

# Structural Reforms and Sustainable Economic Growth: An Empirical Test for Turkey

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## **Abstract**

*Sustainable economic growth is one of the economic goals with an obvious importance for developed countries, as well as developing countries. It is an undeniable truth that sustainable economic development may be ensured not only by employing temporary, demand-side economic policies, but also supply-side and permanent structural reforms. In this context, the relationship between structural reforms and sustainable economic growth was subject to the analysis in our study on the scale of Turkish economy that has been through serious financial crises and rough processes. Supply-side structural reform implementations for Turkey were handled through the period of 1980-2002, and were examined the VAR (Vector Auto-regression) model applied. With the tests applied and the models presumed, it was evaluated that; long-term structural reforms and extensive adjustments in the economy support the GDP (Gross Domestic Product) through the long term equilibrium in a permanent and long-lasting way, and also potentiate sustainable economic growth*

**Keywords:** structural reforms, sustainable economic growth, VAR model

## **Introduction**

Various stabilization policies have been followed in Turkey, just like the other emerging markets, to construct sustainable economic growth. IMF-supported stabilization policies have been used many times for this purpose, especially to eliminate macro-economic imbalances.

Since the 80s, a period of time that free foreign trade and international financial movements gain significance, it was observed that; the countries applying to IMF for a loan suffered a range of problems concentrating on high public sector deficits, external deficits and high inflation (Bruno: 1993) Therefore, the conception has become increasingly powerful that; such problems arise from deep structural distortions, not cyclical fluctuations or conjunctures in the world economy, and these cannot be solved with just pragmatic solutions (Craig and Porter:2003)

In accordance to this conception, the IMF programs also included supply-side reforms called "structural adjustment programs", which focused on not only managing the domestic demand, but also helping countries to expand their production volumes and to maintain macroeconomic stability, realizing sustainable economic growth and supporting the transition to market economy: 1997.

In this study; the results of such implementations in Turkey were analyzed, beginning with January 24<sup>th</sup> 1980 Decisions, which are considered as the start point of structural compliance programs, also including the December 1999 and February 2001 instances that the country faced serious crises caused by corrupted domestic economical balances.

Structural reforms which accelerated in succession after December 1999, concluded in a rapid recovery at the end of 2002 and were reflected in the economic growth positively.

In line with the reasons mentioned above; Within the framework of the VAR model, the efficiency of IMF-supported structural reforms over the sustainable economic growth activity between 1980- 2002 were tested; data on the variables were used in annual basis, and the efforts focused on determining whether the positive shocks in the variables affected the long-term growth rate positively or not, and if they provided the necessary potential for sustainable economic growth

## 1. Review of Recent Literature

Recent national studies on economic stability policies and practices in the context of Turkey can be lined up such as: Apak (1993) Aydoğuş et al. (2002), Barışık (2002), Canpolat (2001), Gerni (1992), Öztürk (2002) and Enç and Aykaç (2003). As international studies; Glassman and Carmody(2001), Gomulka(1995), Guld(1999), Hutchisonetal. (2003), Killick and Manuel (1995), Kolodko (1999), Logan (1997), Mireaux and Schdler (2000), Rodrik (1996) and Tiongson (1997) may be observed to come into prominence. The contents of the studies include examinations of IMF and stabilization policies for country examples or regional stability programs (Latin America, post-Soviet countries) and their results. Thereafter, it is possible to imply that subject-studies are usually concentrated on two basic principles. First; The observed stability (structural adjustment) policies are not oriented towards economic growth, in other words a specific variable such as GDP; Second: They focused heavily on the pragmatic stabilization policies and consequences that are implemented during crisis periods.

Studies on Turkey are also observed to arise in the context of the 2001 economic crisis. None of the academic work to be examined has tested the interaction between structural reforms and long term GDP, as an indicator of sustainable economic growth. In this respect, it is important to evaluate the effects of the stabilization policies to sustainable economic growth, in vulnerable economies such as Turkey that are soft against crises.

