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The Key Determinants of the Import and Policy Recommendations for Turkish Economy

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Abstract
The main purpose of the article is to ascertain the key determinants of the import in Turkish economy, to analyze behavioral pattern of import demand and to make policy suggestions with regard to econometric results. For this purpose, the development of import and its characteristic features have been presented and the determinants of the import have been econometrically estimated by use of 2003.Q1-2014.Q4 period quarterly data. The explanatory variables determining the import are growth of export, real exchange rate returns and growth of GDP. Empirical evidences demonstrate that %1 rise in real exchange rate will lead 0.29% increase on import, %1 rise of export will lead 0.86% increase on import and %1 rise of real exchange rate will lead 3.14% increase on import. These outcomes indicate that structural policies rather than exchange rate policies should be implemented in order to solve the chronic foreign trade deficit problems of Turkey.
Keywords: Import function, foreign trade deficit, variance decomposition

1. Introduction

In the founding years of 1920s, Turkish economy was displaying outward oriented economic structure. The basic reason for being outward oriented in economy is having excessive foreign dependent economic pattern (Şahin, 2009; 43-44). However, the liberal policies pursued which were not satisfied the expectations in founding years led to chase of new economic policies. Turkish economy tended towards statist policies since 1930s for various reasons such as lack of a substantial entrepreneur class, fluctuations on international markets and insufficient infrastructure. 1930s have been period that tight controls were applied on foreign trade and as a result of that foreign trade balance surplus occurred between 1930 and 1937 (www.tuik.gov.tr).

The period between 1940 and 1946 is termed as etatism and war economy years in terms of economy. The policies seeking to create foreign trade surplus was adopted in this term, within this context, the limitation of the import was aimed. It is observed that foreign trade surplus occurred in 1939-1946 periods with the effect foreign trade policies applied from 1930 onwards.

Escalation on import has been experienced with removal of the price and quantity barriers to import since 1946. Escalation of import remained until 1953. Restrictions on import were imposed once again by this year. Even though various policies targeting to curb the import reduced the import in some extent, the foreign trade deficit problem in Turkish economy has existed since 1947.

The Turkish economy embraced import-substitution industrialization policy between the period of 1960 and 1980 in order to achieve foreign exchange savings. Contrary to expectations, the process of import-substitution industrialization in Turkish economy led to a deterioration in the balance of payments. The main cause of this situation was upward tendency of import inputs. Furthermore, the products manufactured with imported inputs were not oriented to export but to meet the domestic demand.

The negative supply shocks which occurred in the international market in the 1970s deepened Turkey's foreign trade deficit. By the year 1980, radical changes in Turkish economy were implemented to overcome the existing current foreign exchange bottleneck. In conjunction with January 24, 1980 Decisions import substation policy has relinquished, export oriented industrialization policy has conducted and foreign trade has been freer. The policies applied for removal of direct indirect and barriers on foreign trade in the era of 1980-1989 went along with financial liberalization in 1989. By the membership to the Custom Union in 1996, Turkey's foreign trade elevated to the global level (Savrul *et al*. 2013; 56).

The economic policies pursued in Turkish economy since 1980 paved the way for enhancing of export significantly in 1990s and 2000s. However, the rise in export accompanied by the rise in import caused to progressively continue of the foreign trade deficit problem which had been ongoing since 1947. The main reason of the increase of the export accompanied by an increase in import has been dependency of the major export sectors in production stage to import. The aim of this study is analyze the aggregate import demand behavior of Turkey for the periods of 2003.Q1-2014.Q4. There are three major framework describing import demand in the literature. The key determinants of import demand function in all these frameworks are the price of imported goods, foreign exchange rate and income of the importer country. The total import demand functions have been drawing considerable attention in all over the world and they have been analyzed by means of wide range of models. There are also large number of studies in Turkey which examine the empirical links between import demand and its determinants.

The study is organized in following format. In the second chapter which follows the introduction, the theoretical framework and literature search related with the study are outlined. The growth of export, real exchange rate returns and growth of GDP are determined as the main explanatory variables of import, following the required time series revisions the OLS estimations were obtained in the third chapter. By means of VAR model variance decompositions were identified and interpreted. An overall assessment of the empirical findings and policy recommendations were included in the fourth chapter.

