

## Co-Integration Analysis of Economic Development and Democracy: The Case of Turkey

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**Abstract:** The relationship between economic growth and democracy is a contentious issue in the literature of comparative politics and political economy. Empirical studies have reached various conclusions, depending upon the sample, data and model utilized. Furthermore there are deviations between certain countries in terms of the relationship between economic growth and democracy. Thus, country specific models have critical importance to shed light on these deviations between those different countries. In this study, we construct a co-integration model of the Turkish economy to examine the relationship between economic growth and democracy. From its very foundation, Turkey has experienced economic and political crises. However, few empirical studies have investigated the relationship between these two traits. Using co-integration analysis for the period 1955 to 2006, we seek to identify the relationship between economic growth and democracy. Our empirical results suggest that there is a long run equilibrium between economic growth and democracy in Turkey.

**Key words:** Co-integration, democracy, growth, Turkey

### INTRODUCTION

There is a great deal of literature dealing with the relationship between democracy and economic development. It can safely be argued that the possibly bi-directional relationship between democracy and economic development is one of the most popular topics both in comparative politics and political economy. However, scholars have not reached consensus about either the causal direction of the relationship or the empirical results reached regarding the relationship between economic growth and democracy. While some works find that the causal relationship flows from economic growth to democracy, others contend that democratic countries are more conducive to economic development. Other strands in the literature argue that there is no significant relationship, or there is a negative relationship rather than a positive relationship, between economic growth and democracy for both directions.

“Inconsistent modeling arguments” and “selection bias” are among the explanations cited for the ambiguous results in the literature (Brunetti, 1997; Przeworski and Limongi, 1993). In addition to these factors, cultural variations based on regional differences are also important factors (Helliwell, 1994; Krieckhaus, 2006). In other words, geographical dynamics that condition the relationship between economic growth and democracy distinguish the case of Africa from Asia or Asia from the

Western world. Moreover it is rather possible to see deviations concerning democracy-economic growth nexus for different countries (Heo and Tan, 2001). In this regard, we contend that Turkey, as a country of hybrid political-economic structure, between East and West, deserves further attention. Turkey is distinguished from many of its European counterparts not only in terms of its unstable and fragile economy but also by its political life, with regards to interruptions in freedoms and democratic governance (Aydın, 2005). However, it would be unfair not to emphasize that Turkey, at the same time, is a role model for Middle Eastern countries with its working, if imperfect, democracy (Lewis, 1994). In addition to this, with regards to economic structure, Turkey broadly deviates from rent-seeking Middle Eastern economies dependent on oil, and from patrimonial African economies. Since the beginning of the 1980’s, Turkey has adopted an economic model based on a market economy, export-oriented growth, including mostly durable consumer goods, and, to a limited extent, agricultural goods (Boratav and Yeldan, 2006; Ersel, 1991).

Turkey’s movement toward democratic consolidation and economic stability has been full of ups and downs. These suggest a symbiotic relationship between democracy and economic development. Three direct military interventions that paralyzed democratic politics in Turkey occurred in the years 1960, 1971 and 1980, respectively (Zurcher, 2004). At the same time, Turkey’s

economy has been far from stable. Crises erupting one after another at the end of the 1960's and 1970's, in 1994 and 1999 and more recently in 2001 have revealed how fragile the Turkish economy is (Akyüz and Boratav, 2002; Celasun, 1998; Ozatay and Sak, 2002). Given the strong relationship between democracy and economic growth, it is possible to claim that Turkey's dismal economic performance has caused democratic collapses in Turkish political life. Conversely, it can be asserted that political instability due to democratic deficit has led to severe economic instabilities in Turkey. Permanent tensions between elected and assigned officials in Turkish political life also have affected the economic environment of the country. However, little research has been done so far which emphasizes this politico-economic issue. Since the existence and direction of the above-mentioned relationship is still in question, we contend that an empirical investigation of Turkey as a case might shed light on these unanswered questions.

