess important weights.

Regarding both the above analysis of Figure 4 and the index weights of the items that we are interested in, in addition to inflation rates being high during 1994-2003 period, we can say that inflation variability is also high and changes in the prices of high-weight items contributed much to the agricultural inflation process. High variability in the agricultural and food price inflation rates indicates that agricultural performance can directly affect the process of inflation.

In the light of these observations, success in managing the agricultural performance and the resulting supply can be said to contribute to reducing the inflation and maintaining the price stability. The VAR models of the agricultural and food price inflations can be seen in Appendix B.

Table 4: Descriptive Statistics for Selected CPI and WPI Items

	Average		Standard Deviation		Trend	
	1994-2003	2001-2003	1994-2003	2001-2003	1994-2003	2001-2003
MONTHLY INFLATION RATE OF SELECTED CPI SUB-ITEMS						
Fresh Vegetables	6.25	5.45	20.58	23.16	-0.04	-0.08
Fresh Fruits	5.17	4.22	13.62	14.28	-0.05	-0.14
Alcoholic Beverages	4.87	3.66	8.34	3.90	-0.04	-0.08
Tuber plants	4.83	4.68	14.13	17.80	-0.02	-0.02
Eggs	4.65	2.51	12.05	9.96	-0.06	-0.27
Sugar	4.55	4.04	7.25	6.40	-0.04	-0.23
Tea	4.42	2.42	8.42	3.45	-0.05	-0.04
Marmalade-Honey-Chocolate-Candies	4.36	3.13	2.96	2.42	-0.04	-0.14
Bread	4.35	2.90	5.08	4.15	-0.04	-0.14
Vegetable Oils	4.35	3.56	6.51	8.46	-0.05	-0.29
Meat Products	4.32	2.69	2.80	1.49	-0.04	-0.01
CPI	**4.28**	**2.75**	**2.71**	**2.12**	**-0.04**	**-0.12**
Meat	4.26	3.02	3.63	2.34	-0.04	0.02
FOOD (Total)	**4.24**	**2.88**	**4.17**	**4.22**	**-0.04**	**-0.12**
Fish	4.24	2.22	7.44	6.33	-0.06	-0.17
Grains	4.22	2.86	3.79	3.65	-0.04	-0.16
Coffee and Cocoa	4.22	2.17	7.52	2.98	-0.08	-0.17
Dried vegetables	4.16	1.61	4.90	4.53	-0.06	-0.24
Margarine	4.13	2.03	4.61	3.98	-0.06	-0.18
Beverages (non-alcoholic)	4.12	2.66	4.07	3.96	-0.04	-0.21
Dried fruits	4.08	2.13	3.28	2.33	-0.05	-0.14
Salt, Spices, Tomato Paste, and similar items	4.04	2.30	2.88	1.27	-0.05	-0.08
Milk and Dairy Products	4.00	2.23	3.71	1.75	-0.04	-0.06
Canned vegetables	3.94	2.34	3.31	2.53	-0.03	-0.07
Water	3.69	2.10	4.10	3.20	-0.05	-0.20
MONTHLY INFLATION RATE OF SELECTED WPI SUB-ITEMS						
Tobacco Products	5.03	3.90	11.83	5.76	2.25	1.00
Fishery	4.72	3.43	12.96	11.83	0.07	-0.06
Manufacturing Sector (Public)	**4.54**	**3.22**	**6.78**	**4.51**	**0.12**	**0.02**
WPI (Public)	**4.44**	**3.12**	**5.94**	**4.22**	**-0.04**	**-0.22**
Forestry	4.37	3.41	9.08	6.02	0.05	-0.03
Food and Beverages (Public)	4.32	3.36	4.63	4.59	0.83	0.82
Food and Beverages (Total)	4.19	3.00	3.53	3.09	0.98	0.99
Manufacturing Sector (Total)	**4.18**	**3.02**	**3.91**	**3.43**	**1.18**	**1.10**
Food and Beverages (Total)	4.16	2.94	3.55	3.05	0.53	0.42
Agriculture	4.16	2.89	4.76	5.13	1.03	1.04
WPI (Total)	**4.15**	**2.95**	**3.31**	**3.03**	**1.07**	**1.02**
Agriculture (Agriculture, Forestry, Fishery)	4.15	2.90	4.60	4.92	0.72	0.86
WPI (Private)	**4.07**	**2.90**	**2.96**	**2.86**	**0.34**	**0.51**
Manufacturing Sector (Private)	**4.07**	**2.93**	**3.24**	**3.08**	**0.41**	**0.63**