## 2. The Model and Empirical Results

### 2.1 The model

The time series to be used in the analysis should be stationary, in other words, should not include unit root terms statistically. The Augmented Dickey-Fuller test, commonly known as the ADF test in literature, was used for this purpose. The model is based on the estimation of a regression equation in which the first difference of the relevant time series is used as a dependent variable and the delayed terms of the series are used as explanatory variables. It is also possible to add an optional constant fixed term and trend to the estimated equation.

For example, the two-term delayed, fixed and trend-containing regression equation would be as follows:

$$\Delta y_t = \beta_1 y_{t-1} + \beta_2 \Delta y_{t-1} + \beta_3 \Delta y_{t-2} + \beta_4 + \beta_5 t \quad (1)$$

The table below shows the components of the sustainable economic growth that will be used in this study; Gross Domestic Product change rate (dy), investment increase rate (di), labor productivity change rate (dp), budget deficit change rate (dd), domestic debt stock change rate (dlb) and foreign capital entry change rate (dfi) The ADF test results for these variables are given in the table below.

**Table 1. ADF test results**

Variable	Level	Level with Trend
dy	-1,67	-2,59*
di	-0.96	-2.33
dp	-1,38	-2,36
dd	-1,53	-1,84
dlb	-1.88	-2,24
dfi	-2,37	-2,93

\* Requires denial of null hypothesis at the level of significance by 5%

*Note:* All of the variables contain at least one unit root at the level of significance by 10% in their first difference.

The Johansen test results for the cointegrated relationship between the variables included in the analysis are shown in table 2

**Table 2. Johansen cointegration test results**

Value	Similarity rate	5% Critical value for significance level	Number of co-integrated vectors
0.931	147, 54	94,15	<i>No</i> *
0.877	91,29	68,52	<i>At least 1</i> *
0,699	47,14	47,21	<i>At least 2</i>
0.459	21.89	29,68	<i>At least 3</i>
0,255	8.98	15,41	<i>At least 4</i>
0.125	2.80	3,76	<i>At least 5</i>

*Note:* At the level of significance by 5%, rejection of null hypothesis is required

According to “Johansen cointegrated vector test” results, there is a long-run equilibrium relationship between the variables included in the model, and they have a long-term co-movement characteristic. While this is equilibrium-related data, it is necessary to determine the effect of a change on one of the variables on the long-run equilibrium values of the other variables. The methodology that will help us in this VAR.

Equation by model;

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_N y_{t-N} + Bx_t + \xi_t \quad (2)$$

$y_t$  , The vector of internal variables,

$x_t$  , The vector of external variables,

$A_1, A_2, \dots, A_N$  And B is the matrix of coefficients to be estimated,

$\xi_t$  Refers to error terms that correlate with each other but do not correlate with lagged values.

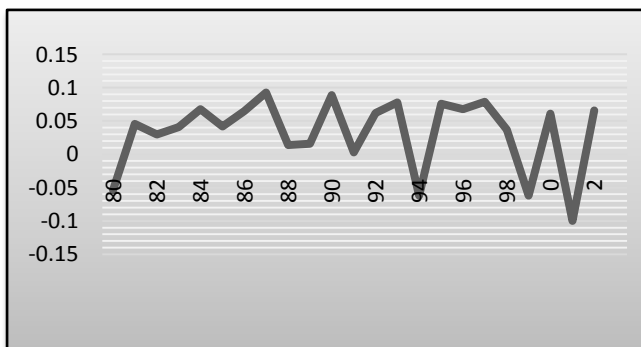
For the VAR model, the following equations should be estimated simultaneously using the ordinary least squares method:

$$\begin{aligned} y_{1,t} &= A_{1,1,1} y_{1,t-1} + A_{1,1,2} y_{2,t-1} + \\ &\quad A_{2,1,1} y_{1,t-2} + A_{2,1,2} y_{2,t-2} + B_{1,t} + \xi_{1,t} \\ y_{2,t} &= A_{1,2,1} y_{1,t-1} + A_{1,2,2} y_{2,t-1} + \\ &\quad A_{2,2,1} y_{1,t-2} + A_{2,2,2} y_{2,t-2} + B_{2,t} + \xi_{2,t} \end{aligned}$$