In this study, we aim to examine the long-term relationship between economic development and democracy in Turkey over the period 1950-2006 by using co-integration analysis based on Johansen methodology. A number of prior studies deal with the relationship between democracy and economic development in Turkey. Covering the years 1950-1982, Heo and Tan (2001), for instance, show that there is a bi-directional relationship between economic development and democracy. A study conducted by Başar and Yıldız (2009) indicates that while the aforementioned two variables are related in the long run, this relationship disappears in the short run. We contribute to the existing literature by extending the time period previously examined and using more robust indices than those that have been utilized so far.

**A theoretical introduction: Unraveling the puzzle of democracy and economic development:** Many studies attempt to theorize the puzzling relationship between democracy and economic development. A great deal of cross-sectional research investigates the relationship between economic development and democracy: Does economic development cause democracy, or does democracy cause economic development? Multiple theoretical explanations have been proposed. Some of these find that one variable directly impacts the other; others identify an indirect relationship between the two variables, positing instead that other intervening or conditioning variables affect the relationship.

In this section, we try to demonstrate the above-mentioned direct and indirect association for both the relationship flowing from economic development to democracy, and from democracy to economic development. The literature on the possible association of economic development and democracy is as old as political economics itself. Drawing from modernization

theories, assumptions about the robustness of the relationship between economic development and democracy are still prevalent in the literature. Dating back to Lipset (1959), economic development has been well documented as one of the most important determinants of democratic transition. Lipset's argument retains validity in more recent studies (Epstein *et al.*, 2006).

Theoretical explanations abound regarding why and how economic development affects or leads to democracy. The literature suggests that changes consequent to economic development lead to a myriad of social changes and political transitions, eventually leading to democracy. The emergence of the middle classes and increase in educational opportunities are two important intervening variables emphasized in the literature in explaining economic growth (Lipset, 1959; Lipset, 1994). Secondly, rising democratic demands from the working classes is another important factor emphasized in some studies (Huber *et al.*, 1993; Rueschemeyer *et al.*, 1992; Landman and Dellepiane, 2008). Thirdly, transformations in the allocation of "land, income, and capital" (Vanhanen, 1997; Boix, 2003; Boix and Stokes, 2003 cited in Landman and Dellepiane, 2008) are identified as factors consequent to economic development that eventually lead to democracy. Lastly, it should be noted that a political culture conducive to democracy is also cited as consequence of economic development (Putnam *et al.*, 1993)

Another string of literature deals with the reverse causality flowing from democracy to economic development, offering multiple theoretical explanations. There are two major insights in this literature. The first point of view argues that democracy and growth are compatible; the second standpoint contends that democracy hinders economic growth. Beginning with the first insight, there are multiple causal paths explaining the relationship. While some of these emphasize the direct impact of democracy on economic growth, others argue that there is an indirect impact. One of the most fundamental factors generally underlined in the literature is that political freedoms guarantee property rights and market competition (Leblang, 1996; Riker and Weimer, 1993). Bueno de Mesquita *et al.* (2001) and Olson (1993) suggest that autocratic regimes are not conducive to economic growth in the long run since they carry the elements of arbitrariness in the sense that autocrats are not subject to any checks and balances in their acts. In contrast, democratic competition is generally associated with transparency in the policy-making process (Wittman, 1989). Democratic institutions compared to any other form of non-democratic institutional framework are another critical factor facilitating economic growth in terms of their performance (North, 1989; North, 1990). The opposing view- that democracy is an obstacle to economic development-is also known as the "Lee thesis" (Sen, 1999). The Lee thesis argues that democracy, by

providing political and civil rights, leads to social instability that eventually obscures economic development (Sen, 1999). In line with this approach, O'Donnell (1973) maintains that in many nations, especially Latin American ones, economic growth could be achieved under the autocratic regimes. Other studies have maintained that demands coming from disadvantaged groups for economic redistribution would harm investment, leading to decline in economic growth (Keech, 1995; Persson and Tabellini, 1994). Similarly, Huntington (1968) emphasized the devastating impact of economic demands coming with political rights granted to the people. There are some more arguments, which build on the negative impact of democracy. While Olson (1982) contends that there is a possible problem of "rent-seeking" interest groups, Nordhaus (1975) draws our attention to the economic compromises given in return for short-term "electoral" benefits (Quinn and Woolley, 2001).