Appendix D: International Agreements Related to Import Regime

The general frame of the Turkey's Import Regime is determined by the rules of the World Trade Organization (WTO), the EU Customs Union Agreement and related Free Trade Agreements. Turkey became a member of the WTO in 1995, the year in which WTO replaced the General Agreement on Trade and Tariffs (GATT) and a member of the EU Customs Union in 1996.[16]

WTO agreement, in general, determined the extents of the tariff and non-tariff measures applicable to imports. By signing the agreement, Turkey committed to reduce tariffs for agricultural and industrial products. In line with these commitments, tariffs are reduced by 30% for industrial products until 2000 and by 24% for agricultural products until 2004.

On the other hand, the Customs Union Agreement covers only the industrial products and the industrial shares of the processed agricultural products. Within this framework, Turkey abolished the tariffs on her industrial sector imports from the EU as well as the Mass Housing Funds; and began applying the Common Customs Policies for the third parties. In the imports of processed agricultural products, where EU system is adopted, the agriculture share is taken from all countries including the EU, whereas the industrial share is taken from only the countries other than the EU. The measures of the EU on textiles and made-up clothes are also adopted.

As a consequence of the Customs Union, Turkey has signed Free Trade Agreements with many countries and re-considered the tariff schedules and tariff quotas.

[16] Republic of Turkey, Prime Ministry Undersecretariat of Foreign Trade.

Appendix E: Import Regime and Policy

The Import Regime is the basic legal body determining the content and application principles of policies to which imported goods are subject. The Regime consists of Decrees, Regulations, and Communiqués about this issue. In the lists attached to the Decree,[17] tariff rates are announced. In our country, protection measures needed in industrial goods and processed agricultural products are in accordance with CU, whereas protection measures needed in agricultural (excluding processed) products are subject to WTO Agreement.

For 2004, decisions taken towards industrial and agricultural products imports in Import Regime can be summarized as follows;[18]

- Tariff rates for industrial and agricultural products are reduced.
- A separate list for goods under suspension practice is announced.[19]
- The reduction in tariff rates of agricultural goods by 2.4 % was realized, which was the last portion of the 24 % reduction agreed upon to be made since the beginning of the WTO membership in 1995 till 2004.
- Tariff rates of some agricultural products are increased in line with WTO contracts.
- Tariff rates on some industrial products are eliminated.

While the tariff rates on industrial goods originating from EU countries was 9 % on the average before CU in 1995, and 14.3 % for those from third countries, the tariff became zero for EU and 5.8 % for third countries with the accession to CU in 1996. In 2003, the average tariff rate for third countries was 4.4 %.[20] The said tariff rate towards imports from third countries is determined regarding WTO obligations and industry's requirements.

On the other hand, import quotas are enabled aiming at cheap acquirement of necessary intermediate goods by industry.[21] Products in this group are mostly raw materials used in textile industry as well as iron-steal flat products.

[17] In these lists published by UFT, List numbered I includes agricultural products, List II industrial products, List III processed agricultural products, and List IV includes fish and fishery products, while List V is the suspension list.
[18] Published in the 1st Repeated Official Gazette dated 31.12.2003 and numbered 25333.
[19] In order to increase the competitive capacity of the domestic producers by lowering costs, suspension practice is applied by reducing or eliminating the tariff rates on some important inputs for manufacturing industry but not produced in the EU area.
[20] Sönmez (2003).
[21] Import quotas refer to a decrease or exemption of tariff rates of a specific amount or value of an imported good. This practice is towards increasing imports of a product/input needed for the national economy, by annually or periodically facilitating its import conditions. The determined quotas are valid for the goods originating from country(es) which agreements are sign with about this issue. If the goods subject to the quota are imported from different countries or the quotas are exceeded, then general rules are applied.