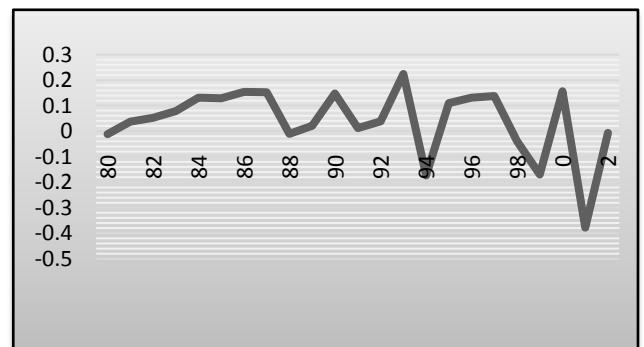
**2.2. Data**

Analyzed data was examined covering the period of January 24, 1980 to 2002. Below are graphical representations of the data for the variables and, the changes that have taken place over the years were observed.

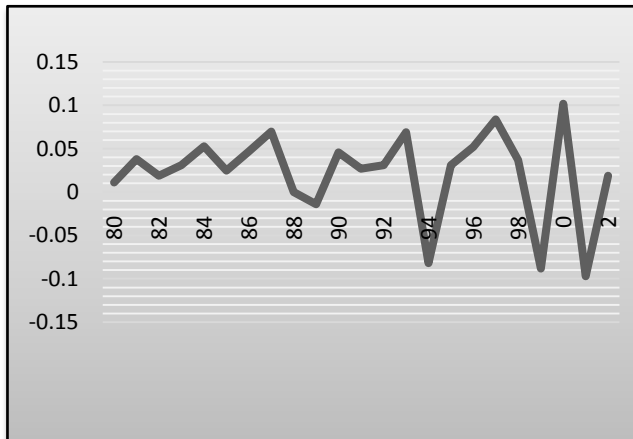
**Figure 1. GDP change rate ( dv)**



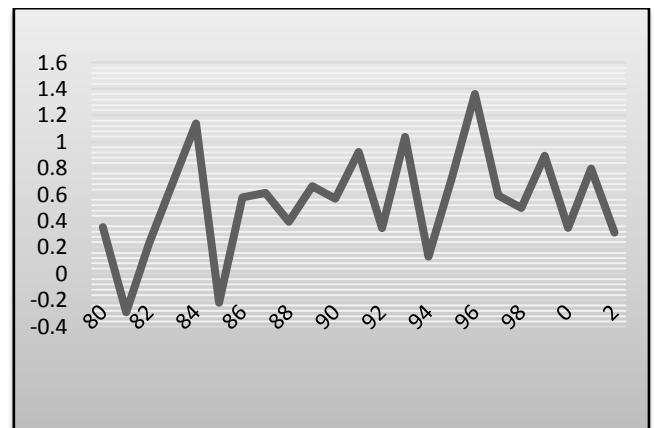
**Figure 2. Investment increase rate ( di)**



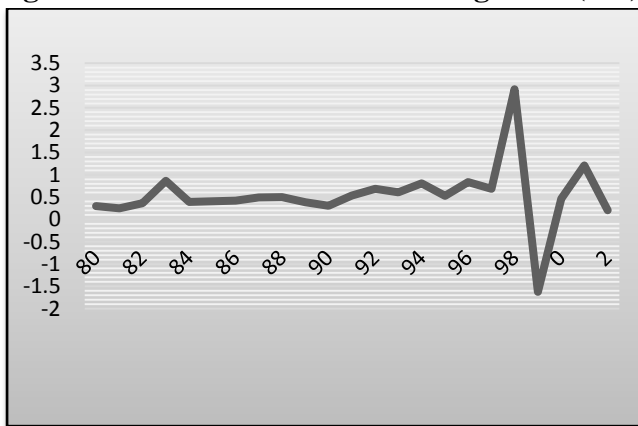
**Figure 3. Labor productivity change rate (dp)**