**Literature review of empirical studies of the relationship between economic development and democracy:** Not only has the economic growth-democracy link been extensively theorized, it has also been empirically tested. There are ample empirical studies, which investigate the relationship between economic development and democracy. While some of these studies focus on the impact of economic development on democracy, others investigate the effect of democracy on economic development.

**Impact of economic development on democracy:** There are plentiful empirical works dating back to Dahl (1971) that probe the impact of economic development on democracy. Employing per capita GNP as a proxy for economic development, Dahl (1971) found that "economic development between 700 and 800 1957 US dollars" is typical of polyarchies (Landman, 2003). Examining the association between economic development and democracy for 60 noncommunist countries in 1960, Jackman (1973) used cross-sectional analysis to determine that the curvilinear relationship, emphasizing the idea of a democratic threshold, is more significant than the linear relationship. He found that a certain level of economic development is a necessary condition to sustain democratic development. Subsequent studies endorsed the non-linearity argument in a similar line. However, overall, the relationship between economic development and democracy has been demonstrated as an empirically robust one. Bollen (1983), Bollen and Jackman (1985), Brunk *et al.* (1987), Burkhart and Lewis-Beck (1994) and Barro (1999) all have shown that economic development is an important determinant of democracy.

Despite these empirical claims, counter arguments and ambiguities persist. Helliwell's (1994) statistical

analysis, too, reveals that a strong positive effect of per capita income on the level of democracy; however, his analysis shows that while economic development has positive effects for the OECD countries and Latin America, it has negative effects for Africa and the Middle East. Muller (1995), using cross-national data from a sample of 58 countries, investigated the relationship between economic development and level of democracy with focus on the impact of income inequality; he reported, "intermediate levels of economic development are associated with the highest levels of income inequality" (Muller, 1995). From this point, he argued that "the independent negative effect of income inequality" explicate the decrease of democracy in "middle-income" nations (Muller, 1995). Glasure *et al.* (1999), in their analysis of the period 1972-1990, argue that there is a "trade off" between economic development and democracy (Glasure *et al.*, 1999). Glasure *et al.* (1999) concluded that economic development has a significant negative effect on democratic performance in the developing and underdeveloped semi-periphery and periphery countries, while there is "no linkage" between economic development and democracy for the core developed countries (Glasure *et al.*, 1999). Minier (2001) examined the linkage between income level, as an indicator of economic development, and democracy and underlined that the demand for democracy goes hand in hand with the level of income per capita up to a certain income threshold (about \$5000), after that point it diminishes. Recently, comparing 135 countries between 1950 and 1990, Przeworski and Limongi found that economic growth does not lead to further democratization (or democratic transition), but it does inhibit democratic collapse (Przeworski and Limongi, 1997). This study casts serious doubt on significant statistical evidence in support of a relationship between economic development and democratic transition. In other words, it suggests that certain levels of economic development help to sustain existent democracies rather than triggering democratic transition. Recently, Robinson (2006), using an elaborate statistical model, concluded that there is no sign of a causal relationship between economic development and democracy, even though they are highly correlated.