2. Theoretical Framework and Literature Search

2.1. Import Demand Model

In all theories from Neoclassical trade theory to Keynesian stand and as much as modern trade theories, the main determinants of foreign trade are price and income. According the Neoclassical trade theory which relies on the assumptions of the General Equilibrium Theory and Neoclassical consumer behaviors, international trade is influenced from the changes in relative prices. The full employment assumption of the Neoclassical theory is the reason for income variations do not affect import demand. On the contrary, in the Keynesian trade model the general level of prices is inelastic and level of employment is variable. That's why the main determinant of the import in the Keynesian model is income. The new trade theory, which concentrate on intra industry concept and cannot be explained with the assumptions of comparative advantage theory, elucidate the foreign trade under the assumptions of product differentiations, economies of scale and imperfect competition.

For the determination of trade volume, these new theories suggested a new relation between trade and income and analyzed this relation under different market structure approaches (Marshallian, Chamberlainian and Cournot approaches). For instance, in the Marshallian approach while constant returns to scale assumption is considered at firm level, the assumption of increasing returns to scale conditions is performed at industry level. On the other hand, Chamberlin approach is based on monopolistic competition. The Cournot approach assumes a market with only a few imperfectly competitive firms where each takes each others' outputs as given (Shuaibu & Fatai 2014; 230).

To sum up, in all these theories (the neoclassic trade theory, the Keynesian trade multiplier and the new trade theory) there are two key determinants: Income and relative prices. Trade barriers, market structure, exchange rates, scale, and all other variables are theoretically considered to be contained in these two variables (Bathalomew, 2010; 9).

2.2 Literature Search

There are great deals of studies analyzing import demand function for different countries. The aim of this study is to estimate import demand function for Turkey as well. Estimating need the relation between import demand function and its determinants arises from the need to attain the best trade policy for the country. For Turkey, there are studies analyzing the determinants of import demand function with different model specifications and different estimating techniques. In the studies for Turkey as well as international studies, the key determinants of import demand function are income, relative prices and exchange rate.

Among the initial studies analyzing effect of the aggregate national income and relative prices on import Harberger (1953), Hinshaw (1945), Liu (1954), Zassenhaus (1953) and Vegh (1941) could be listed (Chani *et al.* 2011; 96). The estimating of the import demand function for different countries and for different periods stir up economists' interest and therefore a large literature has been generated. For instance, among them, Egwaikhide (1999) estimated Nigeria's import demand function using cointegration method with quarterly data belonging to 1953-1989 periods. In this study, real income, relative prices and exchange rate reserves are used as explanatory variables. In a similar study performed by Emran & Shilpi (1993) for India and Sri Lanka it was concluded that national income and relative prices have significant effect on import in the long run. In other study done by Bathalomew (2010), the total import demand was analyzed for Sierra Leone by means of 1977-2008 period time series. The findings obtained from a study in which final consumption expenditure, public expenditure, investment expenditure, export expenditure and relative prices are used as independent variables has confirmed that there is co-integrating relationship between import and its determinants. In their study, Harvey & Sedegah (2011) analyzed the configuration of the import demand of Ghana from 1967 to 2004 using time series analysis and reached the conclusion that domestic income, foreign exchange reserves and trade liberalization play fundamental role on import demand both in short and long term. Although limited numbers of study are available for analyzing import demand of certain product groups, the followings can be cited: Pattichis (1999) analyzing corn, dry milk, butter and rice import demand of Cyprus, Mah (2000) focusing communication products' import demand of the South Korea, Cheng & Fukumoto estimating capital goods, intermediate inputs and final consumption goods import demand function could be listed examples of these studies.

When the national literature is reviewed, it is also observed that income, relative prices and real exchange rate are considered as independent variables in numerous studies. Among these studies, Berksoy (1994) tried to demonstrate the determinants of the import demand by using time series with the data of 1917-