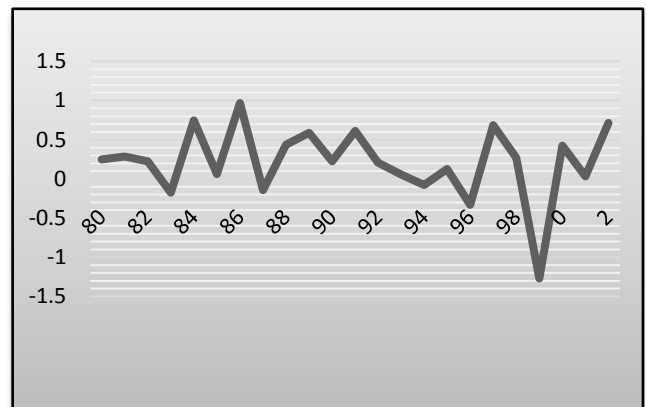
**Figure 4. Budget deficit change rate (dd)**



**Figure 5. Domestic debt stock change rate (dlb)**



**Figure 6. Foreign capital entry change rate (dfi)**



Common point that can be observed in all variables is the tendency that, the data show a change in the negative direction and the macroeconomic stabilization period is interrupted, especially with the financial crises experienced in 1994 and 1999. Observing the rest of the process, it is possible to state that the data is generally stable, even though they are not at the desired levels. In particular, the rate of change in the GDP (GDP) showed a rapid recovery in 2002 with the effects of the transition to a larger structural reform process and a significant recovery to the positive direction.

**2.3. Empirical Results**

The summary results of estimations made through the VAR model are presented in the table below (table 3).

**Table 3. VAR Model Estimation Results**

Dependent variables	Explanatory variables					
	dy	di	dp	dd	dlb	dfi
dy <sub>t-1</sub>	0,745 (0,549)	3,988 (1,256)	1,010 (0,751)	10,754 (1,617)	13,549 (0,782)	8,399 (0,898)
dy <sub>t-2</sub>	-0,253 (-0,285)	0,518 (0,250)	-0,131 (-0,149)	9,796 (2,257)	4,527 (0,400)	-1,346 (-0,220)
di <sub>t-1</sub>	0,054 (0,142)	0,134 (0,150)	-0,118 (-0,312)	-2,238 (-1,194)	-4,310 (-0,883)	1,763 (0,669)
di <sub>t-2</sub>	0,128 (0,318)	-0,286 (-0,304)	0,126 (0,317)	-2,079 (-1,055)	-0,070 (-0,013)	-2,066 (-0,745)
dp <sub>t-1</sub>	-1,316 (-1,100)	-5,018 (-1,794)	-0,917 (-0,775)	-7,186 (-1,226)	1,118 (0,073)	-13,512 (-1,640)
dp <sub>t-2</sub>	0,087 (0,076)	0,703 (0,262)	-0,115 (-0,101)	-9,781 (-1,742)	-0,196 (-0,013)	12,905 (1,634)
dd <sub>t-1</sub>	0,024 (0,530)	0,035 (0,326)	0,019 (0,434)	-0,479 (-2116)	0,056 (0,096)	0,439 (1,379)
dd <sub>t-2</sub>	0,000 (0,014)	0,015 (0,169)	0,007 (0,198)	0,018 (0,093)	0,542 (1,079)	0,432 (1,591)
dlb <sub>t-1</sub>	-0,022 (-0,823)	-0,057 (-0,893)	-0,036 (-1,331)	0,269 2,005	-0,721 (-2,062)	-0,569 (-3,012)
dlb <sub>t-2</sub>	0,028 (0,595)	0,067 (0,651)	-0,007 (-0,638)	0,006 (0,041)	0,059 (0,164)	0,004 (0,235)
dfi <sub>t-1</sub>	0,038 (0,855)	0,096 (0,928)	0,016 (0,386)	-0,114 (-0,526)	0,268 (0,474)	-0,156 -0,509
dfi <sub>t-2</sub>	0,018 (0,372)	0,041 (0,357)	0,014 (0,297)	-0,077 (-0,321)	-0,653 (-1,033)	0,113 (0,333)
Sabit	0,027 (0,660)	-0,035 (-0,357)	0,008 (0,200)	0,646 3,152	0,298 (0,558)	0,213 (0,738)
R <sup>2</sup>	0,507	0,628	0,523	0,742	0,598	0,715
F	0,686	1,126	0,733	1,920	0,991	1,679
Schwartz SC	-1,897	-0,197	-1,916	1,280	3,196	1,962
Akiake AIC	-2,543	-0,844	-2,562	0,634	2,549	1,316