**Impact of democracy on economic development:** A good number of empirical studies investigate the reverse connection- the impact of democracy on economic development- since the end of the 1960's (Kurzman *et al.*, 2002). Leblang (1996), using time series cross-national data from 1960 to 1990, reported that property rights have a positive and statistically significant impact on economic growth. With his work, Leblang (1996) not only theoretically but also empirically demonstrated that countries protecting property rights are more inclined to economic growth than those that do not, and that democratic societies tend to protect property

rights in a more efficacious way than other types of governments (Leblang, 1996). Feng (1997) investigated the interactions between democracy, political stability and economic growth, using three-stage least-squares estimation, and including 96 countries between the years 1960 to 1980. Results of this study clearly show that “democracy has a positive indirect effect upon growth through its impacts on the probabilities of both regime change and constitutional government change from one ruling party to another” (Feng, 1997). In addition, the evidence indicates, “long-run economic growth tends to exert a positive effect upon democracy” (Feng, 1997; Barro, 1997), on the other hand, found that there is a non-linear relation between democracy and economic development by showing that democracy has an impact on democracy only up to a certain level. After that point, the relation between democracy and growth turns negative.

Tavares and Wacziarg (2001) examine the empirical relationship between democracy and economic growth and assume that institutions could have various effects upon growth in several ways. Results of this study “suggest that democracy fosters growth by improving the accumulation of human capital and, less robustly, by lowering income inequality” (Tavares and Wacziarg, 2001). However, in this study, democracy hampers economic growth by “reducing the rate of physical capital accumulation and, less robustly, by raising the ratio of government consumption to GDP” (Tavares and Wacziarg, 2001). Once all of these indirect effects are accounted for, “the overall effect of democracy on economic growth is moderately negative” (Tavares and Wacziarg, 2001). Barro (1996) investigates the effect of democracy on economic growth using approximately 100 countries between the years 1960-1990 and concludes “the overall effect of democracy on economic growth is weakly negative” (Glasure *et al.*, 1999). Similarly, Rodrik (1997) argues that there is not a “determinate relationship between democracy and growth” (Rivera-Batiz, 2002).

**Data and Variables:** The two main variables of this study are economic growth and democracy. We represent the economic growth rate by using the constant value of Gross Domestic Product (GDP) measured in the local currency. Economic development is proxied by the percentage of yearly change in economic growth of Turkey. Data for constant value GDP was obtained from Turk Stat ([www.tuik.gov.tr](http://www.tuik.gov.tr)). The democracy data were extracted from the Polity IV dataset (Marshall and Jaggers, 2002). The Polity IV index ranges from -10 to +10. While -10 refers to “hereditary monarchy”, +10 denotes “consolidated democracy” (Marshall and Jaggers, 2002). The Polity 2 score, which is calculated by extracting democracy scores from autocracy scores, is selected as the proxy of democracy. Using the time period 1955-2006 for Turkey, this study aims to examine the

long-term and causal dynamic relationships between the level of democracy and economic growth. In addition to all these, we created four dummy variables for the years, 1971, 1980, 1994 and 1999 in order to ensure model fit.

## MATERIALS AND METHODS

This study aimed to examine the long-term relationship between democracy and GDP growth in Turkey between 1955 and 2006. Using co-integration and Vector Error Correction Model (VECM) procedures, we investigated the relationship between these two variables. The likely short-term properties of the relationship among economic development and democracy were obtained from the VECM application. Next, unit root, VAR, co-integration and Vector Error Correction Model (VECM) procedures were utilized in turn.

The first step for an appropriate analysis is to determine if the data series are stationary or not. Time series data generally tend to be non-stationary, and thus they suffer from unit roots. Due to the non-stationarity, regressions with time series data are very likely to result in spurious results. The problems stemming from spurious regression have been described by Granger and Newbold (1974). In order to ensure the condition of stationarity, a series ought to be integrated to the order of 0 [I(0)]. In this study, tests of stationarity, commonly known as unit root tests, were adopted from Dickey and Fuller (1979, 1981). As the data were analyzed, we discovered that error terms had been correlated in the time series data used in this study. Thus, Augmented Dickey-Fuller (ADF) tests were used to correct the problem stemming from unit roots. The ADF tests equations are given below:

$$\Delta y_t = \phi_t - 1 + \alpha_i \sum_{i=1}^m \Delta y_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta y_t = \beta_1 + \phi_t - 1 + \alpha_i \sum_{i=1}^m \Delta y_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta y_t = \beta_1 + \beta_2 t + \phi_t - 1 + \alpha_i \sum_{i=1}^m \Delta y_{t-1} + \varepsilon_t \quad (3)$$