1991 periods and he explained the outcome of low price elasticity with structural problems and explained short term positive elasticity values with delayed reactions of decision makers to exchange rate changes. Özatay (1997) analyzed the influence of the real income and exchange rate on import demand for Turkey with the data belonging to the period from 1977 to 1996 and following the study, he concluded that in long term national income and exchange rate have positive and significant effect on import demand and in short term only the exchange rate is significant. In a similar manner, Kotan & Saygılı (1999) estimated import demand for Turkey with data involving 1987-1999 periods and with two different model specifications (Engle-Granger approach and Bernanke-Sims structural VAR method). The outcomes of the first model demonstrated that in the long term national income, inflation rate and international reserves have significant influence on import. The second model which identifies import demand by means of Bernanke-Sims structural VAR method verified that the real depreciation rate and unanticipated changes in national income create considerable effect on import demand. As regards to the study of the Aydın *et al.* (2004), when examining the regressions calculated by using single equation, real exchange rate elasticity coefficient of import demand was determined as 2 and income elasticity coefficient of import demand was determined as 0.40. Bayraktutan & Bıdırdı (2010) estimated the long term import demand function of Turkey by Engle -Granger two step estimating method and it has been verified that Turkey's import is sensitive to economic growth rather than real exchange rate. Kalyoncu (2007) analyzing the import demand for the periods between 1994:1- 2003:12 with Cointegration and error correction modeling reached the outcomes that relative import price and real GDP are significant descriptive variables on Turkey's import demand function and price elasticity of the import is greater than income elasticity of import. Another study belongs to Yavuz & Güriş (2006). In this study, the test result obtained from data of 1982-2002 years refers that there is relation in the long term among Turkey's import demand, real income and relative prices.

3. Data Set and Econometric Model

2003.Q1-2014.Q4 period quarterly data was used for growth of import, growth of export, real exchange rate returns and growth of GDP for Turkish economy. Seasonal effect on the variables was adjusted by Tramo/Seats method. For stationarity, Perron (1997) was performed for unit root test with structural break. The results are summarized in Table 1. Unit root tests results indicated that four series are stationary at 1% level.

Table 1: Unit Root Tests with Structural Break

	Growth of Import	**Growth of GDP**	**Growth of Export**	**Real Exchange Rate Returns**
Test Statistics	-8.8137 [< .01]	-6.5099 [< .01]	-9.9458 [< .01]	-7.0935 [< .01]
Lag Length	1	1	0	0
Break Date	2008.Q4	2008.Q1	2008.Q4	2006.Q2

Notes: Perron (1997) was performed for unit root test with structural break. Vogelsang (1993) asymptotic one-sided *p*-values are used and provided in square brackets. Break specification is intercept only, break type is an innovational outlier. The asymptotic critical values are -4.9491 for 1%, -4.4436 for 5%, and -4.1936 for 10%. The null is "series has a unit root with structural break in intercept".

Figure 1a and 1b, following the seasonal adjustments, shows scatter plots for growth of import-growth of GDP and growth of import-growth of export variable pairs.

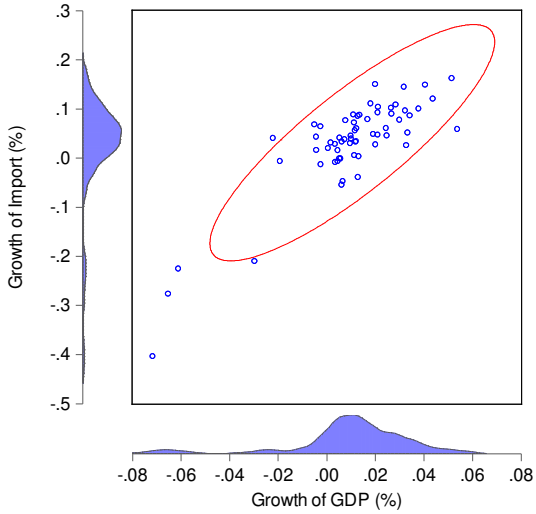

Figure 1a: Scatter Plot of Growth of GDP-Growth of Import

When Figure 1a. and 1b. are jointly analyzed, it is observed that growth of GDP-growth of import variable pair is in more distinctive linear structure and involves strong positive correlation compared to growth of import-growth of export variable pair.