Tariff rates on non-processed agricultural products that do not correspond to CU inclusion are those taking place between 1-24 sections in the lists. High tariff rates are determined for most of the products in this group. In 2003, average protection rate of agricultural goods was 54.4 % for EU and EFTA, and 55.4 % for third countries.[22] With respect to sub-items, tariff rates and Mass Housing Funds are determined at the highest levels of WTO tariff contracts for products which domestic production level meets domestic market's needs and those that have export potential, while below the upper limit of the contracts for products with raw material property, or which domestic production level can not meet domestic market's needs. As increasing effects of tariffs on domestic price levels are considered with care, the sector's employment, economic and other social balances are aimed to be protected when tariff rates are determined.

Import quotas in agricultural goods are applied when agricultural production, which is extremely dependent on seasonal and climatic conditions, comes out to be insufficient in either amount or quality. Compared to tariff reduction, this practice yields advantages regarding its allowance of direct control on the amount and direction of imports.

[22] Sönmez (2003).

Appendix F: Economic Impacts of Tariff Reductions

Sectors protected with tariffs are usually those that cannot compete with external market. A tariff on a product results in a rise in its price (price effect). As a result, a rise in its domestic production (production effect), squeeze in its demand (consumption effect), and a transfer of welfare from consumer to producer (income effect – distribution effect) is observed. Besides, Treasury will continue to receive tax revenue as long as imports continue (tax revenue effect).[23] In case of tariff reduction, the opposite of the above would be expected. However, there are some points to be underlined for tariff reduction. These situations are analyzed below.

Price and Production Effects:

First of all, a probable tariff reduction will result in a fall in the difference of prices that producers and consumers pay, as much as the tariff rate. Nonetheless, there may arise some structural conditions that prevent this to happen. For instance, if economies of scale exists or concentration ratio is high in the market of the good of which tariff rate is altered, importers would use the price difference that they were transferring to the government earlier, for partly or completely expand their profit margins instead of reducing their prices in case of tariff reduction. Consequently, the intended fall in prices will not occur. On the other hand, if the rise in competition in the domestic market of the product imported is possible, increases in the number of importers and the import volume would be observed. These increases carry on provided that the price difference that the producer and consumers pay is such that the importer can keep on its activities.

Consumption Effect:

A fall in tariff rates will cause the consumption of the product to rise resulting from a fall in its domestic price level. The higher the demand elasticity of the imported product, the more the rise in its consumption resulting from the fall in price level.

On the other hand, relative prices may also be affected in case of tariff reduction in particular agricultural and food products. The change in relative prices would generate substitution effects. If the relative price between the goods, the tariffs of which are reduced by different rates, do not change, though the total demand towards these goods will increase, -with the assumption that the imported goods are not inferior- the substitution between these goods will realize at a minimum level, and the demand of other goods is expected to fall. However, if the relative price among the goods changes, consumers may substitute between these goods.

[23] Seyidoğlu (1998).

Tax revenue Effect:

A fall in tax revenues following the period of tariff reduction is expected. However, if the demand for imported products rises in time because of the tariff reduction, improvement in tax revenues will be observed. Within this framework, the effect of short-term fall in tariff revenues on primary budget should be considered. Moreover, in order to avoid a decrease in total welfare, the loss in tax revenues must be lower than the monetary equivalent of the increase in consumer's welfare.

Distribution Effect:

The reduction in tariff rates causes a reallocation of national income from producers to consumers.[24] Compared to prior to reduction in tariffs, there must be an improvement in the conditions of group that consume the products of which tariff rates are reduced. In addition, when the conditions of these groups are compared, the welfare of the group(s) that was disadvantageous before must improve or at least remain unchanged so that total welfare is increased.

Other Effects:

Domestic producers may sacrifice some of their profit margins by reducing the price in order to be able to compete with cheaper imports. If they cannot preserve this competitive position anyway, they may choose to retire from the market or move to the import sector. The second will result in a fall in employment and domestic production of the related sectors.

The reduction in tariff rates that increases imports will expand current account deficit as well.

International Trade Agreements Restrictions:

Tariff reduction must be considered together with the rules indicated by bilateral or multilateral agreements made with other countries, and the possible effects of a reduction must be analyzed within this framework. Besides, restrictions resulting from WTO and CU agreements and contracts adopted before are determining the limits of tariff reductions and required to be used as guide.

Even in the simplified framework presented here, reaching to a technically sufficient and acceptable conclusion necessitates a process of -numerical or judgmental- optimization analysis covering all the points stated above.

[24] Appleyard and Field (1998), Seyidoğlu (1998).

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