Once the number of unit roots in the series was decided, the next step before applying Johansen’s (1988) co-integration test was to determine an appropriate number of lags to be used in estimation.

**Model specification tests:** A number of studies exemplify selection of an adequate lag order when the vector autoregressive model is under the restrictions of co-integration. Methods generally advocated in the literature are information criteria such as Akaike (AIC), Schwarz (SC) and Hannan-Quinn (HQ) and Forecast Prediction Error. Eviews 5.1, econometric software that

provides different lag selection criteria and options, was employed for this study. Lag length was used as suggested by most of the available criteria and we subsequently tested for existence of any autocorrelation with the chosen lag length. If the chosen lag length did not have any problems stemming from autocorrelation, then this confirmed that the selected lag specification was appropriate for the data used. Using this lag-length, we also performed the test for normality and stability in the VAR to make sure that none of them violates the standard assumptions of the model. To this end, the Jarque-Bera test for normality and the unit circle test for stability were utilized in turn. The next step in the analysis was testing for co-integration between series. If time series variables were non-stationary in their levels, this showed that their first differences are stationary.

**Co-integration tests:** The presence of co-integration is evidence of a long-run equilibrium relationship between the series, democracy and economic growth. The Johansen method applies the maximum likelihood to decide the presence (or absence) of co-integrating vectors in a non-stationary time series. The idea of co-integration testing in the study of time series data stems from the works of Engle and Granger (1987). Building on the work of Engle and Granger (1987), Johansen (1988), Johansen and Juselius (1990) and Johansen (1994) developed a maximum likelihood approach to estimate co-integration vectors for an autoregressive process. In this study, we employ the VAR based co-integration test, drawing from the methodology developed in Johansen (1988, 1994).

A  $p$ -dimensional vector autoregressive (VAR) process can be expressed as follows:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \dots + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi Z_{t-k} + \epsilon_t \quad (4)$$

$$\Pi = \sum_{i=1}^p A_i - I \nu \varrho \quad \Pi = - \sum_{j=i+1}^p A_j \quad (5)$$

According to equilibriums (4) and (5),  $\Delta$  stands for the first-difference operator,  $\epsilon_t$  represents the error term,  $\Gamma$  symbolizes matrices of parameters, and  $\Pi$  is a  $(p \times p)$  order which contains information about long-run relationships among the variables. On the condition that the coefficient matrix  $\Pi$  has reduced order  $r < p$ , there are  $p \times r$  matrices  $\alpha$  and  $\beta$  each with order  $r$  such that  $\Pi = \alpha \beta'$  and  $\beta' y$  is stationary. In addition,  $r$  is the number of co-integrating relationships, while the elements of  $\alpha$  symbolize the adjustment parameters in the vector error correction model; each column of  $\beta$  stands for a co-integrating vector (Johansen, 1991).

In developing this method, Johansen (1995) proposed two types of log-likelihood ratio tests, the trace test statistics and the maximum eigenvalue test statistics, to find out the number of co-integrating vectors  $r$  in the Vector Error-Correction Model (VECM). The VECM

model can be thought of as a particular case of VAR imposing co-integration on its variables against the alternative hypothesis of  $r$  or more co-integrating vectors; the null hypothesis of the trace statistics is that there are at most  $r$  co-integrating vectors. Similarly, the maximal eigenvalue statistics tests test for  $r$  co-integrating vectors, as opposed to the alternative of  $r+1$  co-integrating vectors.