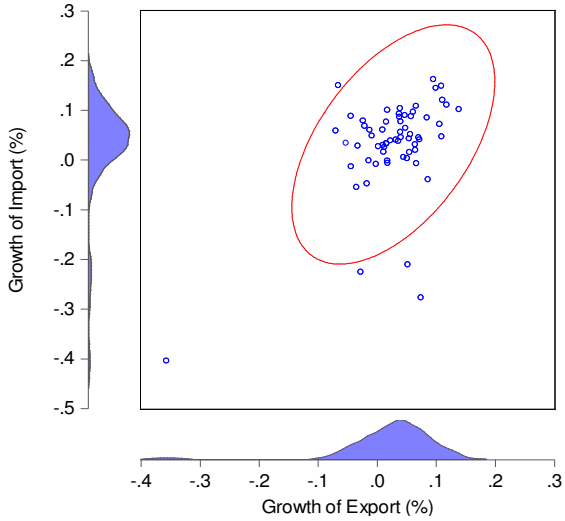

Figure 1b: Scatter Plot of Growth of Export-Growth of Import

Notes: Confidence ellipses with 0.95 confidence level using *F*-distribution. Kernel densities are given at axes.

In this stage, OLS estimates of the elasticity coefficients of the key variables explaining the import will be obtained. Due to mathematical relation between export and GDP in national income identity, two separate equations were estimated. While GDP growth exists within the variables set explaining import in the first model, export is replaced with GDP growth in the second model. This plain approach is ideal to remove the multicollinearity problem:

$$M_t = \alpha_0 + \alpha_1 R_t + \alpha_2 G_t + \alpha_3 G_{t-1} + \alpha_4 G_{t-2} + u_t \quad (1)$$

$$M_t = \beta_0 + \beta_1 R_t + \beta_2 E_t + \beta_3 E_{t-1} + z_t \quad (2)$$

Herein, M_t refers growth of import (%), R_t real exchange rate returns (%), G_t growth of GDP (%), E_t growth of export (%) and u_t, z_t are error terms that provided OLS assumptions. In both models, different lag lengths for the series have been tested. Each test has been assessed from the point of the statistical significance of the parameters, their contribution to the model and diagnostic checking results. Optimum lags were determined 2 for GDP growth, 1 for export and no significant lag were identified for others.

The estimating results for Model (1) and (2) are displayed in Table 2 and Table 3.The results of diagnostic checking are summarized in table notes. Dependent variable is growth of import in the estimations.

The assessment of the findings in Tables 2 and 3 enables to make a number of principal inferences. Since related variables are assessed with percentage, the estimated coefficients can be interpreted as estimate of coefficient elasticity. In the view of that, GDP growth remains fixed (with lagged terms), as a result of 1% rise in real exchange rate[1], import will increase approximately 0.29%. Similarly under the terms other variables remain fixed, when GDP growth in *t* period rises %1, import will increase 3.14%. The influence of mentioned increase in GDP growth positively and significantly continues throughout 2 quarters. The long term influence of rise in GDP growth is 4.37% and in case of rise in GDP growth carries on, this figure signifies that import will increase 4.37% in long term. All slope terms are statistically significant at 5% level.

[1] According to the Real Exchange Rate Index of the Central Bank of the Republic of Turkey, the increase in the index value means that the appreciation of the Turkish Lira.

Table 2. Results of Estimates

	Parameter	***t*-statistics**	
Intercept	-0.0207	-1.7056 [0.0955]	
Real Exch. Rate$_t$	0.2917	1.9431 [0.0305]	
GDP Growth$_t$	3.1448	5.9314 [0.0000]	$\bar{R}^2 = 0.7527$ $F = 36.0102$ [0.0000]
GDP Growth$_{t-1}$	0.6254	2.2395 [0.0305]	
GDP Growth$_{t-2}$	0.6039	2.0354 [0.0481]	

Notes: *p*-values are provided in square brackets. Breusch-Godfrey Lagrange Multiplier test for autocorrelation indicates no autocorrelation in residuals up to 8 quarters lag. BG-LM test statistics is 6.0743[0.6389]. White test for heteroscedasticity indicates no heteroscedasticity in residuals. White test statistics is 11.3624[0.2517]. Residuals are multivariate normal, Jarque-Bera test statistics is 0.6452[0.7242]. The *t* and *F* test results verify that individual significances of parameters and universal significance of equation are statistically sufficient level.