1. Huber standard errors are in parenthesis.

2. The obtained Akiake (AIC) and Schwartz (SC) criteria show that, in all equations, the delay structure is correctly included in the model.

3. It points out that there is no specification error at the level of significance of 10% for the first equation used as the dependent variable and 5% for all other equations.

The positive shocks that will come to the full extent of the variables, considered to be the result of structural reforms effect GDP in an increasing direction and the economic growth moves toward a long term balance value after all the shocks. It can be implied that GDP response is unstable towards the changes of the variable observed only in labor. This is due to the fact that the processed data is mostly on annual terms. Similarly, the response of the GDP to the lagged growth variables is not in a certain way. The reason for this is, the sharp declines experienced in GDP during the period under investigation. However, even in this case, the variables are dragging GDP towards equilibrium in the long run.

While VAR models are technically very useful analytical tools, they are very sensitive to the variance in the time series used, especially in terms of statistics. For this reason the model should be subjected to a variable variance (ARCH-LM) test, as well as the *Diagnostic* tests,

ARCH-LM test is based on the estimation of a regression equation in which delayed dependent variables (the delayed values of the squares of residual terms) are used as explanatory variables. For example, if a three-period delay is predicated;

$$\xi_t^2 = \beta_1 + \beta_2 \xi_{t-1}^2 + \beta_3 \xi_{t-2}^2 + \beta_4 \xi_{t-3}^2 \quad (3)$$

Equation will be estimated.

The ARCH-LM test results are given in the table below (table 4).

**Table 4. ARCH-LM test results**

test	coefficient	possibility
F	0,227	0,798
$TR^2$	0,517	0,772

According to the two tests performed, there is no changing variability problem in the estimated equation system. The tests and the predicted model show that the long-term structural reform efforts will have lasting effects on economic growth, and that the reforms carried out will have a positive contribution to the long-run equilibrium of the economy, with some variables (budget deficit, investment level etc) to be improved.

## Conclusion

By the analysis included in the study, the macroeconomic variables that constitute the components of sustainable economic growth from January 24, 1980 to the end of 2002, when IMF-backed supply-side structural reforms started to be implemented in Turkey, were tested together for their significance during the implementation.

The existence of long-term relationships in the variables tested through the developed VAR model allows to determinate the existence of effects by structural reform implementations to the economic growth on the balance-direction process. Positive shocks in the variables mentioned in the analysis affect the long-term growth rate positively and in this direction, provide the necessary potential for sustainable economic growth.

In particular, the contraction in macroeconomic variables caused by negative shocks in 1994 and 1999 has been directed to balance in a rapidly and effectively as a result of the structural reforms, and the recent positive results recorded support the hypothesis. One of the most important reasons lying behind conclusion of this result is; It can be stated that radical structural reforms aiming the stable regulation of macroeconomic balances were embodied rapidly, especially after the 1999 negative shock. In other words;

Turkey is one of the countries that experienced only temporary mitigations applied to overcome the economic contractions created by periodic fluctuations are inadequate to sustain economic growth. For this reason, the positive development mentioned above is a consequence of the fact that fundamental structural reforms aimed at ensuring long lasting economic stability have been implemented, rather than just temporary measures to overcome periodic effects.

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