In the next step, if the variables are found to be co-integrated, VECM can be estimated. The VECM model has been drawn from the Johansen-Juselius' (1990) methodology for determining long-run relationships between the variables investigated. The VECM model basically enables us to difference between short term and long-term dynamic relationships. Furthermore, VECM is based on the hypothesis that the coefficients of lagged variables and the error correction terms in the co-integrating regression are zero.

Equation (4) can be reformulated into a VECM and expressed as such:

$$\Delta Z_t = C + \Gamma_1 \Delta Z_{t-1} + \dots + \Gamma_{k-t} \Delta Z_{t-k+1} + \Pi Z_{t-k} + \epsilon \quad (6)$$

Existing theory implies that the error-correction term must be either negative or significantly different than zero. The coefficient of the error-correction term measures the speed of adjustment toward long-run equilibrium relationship. The coefficients of the error correction terms stand for the magnitude of change for one unit departure from the long-run equilibrium or disequilibrium path. A negative coefficient on the error-correction term indicates that there is a tendency to move back toward the long-run equilibrium.

## RESULTS AND DISCUSSION

**Statistical findings:** Before presenting the empirical results of this study, specification tests require statistical determination of stationary and lag lengths. The results of these specification tests will be presented and discussed below. Moreover VAR, co-integration test results and vector error correction mechanisms will be presented in the following pages.

First, as mentioned above, it is crucial to detect whether the series are stationary or not. Hence, unit root tests, which examine the integration properties of the variables, are necessary before estimating the co-integrating equations. The Augmented Dickey-Fuller (ADF) test was used to determine the stationarity of the series used in this study. The results obtained from the unit root test suggest that the series are stationary since the null hypothesis of the unit root presence can be rejected. Table 1 provides the results of the ADF and shows that these two variables are all  $I(0)$  series. The next step was determining an appropriate number of lags to be used in estimation, since the choice of lag length is crucial

Table 1: ADF unit root tests

Variables	ADF test statistic	Probability	Critic values		
			%1	%5	%10
Growth	-8.275174	0.0000	-3.562669	-2.918778	-2.597285
Democracy	-3.666390	0.0075			

Table 2: Selection of appropriate lag length

Lag	FPE	AIC	SC	HQ
0	167.3050	10.79406	11.18389	10.94137
1	77.01303	10.01554	10.56131*	10.22179
2	72.15654*	9.945613*	10.64731	10.21079*
3	84.33656	10.09400	10.95163	10.41810
4	90.30826	10.15126	11.16483	10.53429

\*: Shows appropriate lag lengths for the each criterion.

in the Johansen procedure. Table 2 reports the appropriate lag length selected in accordance with Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ).

As reported in Table 2, while Final Prediction Error (FPE), Akaike Information Criterion (AIC) and Hannan-Quinn information criterion (HQ) suggest that the appropriate lag length for the model is “2”, Schwarz information criterion (SC), on the other hand, suggests that the appropriate lag length is “1”.

In addition to the above-mentioned procedures, we also applied a number of diagnostic tests to the residuals of the model. We employed the Lagrange multiplier (LM) for the residuals’ autocorrelation, the stability test and the Jarque- Bera normality test to make sure that none of these violated the standard assumptions of the model. When the number of lag length was decided to be “1”, it was detected that there would be deviations from normality and stability. Thus, lag length was determined as “2” which appeared to be more conducive to our model.

In Table 3, the Lagrange multiplier (LM) test did not reject the null hypothesis of no autocorrelation for lags between 1 and 4, since the probability values were more than 5%; thus, lagged residuals are jointly significant. Our results show that there was not a serial correlation in our model.

To test normality, we checked the skewness and the kurtosis of the model. We employed the Jargue-Bera test as a check. The residuals of the variables, as can be seen from Table 4, in the model were characterized by skewness -0.62 and 0.52; kurtosis 2.92 and 3.70; the Jarque-Bera test 8.10; and probability 0.08. Therefore, normality conditions in our model were satisfied and it did not reject the null hypothesis of normality.