Table 3. Results of Estimates

	Parameter	***t*-statistics**	
Intercept	-0.0018	-0.2083 [0.8359]	
Real Exch. Rate$_t$	0.3968	2.1030 [0.0413]	
Export$_t$	0.8569	8.0886 [0.0000]	$\bar{R}^2 = 0.6474$ $F = 29.1580$ [0.0000]
Export$_{t-1}$	0.2923	2.7533 [0.0086]	

Notes: *p*-values are provided in square brackets. Breusch-Godfrey Lagrange Multiplier test for autocorrelation indicates no autocorrelation in residuals up to 8 quarters lag. BG-LM test statistics is 3.5563[0.8948]. White test for heteroscedasticity indicates no heteroscedasticity in residuals. White test statistics is 13.1907[0.1827]. Residuals are multivariate normal, Jarque-Bera test statistics is 1.3098[0.5194]. With regards to *t* test, the slope terms and with regards to the *F* test universal significance of equation, are statistically sufficient levels.

Based on outcomes in Table 3, under the terms export remains fixed (with lagged terms), 1% rise in real exchange rate will increase import approximately 0.40%. In the same way, under the terms other variables remain fixed, when export in *t* period rises %1, import will increase 0.86%. The influence of increase in export positively and significantly continues throughout 1 quarter. The long term influence of rise in export is 1.15% and in case of rise in export carries on, this figure refers that import will increase %1.15 in long term. All slope terms are statistically significant at 5% level.

When the estimate results are considered as a whole, it has been observed that the largest share among the variables that determine import, undoubtedly, belongs to GDP growth, followed by exports and the real exchange rate. While significant influence of the rise in export is 1 quarter, rise in GDP is 2 quarters.

In determining the variables influencing the import, understanding the dynamic relations between variables has an important role. For this purpose, the VAR model estimates will be used. Due to aforementioned relation between export and GDP in national income identity, the dynamic relations will be estimated in two separate VAR models. Based on Schwarz Information Criteria the optimum lag length of both models is 2 and VAR Model stability conditions are provided in this lag.

In this section, an answer to the question of which variable or variables are effective on import will be searched and for this purpose variance decomposition will be used. The aim of the variance decomposition is to find out the effect of the each stochastic shock on error of forecast variance for future periods. In this analysis, a change in one of the variances is respectively decomposed as affecting all variables and information on the dynamic structure of the system is obtained.

Table 4. Variance Decomposition of Growth of Import*

Period	Standard Error	Import	GDP Growth	Real Exchange R.
1	0.067902	100.0000	0.000000	0.000000
2	0.073101	97.57483	2.146264	0.278910
3	0.081010	84.57795	11.46990	3.952150
4	0.084013	85.23804	10.75225	4.009703
5	0.086095	83.43921	10.95877	5.602013
6	0.086761	82.49487	11.56513	5.940006
7	0.087592	82.61573	11.54260	5.841669
8	0.087849	82.48580	11.59338	5.920812
9	0.088028	82.17515	11.74363	6.081213
10	0.088158	82.19976	11.73439	6.065856

*The dummy variable, valued as 1 in order to represent economic crisis experienced in Turkish economy between 2001.Q1-2001.Q4 periods and Euro-Zone depth crisis between 2008.Q4-2009Q4 periods, are employed as exogenous variable in the VAR model.

The VAR Model variance decomposition findings confirm that variables which have largest share (except its own variable) among error of forecast variances of import are respectively GDP growth with 11.73% and real exchange rate with 6.06%.

In this section, variance decomposition analysis has been updated by means of export instead of GDP growth.

Table 5. Variance Decomposition of Growth of Import*

Period	Standard Error	G. Import	G. Export	G.Real Exchange
1	0.070946	100.0000	0.000000	0.000000
2	0.077974	92.68400	5.929303	1.386698
3	0.083420	88.56278	7.908365	3.528855
4	0.088784	87.73914	7.000944	5.259916
5	0.089743	86.00644	8.845044	5.148514
6	0.091093	85.38673	8.950331	5.662938
7	0.091834	85.23287	8.899264	5.867863
8	0.092000	84.93061	9.208018	5.861373
9	0.092280	84.84666	9.185240	5.968098
10	0.092383	84.80819	9.205179	5.986627

* The dummy variable, valued as 1 in order to represent economic crisis experienced in Turkish economy between 2001.Q1-2001.Q4 periods and Euro-Zone depth crisis between 2008.Q4-2009Q4 periods, are employed as exogenous variable in the VAR model.