To determine stability, the location of eigen values within the unit circle, as displayed in Fig. 1, was examined. Since all eigen values of the model lay within the unit circle, the VAR model satisfies a stability condition.

Table 3: The results of the Lagrange Multiplier (LM) autocorrelation test

Lags	LM-Stat	Probability
1	10.25130	0.0564
2	7.314929	0.1202
3	3.312764	0.5069
4	1.612800	0.8065
5	6.873139	0.1427
6	1.902254	0.7537
7	11.40423	0.0724
8	4.111989	0.3911
9	6.022094	0.1975
10	15.14445	0.0444
11	4.555315	0.3360
12	2.194217	0.7001

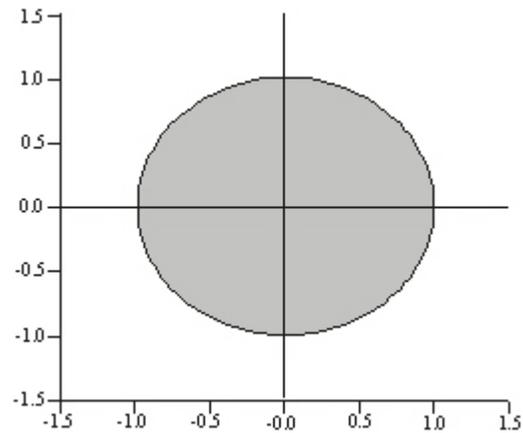


Fig. 1: Inverse roots of AR characteristic polynomial

To analyze whether a long-term equilibrium relationship exists between GDP growth and democracy, we used a co-integration technique based on Johansen’s (1988) and Johansen and Juselius’s (1990) co-integration methodology. Table 5 provides Johansen co-integration test results. The first column of the graph in Table 5 illustrates the null hypothesis  $H_0$ , denoting that there is at least zero and at most one co-integration relationship; the second column shows the eigenvalue; the third and fourth columns point out trace statistics and critical value at 5% significance levels in turn; the fifth column gives Max-Eigen statistics; and the last column represents the critical value at 5% significance level.

Table 4: Normality test results

Component	Skewness	$\chi^2$	df	Probability
1	-0.622581	3.580392	1	0.0585
2	0.526386	2.637329	1	0.1044
Joint		6.217721	2	0.0447
Kurtosis				
1	2.927501	0.996128	1	0.3182
2	3.705069	0.894784	1	0.3442
Joint		1.890913	2	0.3885
Jarque-Bera				
1	4.576520		2	0.1014
2	3.532113		2	0.1710
Joint	8.108633		4	0.0877

Table 5: Johansen co-integration test

Hypothesized no. of CE(s)	Eigenvalue	Trace statistic	0.05 Critical value	Max-eigen statistic	0.05 Critical value
H0 : r = 0	0.393282	41.27071	15.49471	24.48488	14.26460
H0 : r ≤ 1	0.290055	16.78583	3.841466	16.78583	3.841466

Table 6: Restricted estimation of co-integrating and adjustment coefficients

Normalized co-integrating coefficients $\beta$	Co-integrating Eq. (1)
Growth	1.000000
Democracy	-2.769844
Adjustment coefficients $\alpha$	
$\Delta$ Growth	-0.041116
$\Delta$ Democracy	0.187308

Table 7: Vector error correction model

Variables	$\Delta$ Growth <sub>t</sub>	$\Delta$ DEM <sub>t</sub>
$\Delta$ Growth <sub>t-1</sub>	-0.761203	-0.141589
$\Delta$ DEM <sub>t-1</sub>	-0.257027	0.237939
$\Delta$ Growth <sub>t-2</sub>	-0.281827	-0.031806
$\Delta$ DEM <sub>t-2</sub>	-0.088206	0.052553
D1	1.180416	-9.780047
D2	-5.262802	-12.57888
D3	-12.15567	0.261305
D4	-13.83849	-0.669480
ECT <sub>t-1</sub>	-0.041116	0.187308

According to the test results, trace and max-eigen statistics fall below the critical value at 5% significance level. Thus the null hypotheses that there are no co-integrating equations can be denied. Trace and maximum-eigen value tests jointly illustrate that there is at most one co-integrating equation when the significance level is 5%.