Accordingly, it is confirmed that variables which have largest share (except its own variable) among error of forecast variances of import are respectively export 9.21% and real exchange rate 5.99%. Variance decomposition results are consistent when they assessed jointly with OLS estimates.

4. Conclusion and Overall Assessment

The most important result obtained from the econometric model is that the income elasticity of import is much higher than the price elasticity of import in Turkey: While a 1% rise in the real exchange rate leads to 0.29% increase in import, a 1% rise in the growth rate leads to approximately 3.14% increase in import. These results indicate that, at the high growth phase of the Turkish economy, import, consequently foreign trade and current account balance have been deteriorated. The analysis can be extended as follows:

During period between 2013 and 2015 of the Turkish economy the average distribution of imports by commodity groups as follows: The share of investment goods are nearly 15%, intermediate goods 70%, consumption goods 12%, and other goods 3%. Hence, the share of intermediate and investment goods in aggregate import is approximately %85 (www.tuik.gov.tr). This situation generates the need of investment goods and intermediate goods of Turkish economy in high growth periods and consequently, it escalates import and

current account deficit. In a similar manner, decrease of the growth rate in the periods that economy goes through a recession and crisis (For instance years between 2001 and 2009[1]) reduces the demand for import by means of intermediate and investment goods. In brief, high income elasticity indicates that Turkish economy relies on outside financial resources and import is boosted by growth.

One of the most significant results of the Turkish economy relying on foreign resources is low price elasticity of demand on imported goods. This implies that the exchange rate policy maintaining TL's value low will not be very effective both to prevent increasing import, foreign trade and current account deficits.

An additional factor that affects the growth of import in Turkish economy is export. With regards to result obtained from the model is that 1% increase in export leads 0.86% rise in import. This result points out that import is also a function of export. In accordance with the OECD data, in a $100 worth of Turkey's export, $41.5 part involves Turkish value added input while $58.5 part has imported value added input (http://stats.oecd.org/; Cited by: Güngör Uras, 2013). This specifies that in order to earn $100 export revenue $141 worth of import is required. Thus, in order to elevate export, higher import rise is necessary. Based on the empirical findings, we can reach following results for Turkey's economy: The recipe to constraint the chronic foreign currency deficit of Turkey (foreign trade and current account deficit) is not to decelerate production or curb demand. At the heart of the solution, achievement of the structural change in production lies. Therefore, the problem that Turkish economy needs to solve in short period is to squeeze the share of imported input both in export and in domestic production. Particularly, the creation of new capacities that will substitute intermediate and investment goods which constitute %90 of the import should be principal target of the Turkish economy. At this point, the task of the public should be development of the existing capacities for production of intermediate and investment goods and along with that encouragement of new capacities to be installed with substantial investment incentives.

Turkish economy needs to accelerate high/advanced technology production and to boost the export in order to internally compete with imported goods and to reduce usage of imported inputs as well as to surge the export. The share of the high technology production in manufacturing industry of Turkey as of 2012 is barely 3.5%. In a similar manner, only 3.7% of the products exported by Turkey are comprised of high/advanced technology products. The share of the goods with low density technology in export is %34; as for the share of the goods involving medium technology products is 62%. It should be stated that the share of high/advanced technology products have been decreasing by years. The same ratio was 6.2% in 2002 and 4.5% in 2007. The share of the high/advanced technology products in manufacturing industry which were 5.7% in 2003 and 5.7% in 2007, has been declined similarly (Ministry of Development, Program 2014, p. 186).

In order Turkey enhance the share high technology products both in-country production and in export, its first priority should be place importance to education, human capital and technology intensive R&D projects. Nonetheless, the capability of the Turkish economy to grow its manufacturing industry is extremely insufficient without moving to technology intensive production. A production industry structure which is based on low intensive technology will lead to not only use of imported input and consequently non-prevention of the import, but also limited amount of export goods involving high technology and consequently limited amount of export revenue. In our opinion, this one of the underlying reasons that Turkish economy has been running constant trade deficit since 1950.

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[1] For instance, the import increasing 36% in 2000 decreased 28% due to shrinking of the economy in 2001. Similarly, the import mounting 20% in 2008 reduced 30% due to global crisis and accordingly shrinking of the economy in 2009 (www.tcmb.gov.tr).

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