The restricted estimation of co-integrating and adjustment coefficients is displayed in Table 6. The normalized equation shows that there is a positive correlation on a long-run relationship between GDP growth and democracy.

The Vector Error Correction Model (VECM) estimation results obtained from equation 6 are given in Table 7. The VECM model also includes dummy variables to fix diagnostic test results. The coefficients of ECT<sub>t-1</sub> contribute the adjustment of  $\Delta$ GROWTH<sub>t</sub> and  $\Delta$ DEM<sub>t</sub> for long-run equilibrium between economic growth and democracy.

According to Table 7, the coefficient of the error-correction term is negative and statistically significant. In the event of a one-unit deviation from long-run GDP

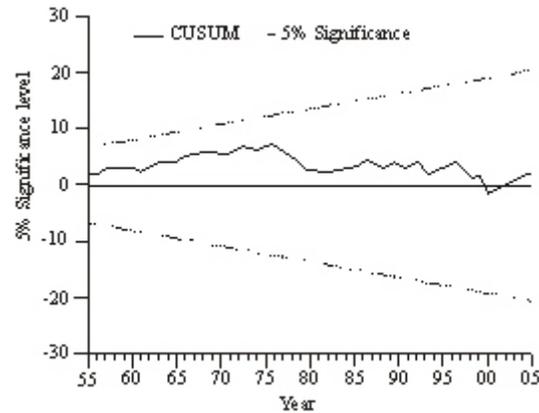


Fig. 2: CUSUM (the cumulative sum of residuals) for GDP growth

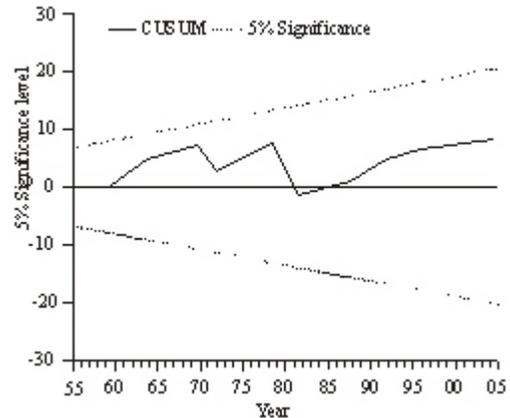


Fig. 3: CUSUM (the cumulative sum of residuals) for democracy

growth, there is a correction of approximately 4% in the subsequent time period.

To test for parameter stability, we took the cumulative sum of residuals (CUSUM) into account. As can be seen in Fig. 2 and 3, 5% significance lines used as

limitations are not exceeded for either GDP growth or democracy scores. Therefore, it can be safely argued that there is no structural break during the period investigated.

### CONCLUSION AND RECOMMENDATION

This study investigated whether there is a relationship between economic development and democracy in long run. To put it in a more provocative way, we investigated the linkage between political and economic parameters. Considering the data covering the period 1955-2006, our statistical analysis based on Johansen co-integration estimation methodology suggests that there exists a significant, relationship between democracy and economic growth. In other words, this analysis shows that economic growth and democracy are co-integrated. Hence, our analysis lends support to the proposition that democracy is an important indicator for economic development in Turkey and there is long run equilibrium between these two variables. This finding also hints that there might be a causality relationship between these two variables. Future studies may examine the causal direction of these two traits as well as adding other factors besides democracy that have possible impacts on economic development for Turkey

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